Proceedings of the 7th Annual International Seminar on
Transformative Education and Educational Leadership

20 September 2022, Medan, North Sumatera Province, Indonesia

AISTEEL 2022

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Preface

We are delighted to introduce the proceedings of the seventh Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2022) was held by virtual seminar on 20 September 2022. This seminar is organized by Postgraduate School, Universitas Negeri Medan and become a routine agenda at Postgraduate School of Unimed now. The AISTEEL is realized this year with various presenters, lecturers, researchers and students from universities both in and out of Indonesia participating in, the seminar with theme “Technology and Innovation in Educational Transformation”.

The 7th AISTEEL presents 4 distinguished keynote speakers from Universitas Negeri Medan - Indonesia, Murdoch University-Australia, Curtin University Perth-Australia, University Malaya – Malaysia, Monash University - Australia, and Tampere University of Applied Sciences, Finland. In addition, presenters of parallel sessions come from various Government and Private Universities, Institutions, Academy, and Schools. Some of them are those who have sat and will sit in the oral defence examination. The plenary speakers have been present topics covering multi disciplines. They have contributed many inspiring inputs on current trending educational research topics all over the world. The expectation is that all potential lecturers and students have shared their research findings for improving their teaching process and quality, and leadership.

There are 287 articles submitted to the committee including short and full paper type. Some of which are presented orally in parallel sessions, and extended abstract form. All participants in the presenter form divide to 15 parallel rooms. The articles have been reviewed by double blind reviewer and 162 of them were accepted to be published by EAI indexed by International Indexation.

The Committee of AISTEEL invest great efforts in reviewing the papers submitted to the conference and organizing the sessions to enable the participants to gain maximum benefit.

Grateful thanks to all of members of The 7th Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2022) for their outstanding contributions. Thanks also given to the EAI publishing for producing this volume.

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The Effectiveness of Animal Physiology Textbook Based on Higher Order Thinking Skills

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{purbaindrajaya@gmail.com¹, melvasilitonga2013@gmail.com², idramsya@unimed.ac.id³}

The Biology Education Study Program of Postgraduate School of Universitas Negeri Medan, Indonesia 2022¹,²,³

Abstract. The aim of this study was to determine the effectiveness of animal physiology textbook based on higher order thinking skills. Type of this research was quasi experiment. The design used was pretest-posttest control group design. For experimental group, learning process used animal physiology textbook based on higher order thinking skills meanwhile control group used electronic book or journal of animal physiology. Hypothesis was tested by t-test used SPSS 16.0 software program. The post-test result showed that the average score in experimental group (71.19) was higher than control group (55.67) with p-value (0.000) < α (0.05). H₀ was rejected and H₁ was accepted. Students' higher order thinking skills in experimental group was significant higher than control group. N-gain result in experimental group was 0.59 in the category of “Good”. It can be concluded that the effectiveness of animal physiology textbook based on higher order thinking skills was good.

Keywords: Animal Physiology, Higher Order Thinking, Textbook

1 Introduction

The higher education curriculum that refers to the Indonesian National Qualifications Framework (KKNI) in its preparation must meet the National Education Standard (SNP). Permendikbud No.3 of 2020 states that the National Standard of Education (SNP) is a minimum criterion for learning at the higher education level that must be met by all universities in Indonesia. One that is included in the national standard of higher education, namely the standard of learning facilities and infrastructure. This standard contains minimal criteria related to content needs and processes to achieve learning goals. In this case, the teaching book becomes one of the standards that must be met.

According to [7], teaching books are media containing learning materials that are systematically arranged for the purposes of the teaching and learning process. The teaching book is compiled by lecturers who study courses in accordance with the field of science they master. The use of teaching books is expected to accommodate students' learning difficulties so that writing is arranged with flexible learning patterns according to student needs. In addition, the writing style
is also communicative and well organized, uses standard language in accordance with scientific writing rules, has an adequate and complete depth of learning materials, and can build student motivation to learn independently. Teaching books as teaching materials are one of the important components in the learning process so that in its application it becomes the most frequently used media [2][6].

Teaching books become a necessity in various universities to assist students in completing lecture assignments, as well as achieving learning goals and competencies of graduate achievements in accordance with the curriculum and national standards of education. Students who will graduate as undergraduates are required to have general skills, namely being able to apply or develop science and technology through logical, critical, systematic, and innovative thinking in accordance with their field of expertise. Competence in national standards of education is closely related to the competencies needed in the 21st century or namely critical thinking ability, creativity, communication, and collaboration.

According to [10], one of the skills that are important to develop and is part of the goals of the education system today is the ability to think critically. Students who have critical thinking skills will be able to solve various contextual problems, especially those related to the development of animal physiology using critical and rational thinking logic. To achieve these goals, a learning process needs an evaluation based on higher order thinking skills (HOTS). Therefore, the development of teaching books based on higher order thinking skills is believed to be effective in improving the high-level thinking skills of students [5].

The development of animal physiology textbooks based on higher order thinking skills is presented in the preparation of tasks and exercise questions in teaching books. The components of HOTS in the teaching book are in accordance with bloom taxonomy revisions by [1] which are related to the ability to analyze, evaluate, and create.

The use of teaching books based on higher order thinking skills can result in productive learning activities. Students can be able to associate, manipulate, and transform their knowledge and experience with critical thinking patterns [8]. This is in line with what [3] stated the learning process can run optimally with a good teaching book accompanied by an evaluation system that can improve students' high-level thinking skills. Teaching books that can lead students to high-level thinking skills contain questions that invite students to analyze, evaluate, and create. The components of HOTS in teaching books can create effective learning to improve students' high-level thinking skills [9]. This study aims to find out the effectiveness of animal physiology textbooks based on higher order thinking skills in improving students' higher order thinking skills.

2 Research Method

This research has been conducted in Biology Education Program at Medan State University. The population was all the fifth semester undergraduate students who were taking Animal Physiology course in the year of 2021. Sample consisted of 2 groups selected randomly, class A of Biology Education Study Program as experimental group (n = 21 students) and class C of Biology Education Study Program as control group (n = 18 students).
Type of this research was quasi experiment. The design used was pretest-posttest control group design. The design was represented as: O1 X O2 with O1 representing the pretest, X representing the treatment implemented, and O2 representing the posttest. The experimental class and the control class were given a pretest with the same questions first. Then, given treatment in the form of learning animal physiology for 7 weeks or 14 meetings. In the experimental class, the learning process used animal physiology textbooks based on higher order thinking skills. The materials taught was 5 chapters sourced from the textbook, namely Chapter VII Nervous System, Chapter VIII Endocrine System, Chapter IX Excretory System, Chapter X Osmoregulation and Thermoregulation, and Chapter XI Bioluminescence. Meanwhile, in the control class, the learning process was carried out with the same material as in the experimental class, but by using a journal or e-book of animal physiology. After the treatment was completed, a posttest was conducted with the same questions as the pretest.

The data used in this study was quantitative data derived from the results of pretest and posttest. Multiple choices and essays test were the instruments for data collection. Hypothesis was tested by t-test used SPSS 16.0 software program In order to undertake hypothesis testing, the researcher expressed the research hypothesis as a null and alternative hypothesis. The null hypothesis and alternative hypothesis are statements regarding the differences or effects that occur in the population. The level of statistical significance or the probability (i.e., the p-value) of observing the sample results given is determined to express that the null hypothesis is true. However, the statistically significance chosen was 0.05. There was a 5% or less chance (5 times in 100 or less) that the difference in the mean exam performance between the two teaching approaches is as different as observed given the null hypothesis is true. If the p-value is less than (or equal to) 0.05, the null hypothesis is rejected and alternative hypothesis is accepted. If the p-value is greater than 0.05, the null hypothesis is accepted and alternative hypothesis is rejected. The hypothesis is as follows:

**H0 :** Students’ higher order thinking skills in the class of using animal physiology textbook based on higher order thinking skills was significant lower than students’ higher order thinking skills in the class of using journal or e-book of animal physiology.

**Ha :** Students’ higher order thinking skills in the class of using animal physiology textbook based on higher order thinking skills was significant higher than students’ higher order thinking skills in the class of using journal or e-book of animal physiology.

Data was also analyzed by N-gain test. It is used to determine the achievement of students’ higher order thinking skills from before and after the learning process. The formula of N-gain test is as follows:

\[
N\text{-gain} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Maximum Score} - \text{Pretest Score}}
\]

The results of N-gain are classified into 3 categories as shown in Table 1. A good level of effectiveness if the N-gain value is greater than 0.40.
Table 1. Classification of N-gain [4]

<table>
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<th>Gain Score</th>
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<tr>
<td>$g &gt; 0,70$</td>
<td>High</td>
</tr>
<tr>
<td>$0,30 \leq g \leq 0,70$</td>
<td>Medium</td>
</tr>
<tr>
<td>$g &lt; 0,30$</td>
<td>Low</td>
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3 Result and Discussion

The average score of pretest in the experimental class was $29.43 \pm 8.76$ and is not different from the control class, which was $28.72 \pm 6.94$. However, after the learning process by using Animal Physiology textbook based on higher order thinking skills, the average score of posttest in the experimental class was $71.19 \pm 9.14$. It was higher than the average score of posttest in the control class used journals or e-books, namely $55.67 \pm 6.83$. Pretest and posttest score both in experimental class and control class can be seen in Figure 1.

![Fig. 1. The Average Score of Pretest and Posttest in Experimental Class and Control Class](image)

T-test was conducted by using pretest and posttest data. The result of t-test can be seen in Table 2. The pretest score in the control class and the experimental class were not significantly different ($p > 0.05$). This shows that there is no significant difference between students’ higher order thinking skills in the control class and experimental class before the lesson is implemented. After the learning process is carried out in both classes, then a posttest is carried out in the form of a higher order thinking ability test. The test results were then tested by t-test (Table 2). $H_0$ is rejected and $H_a$ is accepted. The result of the t-test shows that students’ higher order thinking skills in the experimental class is significantly higher than the control class. In other words,
learning using animal physiology textbooks based on higher order thinking skills is more effective than learning using journals or e-books.

### Table 2. T-test

<table>
<thead>
<tr>
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<th>Class</th>
<th>$\alpha$</th>
<th>Sig. t (p-value)</th>
<th>Conclusion</th>
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<tr>
<td>Pretest</td>
<td>Control</td>
<td>0,05</td>
<td>0,784</td>
<td>There is no significant difference</td>
</tr>
<tr>
<td></td>
<td>Experiment</td>
<td>0,05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>Control</td>
<td>0,05</td>
<td>0,000</td>
<td>There is a significant difference</td>
</tr>
<tr>
<td></td>
<td>Experiment</td>
<td>0,05</td>
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Data was also analyzed by N-gain test. The result of N-gain test can be seen in Figure 2. Based on data analysis, the average N-gain score in the experimental class was $0.59 \pm 0.13$ and higher than the N-gain score in the control class, which was $0.38 \pm 0.09$. The result of the acquisition of N-gain in the experimental class and control class are in the medium category.

![Fig. 2. N-Gain Score in Experimental Class and Control Class](image)

The result of N-gain score was analyzed by the category of higher order thinking skills (analyzing, evaluating, creating) that is shown in Figure 3. The results of the N-gain test based on the category of higher order thinking skills shows that the ability to analyze, evaluate, and create in the experimental class are higher than the ability to analyze, evaluate, and create in the control class. This shows that the Animal Physiology textbook based on higher order thinking skills is effective in improving students' higher order thinking skills. According to [4], the level of effectiveness is good if the N-gain score is greater than 0.40 ($N$-gain > 0.40). The average N-gain score in all categories in the experimental class ($0.59$) is greater than 0.40 and is included in the category of good meanwhile the average N-gain score in all categories in the control class is lower than 0.40 and is included in category of not good.
The effectiveness of a developed textbook was tested by conducting the learning process using animal physiology textbook based on higher order thinking skills. The textbook was used as a learning source for students. Learning activities in the classroom used an active learning method that asked students to think at high levels, namely analyzing, evaluating, and creating, based on the tasks and exercises presented in the textbook. Students were actively asked to solve the problems presented in the exercise and connect it to the learning concepts. In addition, students were also asked to discuss the materials contained in the textbook critically in their group discussion. Then, they presented it in the class. Through those activities, the ability of critical thinking and problem solving which are the parts of the process to cultivate the students’ higher order thinking skills can be improved. This is in line with what [5] stated that in the process of cultivating students’ higher order thinking skills requires a learning process that leads to HOTS learning activities, such as using learning media or textbook based on higher order thinking skills. The improving of students’ higher order thinking skills can be seen from the increasing of students’ critical thinking, problem solving, reasoning ability, and decision making.

The effectiveness of animal physiology textbook based on higher order thinking skills was tested by t-test and N-gain test. Based on the analysis of the t-test, it is known that the students’ higher order thinking skills in experimental class that uses developed animal physiology textbook is significantly higher than the students’ higher order thinking skills in control class that uses journals or e-book. This suggests that animal physiology learning using a textbook based on higher order thinking skills is more effective than learning using journals or e-books. This result is also supported by the average of N-gain score in the experimental class, which is 0.59 greater than 0.40 (N-gain > 0.40). It shows that the effectiveness level of animal physiology textbook that has been developed is included in the good criteria. The result of this study is in line with [4] stated that the effectiveness of a textbook is good if the acquisition of N-gain score is greater than 0.40.

The average of N-gain score in the control class is 0.38, smaller than 0.40 (N-gain < 0.40). In general, this suggests that the effectiveness level of animal physiology learning using journals or e-book is in the category of not good. However, if the N-gain score is analyzed based on the category of higher order thinking skills, the ability to analyze in the control class is relatively good. This is different from the acquisition of N-gain scores in all categories of higher order thinking skills in experimental class, namely the ability to analyze, evaluate, and create included...
in the category of good (N-gain > 0.40). The result of this study is supported by previous research. According to [9], one of the ways to cultivate the students’ higher order thinking skills is to carry out the learning process by using teaching books as the learning sources that can lead the students’ to think at a high level, such as analyzing, evaluating, and creating. The tasks and exercises compiled in the textbook are not limited to the ability to remember or understand (lower order thinking skills), but the tasks and exercises compiled in the textbook must be able to improve the students’ higher order thinking skills. There must be some stimulus presented in the textbook that stimulate the students to think at high levels. With the components of higher order thinking skills (HOTS) in a textbook, it can create the effective learning and improve the students’ higher order thinking skills.

4 Conclusion

The research result shows that students’ higher order thinking skills in the class of using animal physiology textbook based on higher order thinking skills is significant higher than students’ higher order thinking skills in the class of using journal or e-book of animal physiology. The average N-gain score using animal physiology textbook based on higher order thinking skills is included to the category of good. It can be concluded that the effectiveness of animal physiology textbook based on higher order thinking skills is good to enhance students’ higher order thinking skills.

References

Football Talent Scouting Application Development  
“Sport Search” Method based on Android

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¹,²,³ The Sport Science Study Program of Postgraduate School of Universitas Negeri Medan, Indonesia 2022

Abstract. This study aims to (1) produce a football talent scouting application product for students aged 11-14 years, (2) find out the use of soccer talent scouting applications using the android-based sport search method. This research is a development research with the Borg and Gall approach model through 8 stages, namely: (1) potential and problems, (2) information gathering, (3) product design, (4) Design validation, (5) Design revisions, (6) small-scale trials, (7) revisions of small-scale trials, (8) large-scale trials, and (9) Final Products. The subject of this study was a soccer school coach (SSB) in Medan City with licenses D, C, and B. The trials carried out included two stages, namely small group trials with 10 coaches and large group trials with 25 coaches. The results of this study are (1) a football talent scouting application product to identify and evaluate the potential for soccer talent of students aged 11-14 years, (2) The feasibility level of this product is known through a validation assessment of material and media experts. For the validation of the first material expert, the level of achievement is 90.00% in the Very feasible category and the second material expert validation is the level of 94.00% in the Very Eligible category and validation of the media expert at the level of 96.15% in the Very Eligible category. This product also went through a small group trial phase with an achievement rate of 77.67% in the Eligible category. Meanwhile, at the trial stage for this large group of products, the achievement rate was 87.27% in the Very Eligible category. Thus, it can be concluded that this talent scouting application product is suitable / very feasible to use.

Keywords: Talent Scouting, Football, Sport Search, Application

1 Introduction

In the current industrial era 4.0, the development of science and technology (IPTEK) in the world and also Indonesia is very rapid, various human activities in daily life have been greatly helped by advances in technology, including in the field of sports, which have been helped in the process of training and competitions.
In the city of Medan which is the capital of North Sumatra Province (North Sumatra) and also one of the big cities in Indonesia. The use of technology in the world of football coaching is still very minimal. This is one of the inhibiting factors for trainers in the grassroots age group in achieving maximum performance in North Sumatra in particular. Ideally, today's modern coaches should be required to be more responsive to developing technology in soccer.

The results of observational studies and interviews as well as needs analysis that have been carried out by the author from April to June 2021 for coaches aged 11-14 years at 14 (fourteen) soccer schools (SSB) Medan City, are as follows:

a. The SSB student admission system in Medan City is 100% using general requirements such as family cards, diplomas, birth certificates, and passport photos.

b. The SSB student admission system in Medan City that uses special requirements such as aptitude or skill tests is only 14%.

c. The knowledge and understanding of the SSB coach in Medan City on the test instrument in scientific football talent scouting is very lacking.

d. 100% of Medan City SSB coaches use and are able to operate Android phones, but are not used in football coaching science and technology.

e. As many as 100% of the KU 11-14 SSB Coaches in Medan City need a digital-based soccer scouting talent test.

Talent scouting (talent scouting) in the sport of football in the city of Medan has not been identified as a whole, only looking at the technical and skill aspects, whereas to obtain maximum talent there are other aspects such as Anthropometry and Biomotor. Based on the results of the observations and interviews above, the authors are interested in developing an Android-based football talent scouting application which is named the Indonesian Football Talent Identification Application (AIBANESIA).

2 Method

This study uses the Research and Development method from the theory of Borg and Gall (2003), this model was chosen because the procedure developed by Borg and Gall is more complete because it has two main objectives, namely: (1) producing certain products, and (2) test the effectiveness of the product in achieving the objectives to be achieved.

The development procedure used in this study refers to the steps of the research and development (R & D) model of the theory of Borg & Gall (2003) proposed by Sugiyono (2013) which conveys that there are ten steps in research and development research. The following is an image of the research design flow for developing an Android-based soccer talent scouting application.
According to Sugiyono (2013: 297) to be able to produce certain products, research that is needs analysis is used and to test the effectiveness of these products so that they can function in the wider community, research is needed to test the effectiveness of these products. Based on this opinion, in the context of this research, the aim is to develop an Android-based soccer talent scouting application so that coaches understand the soccer talent scouting test instrument and make it easier to select/select, evaluate, student talent effectively and efficiently.

2.1 Research Subjects and Objects
The subjects of this study were 2 Sports Lecturers, 3 Material & Media Experts, and 35 soccer coaches certified with D, C, and B licenses who were representatives of each soccer school (SSB) in the Medan City area.

2.2 Data Collection Instruments and Techniques

Research Instruments. To produce a quality development model, an instrument is needed that is able to explore the data needed to collect data in this study. There are two instruments used, the first to assess the application and the second to assess the material. Instruments in the form of questionnaires for material experts, media experts, and for trainers.

<table>
<thead>
<tr>
<th>Eligibility Percentage</th>
<th>Score Obtained</th>
<th>x 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum total score</td>
<td></td>
</tr>
</tbody>
</table>

Data collection technique. The types of data obtained from this research are quantitative data and qualitative data. According to Endang Mulyatiningsih (2012: 38) quantitative data is data in the form of numbers or data that has been rated. While qualitative data is data in the form of sentences or pictures. Quantitative data in the form of assessments, collected through questionnaires or product trial questionnaires, during testing activities, were analyzed by descriptive quantitative analysis. Percentage is intended to determine the status of something then interpreted with qualitative
sentences. The questionnaire used in this study is an assessment questionnaire. Based on the number of opinions or answers, the researcher then percentages each answer with the formula:

After presenting in percentage form, the next step is to describe and draw conclusions about each indicator. The suitability of aspects in the development of an Android-based football talent scouting application can use the following table:

**Table 1. The suitability of aspects in the development of an Android-based football talent scouting application**

<table>
<thead>
<tr>
<th>No.</th>
<th>Percentage of Achievement (%)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81% - 100%</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>2</td>
<td>61% - 80%</td>
<td>Agree</td>
</tr>
<tr>
<td>3</td>
<td>41% - 60%</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>21% - 40%</td>
<td>Disagree</td>
</tr>
<tr>
<td>5</td>
<td>0% - 20%</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

Source: Suharsimi Arikunto (2009)

2.3 Data analysis technique

Data analysis technique is a step to find out the results of the research conducted. Data analysis includes all activities, classifying, analyzing, using and drawing conclusions from all data collected in action. After the data is collected, the data will be processed. The data collection carried out in the study used two techniques, namely preliminary study instruments and model development instruments and field trials. Quantitative data from the validation of material experts, media experts and respondents was then converted into qualitative data on a scale of 4 using the conversion reference of Djemari Mardapi (2007: 84) in the following table:
3 Results and Discussion

3.1 Development Results

The development of a product called AIBANESIA (Indonesian Talent Identification Application) based on Android as a tool for making product media. The following is a product display that researchers have successfully developed.

Table 2. Quantitative data from the validation of material experts, media experts and respondent

<table>
<thead>
<tr>
<th>No.</th>
<th>Respondent's Score</th>
<th>Eligibility</th>
<th>Category Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$X \geq M_i + 1. Sbi$</td>
<td>A</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>2</td>
<td>$M_i + 1. Sbi &gt; X \geq M_i$</td>
<td>B</td>
<td>Worthy</td>
</tr>
<tr>
<td>3</td>
<td>$M_i &gt; X \geq M_i - 1. Sbi$</td>
<td>C</td>
<td>Not Feasible</td>
</tr>
<tr>
<td>4</td>
<td>$X &lt; M_i - 1. Sbi$</td>
<td>D</td>
<td>Very Inappropriate</td>
</tr>
</tbody>
</table>
The AIBANESIA display has 4 (four) menus, namely 1) Profile Menu, 2) Menu About Sport Search, 3) Implementation Instructions Menu, and 4) Talent Test Menu, as shown below.

3.2 Expert Judgment Validation Results and Analysis

At this stage, validation of the product that has been developed by two experts / Expert Judgment is carried out, namely Dr. Imran Akhmad, M.Pd and Mr. Dr. Indra Kasih, M.Or. This Expert Judgment is a lecturer in Research Methodology course as well as a related expert in the field of Strength and Conditioning (SC) as well as a lecturer in Information and Communication Technologies (ICT) course. There are 2 aspects assessed by Expert Judgment, namely the Material Aspect and the Media Aspect.

The data was obtained by providing the initial product of an Android-based soccer talent scouting application and a questionnaire assessment sheet to Expert Judgment. Expert Judgment observes the application and then provides an assessment and input on the application in writing or orally. The assessment to the expert includes the quality of the Android-based soccer talent scouting application which is seen from the visual aspect and comments or suggestions in general and conclusions.

The results of the analysis of expert judgment 1 are the total score achieved with an average score of 3.28 and an achievement rate of 82% in the "Very Eligible" category, while expert judgment 2 is the total score achieved with an average score of 3.12 and an achievement rate of 78% with the "Eligible" category.

3.3 Results and Analysis of Material and Media Expert Validation

At this stage, validate the products that have been developed, by two material experts and 1 media expert, namely Dr. Komaruddin, M.A, Sugianto, SE, and Mohamad Fathur Rohman, ST.

The validation analysis of the material expert 1 at this stage is 90% with the "Very Eligible" category, and the analysis of the translation of the material expert 2 at this stage is a total score of 94% with the Very Eligible category. While the validation analysis of media experts at this stage is 96%, an average of 3.8 with the "Very Eligible" category.

3.4 Results and Analysis of Small-Scale Trials

In this small group trial phase, 10 trainers were randomly selected proportionally based on the qualifications of trainer licenses D, C, B, and A to represent the population. The data is obtained by giving a questionnaire to the coach and an android-based soccer talent scouting application that has revised judgment instruments, material experts and media experts. The coach will provide an assessment of the questionnaire and provide input or suggestions on the application. The evaluation given to the coach includes the quality of the android-based soccer scouting talent application which is seen from the Useful aspect and the Interesting aspect and comments or suggestions in general and conclusions.

The small group trial was carried out on February 7, 2022. Data from the small group trial The coach's assessment of the android-based soccer talent scouting application had an achievement rate of "77.67%" with the "Eligible" category.
3.5 Results and Analysis of Large-Scale Trials

In this large group trial phase, 25 trainers were randomly selected proportionally based on the qualifications of D, C, B, and A license trainers to represent the population. The data is obtained by giving a questionnaire to the coach and an android-based soccer talent scouting application product that has revised judgment instruments, material experts and media experts. The coach will provide an assessment of the questionnaire and provide input or suggestions on the application. The evaluation given to the coach includes the quality of the android-based soccer scouting talent application which is seen from the Useful aspect and the Interesting aspect and comments or suggestions in general and conclusions.

The large group trial was carried out on February 15, 2022. Data from the large group trial The coach's assessment of the android-based soccer talent scouting application had an achievement rate of "82.27%" in the "Very Eligible" category.

4 Conclusion

The product resulting from this research is the Indonesian talent identification application (AIBANESIA) which has been developed in accordance with current football needs and in accordance with input and advice from material experts and media experts, the products that have been developed have gone through several stages of manufacture including are the stages of the material and material collection process, the product manufacturing process, the material expert validation process, the media expert validation process, small-scale trials and large-scale trials.

Based on the validation process carried out by material experts who have assessed the AIBANESIA application product in terms of the Feasibility Aspect of the material included in the "Very Eligible" category for use, while in the validation process media experts who have assessed products that have been developed based on the Media Feasibility Aspect are included in the validation process in the "Very Eligible" category. Small group and large group trials were conducted on SSB trainers in Medan City on the AIBANESIA application covering usefull aspects (useful) and interesting aspects (interesting) included in the "Very Eligible" category.

The application of soccer talent scouting with the Sport Search method has the ability to identify, distinguish the potential and talent of soccer students aged 11-14 years, so that it is effectively and efficiently used by coaches in the talent identification process.

References


Development of Scaffolding-Based Discovery Learning Model to Improve Students' Economic Learning Outcomes at SMA Negeri 1 Salak, Pakpak Bharat Regency in Academic Year 2021/2022

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Abstract: The goal of this study is to improve the scaffolding-based discovery learning model's syntax in Pakpak Bharat Regency's class X IIS SMAN 1 Salak so that it may better promote learning and help teachers present material to students. A 4D development model is employed in this development investigation. The SMAN 1 Salak Pakpak Bharat facility served as the study site. This study used class X IIS1 as its sample. The study's findings led to the development of a scaffolding-based discovery learning model, which is valid and qualifies for use as a teaching aid in class X IIS1 economics. 85% of student replies were used to produce products based on the evaluation of material features, learning design specialists' work, and student responses.

Keywords: Discovery Learning Model, Scaffolding, Learning Outcomes

1 Introduction

Because science and technology (IPTEK) are advancing so quickly and are now an essential part of daily life, people must acquire the skills necessary to compete in the global marketplace. Developing excellent human resources or human resources through education is one strategy being used to address this significant challenge. Therefore, it is necessary to constantly implement education reform that aims to raise the standard of education in the country. The dignity of the Indonesian people is anticipated to rise as a result of efforts to raise education quality.

The world of education is essential to keep up with technological advancements and use more complex information and communication technology facilities to speed up the learning process. By comprehending how technology can aid in the learning process, they can create learning procedures that are efficient. (2002) Rose, Meyer, and Strangman.
In addition, it is hoped that with the use of information and communication technology, the learning mindset can shift from teacher-centered to student-centered. Technology advancements make it easier to conduct and create novel learning procedures that will result in high-quality outputs. Students will also develop as people with the capacity for thought and learning.

The effectiveness of enhancing education requires efforts from many angles, including paying attention to all factors that are crucial, such as raising the caliber of teachers, curriculum, facilities and infrastructure, school administration, and community involvement. Teachers are also expected to be able to act as mentors and facilitators in the classroom, as well as deliver material creatively, utilize learning media, and carry out appropriate evaluations to ensure learning results.

The current educational system includes learning outcomes as one of its elements. Student learning outcomes are the degree of success or mastery in learning that has occurred during the teaching and learning process and is developed in the form of values across a variety of subjects. Additionally, one of the elements that can promote learning outcomes is motivation.

However, to achieve success in learning several factors must be considered, such as students' understanding of the concept of learning the lessons presented, the teacher can also use learning models or even use learning methods, as well as learning media in conveying learning. It is without realized greatly affect the learning process carried out in schools. However, learning models are rarely or even not applied in the learning process, more often using conventional methods will result in students being bored and ultimately lacking enthusiasm in the learning process. Factors such as the lack of application of learning models in the teaching and learning process are caused by teachers who do not want to apply them so it has an impact on student learning outcomes who always feel bored during the learning process and learning outcomes decrease. This requires a teacher to think more about how to achieve maximum learning objectives by using learning models or even learning media.

According to the findings of observations made by researchers at SMA Negeri 1 Salak in class X IIS 1, researchers discovered a number of issues that made the learning process less effective, including the teachers' propensity to use traditional teaching methods like lectures, questions and answers, and assignments, as well as their sole focus on books, during the teaching and learning process. When explaining the lesson such that the pupils have trouble grasping the information the teacher is presenting. When the teacher attempts to ask brief questions, the students only modestly respond in accordance with the textbook, and the majority of students remain silent. Then, the students appear passive and only function. In addition, teachers also rarely use interesting learning models, therefore student learning outcomes are still on average below the minimum completeness criteria (KKM), which is 75.

Of course, students' economic learning outcomes are still relatively low and have not achieved success in learning by what is set. This shows that students' learning outcomes in economics must be improved. Seeing the conditions that occur, it is necessary to make changes in the learning process. One way to overcome these problems is to improve learning outcomes by using learning models that can improve student learning outcomes. Based on things that have occurred in schools, the researchers feel the need to develop learning models in the teaching and learning process, so that students are active and enthusiastic in learning and the learning process can run effectively and according to the objectives of the existing curriculum and
student learning outcomes can also increase. In addition to developing a learning model, it is also necessary to relate it to the method.

The learning model that the researcher uses is the Discovery Learning Model, where the teacher does not tell the facts, but the students find the information they need for themselves. According to the results of the study (Saputra, 2016) stated that, by finding it yourself and investigating it yourself, the results obtained will last a long time in memory, and are not easily forgotten by children. The Discovery Learning learning model can train students' knowledge acquisition skills and cognitive abilities. So that later it will affect the learning outcomes obtained by students. Meanwhile, according to (Ali & Setiani, 2018), the Discovery Learning Model can improve the skills of the direct observation process or the discovery process regarding problems in the surrounding environment, so that students better understand the concepts given by the teacher and are very effectively used to improve student learning outcomes. In addition, according to the research results of Muhammad Yusuf and Ana Ratna Wulan (2015), the application of the discovery learning model shows that there is no significant difference between the use of the discovery learning model.

Based on the results of previous research according to Agus Santoso (2016), Discovery learning is student-centered learning. In other words, discovery learning is discovery learning where students experience directly the subject matter presented by the teacher. Furthermore, according to research results (Tsamaniariety and Yuli, 2019) stated that the results of developing the Discovery Learning learning model on student personality development increased the effectiveness of learning using a larger learning model, and increased high attractiveness so that it had a positive impact. In applying the learning model, the teacher needs to link the learning methods that will be used during the learning process in the classroom. One of the methods applied to accompany the learning model is the Scaffolding method. The scaffolding method is one method that can be used by teachers, by providing assistance, guidance, encouragement (motivation), attention to students to achieve learning objectives. The assistance provided can be in the form of instructions, warnings, or encouragement (Mamin, 2008). Scaffolding is given by the teacher to students by providing a large amount of assistance in the early stages and gradually reducing the assistance until they are finally released and able to complete on their own.

Based on existing research, the results of research conducted by Santosa et al (2013) show that learning by using the Scaffolding method can increase students' learning independence and problem-solving abilities in the learning process. Another study conducted by Wang (2014) showed that the knowledge of students who were taught by the Scaffolding method showed a significant increase in the understanding of students who were taught. Based on several facts found in the field, it is necessary to develop a learning model so that the learning process continues effectively and achieves the desired learning objectives. As well as the need to use methods in linking learning models in delivering material to students, so that students are enthusiastic and eager to follow the learning process. Research on the development of the Discovery Learning learning model based on the Scaffolding method, are some of the things that can be done to improve student learning outcomes at SMAN 1 Salak, Pakpak Bharat Regency in economic subjects. Therefore, researchers are interested in conducting development research entitled "Development of a Scaffolding-Based Discovery Learning Model To Improve Student Learning Outcomes at SMAN 1 Salak, Pakpak Bharat Regency in Academic Year 2021/2022".
2 Research Methods

Development of Scaffolding-based Discovery Learning Modules on economic subjects using research and development (Research and Development). The development model used is the 4D model developed by Thiagarajan & Semsel to design a learning system. The acronym 4D stands for define, design, develop, and disseminate. A quantitative technique will be used in further experimental investigation on the end-product of this development. The purpose of this study was to determine how to use the developed model to help students become better problem solvers. The research method used is to use the test is in the form of a post-test for the experimental class using the developed model and the control class without using the developed module. The subjects in this study were all students of class X IIS which consisted of 3 (three) classes, the samples in this study were class X IIS1 as the experimental class and class X IIS2 as the control class. The variables in this study consisted of independent variables, namely the Scaffolding-based Discovery Learning learning model (X), the dependent variable was student learning outcomes (Y).

Technical analysis of data in the feasibility test of the product developed is using feasibility analysis, namely validation analysis obtained from material experts, design experts, economic learning practitioners and feasibility trials based on questionnaire sheets analyzed using descriptive analysis techniques. Data analysis techniques used for product effectiveness testing To increase student learning outcomes, the t-test was used with (sig) 95% and the level of significance (α) 5%.

3 Results and Discussion

The device developed was a scaffolding-based discovery learning model to increase student learning outcomes utilizing the 4-D development model, it was discovered based on the description of the research results that have been provided in the research results section. The four stages of the 4-D development paradigm are define, design, develop, and disseminate. This research was conducted up till the development stage due to research limitations. The validity and efficacy of the outcomes of the development of learning tools will be evaluated.

The development stage of the learning model device starts from the define stage. The define stage consists of initial and final analysis, student analysis, task analysis, concept analysis, and specification of learning objectives. The purpose of the final preliminary analysis is to find out the general problems faced in economic learning activities, while the student analysis is carried out to determine the characteristics of students. Then the purpose of the analysis aims to formulate Basic Competencies (KD) that will be applied.

The specification of learning objectives aims to formulate learning objectives that must be achieved by students during the learning process by the fundamental skills to be used, particularly by using the device. Concept analysis is an analysis of the key concepts contained in the material patterns of producer and consumer behavior in economic activities and employment. acquired learning.

The next stage is the design stage. The design phase aims to design learning tools developed in the form of scaffolding-based discovery learning models and instruments used in research. The last stage in this development research is development. The research instrument was
validated before being used to measure the validity of the model. The developed model was validated by expert validators before being used in individual, small group, and field trials.

The results of the assessments submitted by several experts and student trials can be seen in Table 1 below:

1. The Feasibility of Using the Improvement of the Scaffolding-Based Discovery Learning Model Student Learning Outcomes

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Average Score (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material Validation</td>
<td>96%</td>
<td>Very Deserving</td>
</tr>
<tr>
<td>2</td>
<td>Validation of Design</td>
<td>89%</td>
<td>Very Deserving</td>
</tr>
<tr>
<td>3</td>
<td>Individual Trial</td>
<td>85%</td>
<td>Very Deserving</td>
</tr>
<tr>
<td>5</td>
<td>Trial in a Small Group</td>
<td>86%</td>
<td>Very Deserving</td>
</tr>
<tr>
<td>6</td>
<td>Field Test</td>
<td>88%</td>
<td>Very Deserving</td>
</tr>
</tbody>
</table>

| Average | 88.8% | Very Deserving |

Based on the table of results of the feasibility assessment of the scaffolding-based discovery learning model that was developed with the average percentage value of the overall score of 88.8%, it is included in the "Very Eligible" category, the scaffolding-based discovery learning model that was developed proved feasible to use in the process learn how to teach. In line with the results of the study (Komang Syuryani, 2020) revealed that the validity score of the Environmental-based Discovery Learning learning tool is known that each indicator gets an average validation score in the range of 4.01 < X < 5.01 with very good qualifications. Furthermore, the results of the study (Septina Dwi Prasetyana, 2015) stated that the results of the feasibility of the device expert validator obtained a score of 3.44 in the good category, the material expert validator received a score of 3.52 in the very good category, and the practitioner validator received an assessment of 3.65 in the very good category. From the discussion above, it can be concluded that the model development is feasible to be used as a learning tool. This scaffolding-based discovery learning model can be used as an economic lesson plan in class X IIS.

2. The Effectiveness of the Scaffolding-Based Discovery Learning Model to Improve Student Learning Outcomes

By examining the data, it is possible to examine and interpret how the problem in this study was formulated on student learning outcomes taught using the model developed in the experimental class and without using the module in the control class. Learning outcomes obtained the highest score (X_{max}), the lowest score (X_{min}), and the average score (\bar{X}) for the experimental class and control class which can be described as follows:
From Table 2 it is well known that there are discrepancies between the lowest and maximum scores. The minimum and maximum scores were higher in the experimental class than in the control class. The average economic problem-solving ability of students is also different, the experimental class is higher, namely 92, while the control class has an average value of 77. The interpretation of the difference in the average problem-solving ability of students can be seen in Figure 4.1 below:

**Fig 1.** The interpretation of the difference in the average problem-solving ability of students

Based on Figure 1, it can be seen that the experimental class using the scaffolding-based discovery learning model that was developed was higher than the problem-solving abilities of students in the control class without using the developed learning module. The results show that the implementation of the scaffolding-based discovery learning model in the learning process has an average of 92 higher than the problem-solving ability of students in the control class with an average of 77. To see how big the difference in student learning outcomes in
post-test scores using a scaffolding-based discovery learning model with post-test scores without using a scaffolding-based discovery learning model, can be seen in the descriptive statistics in the following independent sample test.

**Table 3. Group Statistics**

<table>
<thead>
<tr>
<th>Student learning outcomes</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Test Experiment</td>
<td>34</td>
<td>92.00</td>
<td>2.000</td>
<td>.343</td>
</tr>
<tr>
<td>Post Test Control</td>
<td>34</td>
<td>77.41</td>
<td>1.438</td>
<td>.247</td>
</tr>
</tbody>
</table>

Based on the results of the descriptive statistical calculations above, it was found that the student learning outcomes in the class using the scaffolding-based discovery learning model obtained an average value (92) which was greater than the class that did not use the scaffolding-based discovery learning model by obtaining an average score (77.4). According to the results of previous researchers (Midaiyana Nella Santi, 2019) the results of his research state that the Discovery Learning learning model can be used by teachers as an alternative to introducing geometric shapes. The assessment of the feasibility of the material resulted in a score of 110 and 105 which were in the "adequate" category. In the results of the initial field trial, the results of the teacher's response to the discovery learning model were a score of 105.25 which was in the feasible category, while the field trial scored 116.5 which was in the very feasible category. The development of the discovery learning model was declared effective by increasing the ability to recognize the geometry of children aged 4-5 years getting the results of the t-test obtained by the value of sig (p) <0.05, which means there was a significant change between the children's abilities before and after being given treatment. Then according to the results of the study (Ajeng Raja Azura, 2019), the results of the ANOVA test were obtained that were significant in trial 1 of 0.839 > 0.6319 (r-table) and significant in trial 2 of 0.946 > 0.3338 (r-table). This means that trial 1 obtained 0.839, which is greater than the requirement of 0.6319. In trial 2, it was obtained that 0.946 was greater than the requirement of 0.3338. So there is the influence of the Discovery learning model on student learning outcomes in the material of changing the shape of objects. Furthermore, the results of the study (Muhammad Yusuf, 2015) The results showed that there was no significant difference between the use of the shared integration type discovery learning model and the webbed integration type to improve students' science process skills based on the value of t-count = -1.537 which was in the acceptance area t-table = ±2.014 with a significance value of 0.131. The average N-Gain of science process skills of students in the shared integration class is 0.55 with moderate criteria and the webbed integration class is 0.47 with moderate criteria. It can be concluded that the increase in learning outcomes proves that the scaffolding-based discovery learning model is effectively used as a good learning tool for teachers in the field of economics studies or students so in other words a learning device is said to be effective if the goal is achieved in the form of learning outcomes, effective and efficient in its use.

**4 Conclusions and Suggestions**
Based on the findings and discussion of the development research conducted, it can be concluded as follows:

The discovery learning model based on scaffolding was developed The discovery learning model based on scaffolding model in economics subjects of consumer and producer behavior patterns in economic activities. The product developed, based on the assessment of material aspects and learning design aspects, carried out by experts and also student responses, obtained an average percentage of 88% feasibility level so that the conclusion is classified as "very feasible". category. The discovery learning model based on scaffolding was developed meets the requirements for effectiveness to be used as a learning model in economics subjects. The product developed based on the statistical test of data on student learning outcomes using the developed model was higher than the student learning outcomes taught without the developed model. This can be seen based on the results of the test using the t-test with the test results showing T-statistics 12.004 > t-table 1.671 with 0.05 and dk = 62 and based on the average value of student learning outcomes from the experimental class 92 > 77 the average value in the control class. So it can be concluded that the product developed is effective in improving student learning outcomes.

From the conclusions that have been stated, the following are suggested:

The Scaffolding-based Discovery Learning Model has been tested for feasibility and effectiveness, so it is recommended for teachers to use this learning model as a choice in the learning process, especially on different materials. The Scaffolding-based Discovery Learning Model on the material of consumer and producer behavior patterns in economic activities can be suggested to teachers or further researchers that the Scaffolding-based Discovery Learning Model can also develop in all other aspects such as aspects of religious values, and moral, physical motoric, social-emotional, cognitive, language, and artistic integrity.

References


Multiliteracy-Based Teaching Materials To Improve Student Understanding

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Abstract. This research is a development research that aims to produce a product in the form of multiliteracy-based teaching materials. The product development of this research is based on the Borg & Gall development research model proposed by Sugiyono. The development of teaching materials is carried out by applying various types of literacy according to Waskim in each part of the module including basic literacy, library literacy, media literacy, technological literacy, and visual literacy. As a result, basic literacy activities include reading material and writing assignments, media literacy in the form of using digital media and print media during the learning process, library literacy in the form of directing students to understand the basics of libraries, technological literacy, namely the use of various technologies such as cellphones and laptops, and visual literacy in the form of various images related to learning materials. All of these literacy activities can improve students' ability to understand learning.

Keywords: teaching materials, multiliteracy, development

1 Introduction

The development of the times has influenced various fields, including the field of education. This development requires students to be more active in the learning process at school with teacher guidance or independently. This is because the current curriculum is adapted to the learning system in the 21st century, which is referred to as the K13 curriculum. This curriculum is different from the previous curriculum which is teacher-centered. Now the focus and center of the K13 curriculum is on students. Thus students are required to always be active in the learning process, such as finding and finding concepts independently.

Literacy is a term that cannot be separated from the learning process. In simple terms, literacy is the ability to read and write. Then this understanding develops into the ability to read, write, listen and speak. Over time, the term literacy has been widely understood, shifting from a limited understanding to a broader understanding that includes several other fields.
Literacy is used in various fields of science directly related to the media as a means of communication and meaning formation. This is in line with the belief that the process of critically understanding information is not solely through texts. Meaning will be formed if it is understood through the use of various media such as pictures, performances, videos, films and various other media.

Setiawan (2018: 1) argued the term literacy were more extensive, but still refers to skills or basic writing and reading competence, ie the ability to read and write. Basically, the most important thing about literacy is to be free from illiteracy in order to understand the whole concept from a functional point of view, and one way to get this literacy skill is through the learning process.

The journey of information and communication technology led to the development of the definition of literacy until it entered the fifth generation. This fifth generation literacy is referred to as multiliteracy. The term multiliteracy implies that there is skill in the use of different methods of expressing and understanding an idea or information. These skills range from using various forms of conventional text, symbols, to utilizing innovative multimedia.

The multiliteracy learning process emphasizes the ability of students to understand and use various forms of text, symbols, and media in improving learning understanding. The increase in this ability is directly proportional to the ability to understand learning. The way that can be done to improve this ability is to apply various literacy activities in the learning process. These literacy activities include reading and writing, visually understanding images, and using technology.

2 Theoretical Basis

2.1 Teaching Materials

Teaching materials are the most important thing in learning activities. In line with Mulyasa's opinion (2006: 96) he argues that teaching materials are teaching resources that contain specific and general learning messages and can be used in learning. Dick and Carey (2009:253) also reveal about teaching materials, where teaching materials are teaching resources that contain material and must be studied by students in order to achieve learning objectives. These teaching materials can be in print or not.

Widodo and Jasmadi (2008: 40) put forward the meaning of teaching materials. Teaching materials are a set of learning tools that contain knowledge, limitations, methods, and assessment tools that are designed systematically and attractively in order to achieve certain learning objectives. This goal is achieved through the acquisition of competencies and sub-competencies in all their complexities. Thus, teaching materials must be designed based on learning development rules that are tailored to the material, learning needs, there is an evaluation, and most importantly designed to be attractive for students to learn.

According to Mulyasa (2006:46), the forms of teaching materials include the following:

1)Printed teaching materials (printed)
2)Listening Teaching Materials (Audio)
3)Hearing Teaching Materials (Audiovisual)
4)Interactive Teaching Materials
Module. The learning module is the smallest unit of teaching and learning program, which can be used by students in learning the material either independently or taught by students on their own (self-instructional) (Winkel, 2009:492). Meanwhile, according to Anwar (2010: 46), the learning module is a systematic and interesting teaching material that contains materials, assessments, and methods that can be used independently in achieving a required competency.

According to Daryanto (2013: 9), the module is one of the teaching materials that is fully and systematically arranged, containing a set of learning experiences that are scheduled and made to assist students in achieving a specific learning goal. One of the functions of the module is to become an independent learning tool. This independence does not depend on a speed, so students can learn according to the speed of each understanding. The module must contain objectives, learning materials/substances and assessment.

Learning modules are teaching materials that students can use independently. Modules can be said to be good if they are arranged in an attractive, clear, and systematic way. One of the advantages of the module is that it can be used anytime and anywhere according to student needs. The learning module is packaged in a complete and systematic way, and must contain special learning in order to help students master a competency. The module serves as a vehicle for independent learning, so students can learn independently according to their time and understanding. The minimum module contains learning objectives, materials, and assessments.

Multiliteracy. Literacy was originally understood as the ability to read and write. Literacy comprehension turns into the ability to read, write, listen and speak. Over time, the term literacy has been widely understood, shifting from a limited understanding to a broader understanding that includes several other fields.

The journey of information and communication technology led to the development of the definition of literacy until it entered the fifth generation. This fifth generation literacy is referred to as multiliteracy. The term multiliteracy implies skills in the use of different methods of expressing and understanding an idea or information. These skills range from using various forms of conventional text, symbols, to utilizing innovative multimedia. The multiliteracy learning process emphasizes the ability of students to understand and use various forms of text, symbols, and media in improving learning understanding. Learning must be in accordance with technological changes, and relate directly to the global environment.

In this 21st century, the general goal of literacy learning is to enable students, through their multi-intelligence abilities, to become competent communicators in multi-literacy, multi-cultural and multi-media contexts. Multiliteracy is a skill to understand information and express various ideas, using conventional texts and innovative texts related to the cultural context through various 21st century technological media. In education and learning, multiliteracy is understood as the skill to understand learning materials through the surrounding cultural context and is supported by various technological media.

Multiliteracy learning is learning that aims to maximize multiliteracy skills in realizing effective learning (Abiddin, 2015:20). Various multiliteracy skills used include language skills and mastery of information and communication media skills. The concept of multiliteracy proposed by Eisner (Abidin, 2015:20) also states that multiliteracy comes from the concept of literacy which is defined as the ability to capture the meaning of written symbols and various symbols that have meaning. Literacy is also understood as the ability to generate ideas using various media, using conventional language codes and high-tech codes.
The concept of multiliteracy is related to multi-context, multimedia and multicultural. Multi-context as a derivative of the concept of multiliteracy is related to skills in understanding various contexts, both situations and scientific contexts. Multiliteracy learning does not only use one type of media, but uses various types of media ranging from conventional media to digital media. Multiliteracy is also related to multiculturalism, which means that a text composed is influenced by the author's background and understanding of certain cultural elements.

![Fig. 1. The concept of multiliteracy learning](image)

The concept of multiliteracy learning was developed based on the basic elements of multiliteracy. Multiliterate learning is developed based on students' abilities. This ability is seen from several aspects such as intelligence, learning style, and learning capital. The concept of multi-intelligence in multi-literacy learning is based on the type of intelligence of each student that differs from one another. These various types of intelligence are related to the level of students' understanding of learning.

The text is multimodal, which means that the text is not limited by words but is broader and can be in the form of images, performances, musicals, or digital texts based on information and communication technology. Then in line with multi-intelligence and multimodal, multi-literacy learning also considers the various learning styles carried out. In the process of understanding learning materials, students do not only use one learning style/method, but also various kinds of learning methods.

As the main concept of multiliteracy, literacy is understood through various learning perspectives. Some of these points of view are the language point of view (on the text), the cognitive point of view (on thinking), the cultural point of view (on the group), and the knowledge growth point of view (on growth). Viewed from the point of view of language, literacy learning is carried out so that students are able to use various language systems to understand and instruct language. Viewed from a cognitive point of view, literacy learning aims to improve students' ability to use various processes and strategies to form certain meanings based on texts, objectives, and audiences. Viewed from a cultural point of view, literacy learning aims for students to form meanings related to certain social groups. And when viewed from the point of view of knowledge growth, literacy learning aims to enable students to develop their literacy skills so that they can understand the meaning in the text.

Based on the explanation above, the application of multiliteracy in learning can improve students' understanding of learning materials. In more detail, multiliteracy in the learning process is carried out by implementing various literacy activities. The following are the types
of literacy activities that can be applied to learning to improve learning abilities. These types of literacy were put forward by Waskim (2017:71) which are divided into five types, namely:

1. **Basic Literacy**, literacy that aims to maximize the ability to speak, listen, write, read, and count. The ability to count is related to the ability to analyze calculations (calculating), interpret information (perceiving), communicate information, and describe information (drawing) based on personal understanding and experience.

2. **Library Literacy**, is the ability that a person has with regard to the basics of literature. The basics in this library include understanding the function of the library as a place to obtain information. Basically, library skills that must be known include understanding fiction and non-fiction, references and collections, understanding the Dewey Decimal System as a classification system in libraries, using catalogs and indexes, obtaining information, papers, and research.

3. **Media literacy** is the ability or skill to understand and use various kinds of media. In general, media consists of three types, namely print media (magazines, newspapers), electronic media (radio, television), and digital media (internet). The ability to use media as a tool to receive information or knowledge and convey good information in expanding knowledge.

4. **Technological literacy**, is the ability to understand various technologies along with the times. This understanding includes knowledge of the difference between hardware and software, understanding printing technology, presenting, and accessing the Internet, and applying ethics in the use of technology.

5. **Visual Literacy**, is the ability to understand information visually (visible). This capability is an extension of media literacy and technological literacy. The management of various images that seem to never stop every day needs to be improved. Various visual and audiovisual information seemed to flood from various corners of the media from print to digital.

### 3 Research Methods

Teaching materials were developed according to the needs analysis which were then re-analyzed based on the assessment of the material expert team and the design of teaching materials using a rubric developed with slight modifications by expert opinion. The criteria for teaching materials based on the criteria for the suitability of multiliterate-based teaching materials are still guided by the syllabus as a reference for the competencies developed. The researcher adapts the development applied by Borg and Gall on the grounds that the development design has the objective of developing and validating the product. The development of teaching materials is structured programmatically with preparation and planning with the following steps: Research and information gathering, planning the form of teaching materials, developing a preliminary form of teaching material products, expert validation, testing, revision of profuk and final products of teaching materials for scientific work multiliteracy based.
4 Discussion

4.1 Multiliteracy-Based Teaching Materials

Multiliteracy-based teaching materials contain various literacy activities such as basic literacy, media literacy, library literacy, technological literacy, and visual literacy. This is in line with the concept of multiliteracy proposed by Abidin (2015: 4) that multiliteracy is not only understood as the ability to capture meaning in written symbols but also in various other meaningful symbols. Along with the times, the process of capturing and producing meaning is also related to various media and technologies.

At the beginning of the learning activities students will carry out basic literacy activities, namely reading the objectives and learning materials and are directed to write down the results they observe. The provision of stimulus at the beginning of the learning process is carried out by carrying out media and visual literacy activities, then students will carry out basic literacy activities by writing down their observations.

Basic literacy is literacy that includes reading and writing activities. The cover section of the module presents the readable writing of the module title along with illustrated images that can be used as a starting point for introducing learning materials to students. The picture of a pile of books on the cover can provide a visual understanding which means that students have carried out visual literacy activities.

Basic literacy is the main step in the learning process. These abilities include the ability to listen, speak, read, write, and count. This has been stated by the Ministry of Education and Culture (2019:1) in the Innovation magazine, basic literacy skills are the main foundation of all stages of the learning process, especially in the 21st century. Thus, reading activities are a basic activity in the process of understanding learning materials.

This statement is supported by research conducted by Khatimah (2020: 63) with the conclusion that basic literacy activities affect the reading interest of fifth graders at SD Negeri 32 Buakang, East Sinjai District, Sinjai Regency. This is evident from the average score of students before the basic literacy treatment is 64.38 and after the basic literacy activity treatment is 87.53. This shows that basic literacy activities that are applied to the learning module can increase students' interest and reading ability which is the main basis in the learning process.

The research was also proven by Amri and Rochmah (2021) who showed the effect of basic literacy, namely student reading on student achievement. This research was conducted by an elementary school in Pegagan Village, Palimanan District by looking at the students' reading ability and then associated with student achievement. Reading literacy ability with learning achievement of SDN students in Pegagan Village, Palimanan District has a positive relationship with a value of 23.2%.

Visual literacy is the ability to interpret visual forms in obtaining and creating a message. In line with the research conducted by Ayu (2019) with the conclusion that visual literacy plays a role in students' cognitive formation because it makes students better understand concepts and strengthen memory.

Mansyur, et al. (2015:280) suggests that visuals are very useful in improving learning. This is because visual literacy is an activity that is carried out before verbal literacy activities in building
information. Capturing information in the form of images in the thought process is the basis of reading and writing activities.

A concept map is an image that describes several concepts of an interrelated learning material. Concept maps aim to enable students to understand and relate the flow of the material being studied. The existence of a concept map in this module serves so that students can understand the material well. The concept map is designed simply and colored green in order to give calm and stimulate students' creativity. In this section students have done visual literacy. Visual literacy activities carried out in the form of interpreting concept map images containing details of Basic Competencies. Students will find it easier to know what abilities they must have after studying the module through marker lines that indicate and connect several competencies.

The introductory part of the module contains several things such as time allocation, Basic Competencies and detailed indicators, descriptions of learning materials, and instructions for using the module. The introduction section serves as a guide in using the module, such as the tools and media needed to support learning. Time allocation shows the length of learning time. Basic Competencies are knowledge and skill competencies that must be mastered by students which are then translated into several indicators. The material description is the part that explains the material discussed in the module in general, while the instructions for using the module contain a series of instructions and tools needed to make it easier for students to use the module. The introduction section contains several literacies, namely basic literacy, technological literacy, and visual literacy.

Media literacy is in the form of presenting a qr code and must be scanned using high-tech objects, namely cell phones. The scan results from the qr code will take students to a medium, namely digital media (browsing internet) so that simultaneously students have done media literacy. Media literacy in the module does not only use digital media, this module also directs students to use print media in the form of newspapers and magazines as a source of learning. This is contained in the exercise section of each indicator. Thus, students have learned to use various media that will improve their abilities. The use of various media as learning resources also supports library literacy activities for students.

The role of various media in the process of improving student learning outcomes has been proven by Audie (2019) through his research. He stated that the use of various media in the learning process in addition to making it easier for teachers to convey material can also increase student motivation so that students are more active and innovative in learning. Learning media can help the effectiveness of the learning process.

Liswanti, et al (2015:102) mention that the use of media in learning can increase student interest so that learning materials are easy to understand. The use of media in learning also has several foundations such as philosophical, technological and empirical.

Basically, learning activities are a learning process that is given to students in accordance with the basic competencies to be achieved. The learning activities in this module are divided into three learning activities and each learning activity contains materials, exercises, and summaries. Materials and exercises are arranged according to the basic competency indicators. Each learning activity is accompanied by pictures and contains multi-literacy activities such as basic literacy, media literacy, library literacy, technological literacy, and visual literacy. The training section includes basic literacy activities, media literacy, library literacy, and technological literacy. While the summary only contains basic literacy.
Technological literacy is carried out through the use of various technologies in the learning process. In addition to using cell phones, students are also directed to use laptops to complete various exercises as a form of technological literacy. Technology has a significant influence in the field of education, because technology is able to provide convenience in learning.

Amanda (2020) mentions several roles of technology in education, namely it can improve the quality of education. Technology can facilitate the teaching and learning process by teachers and students, besides that it can also be used in obtaining a lot of information related to learning materials. Technology can also be used as a media to support learning so that students do not feel bored because of monotonous learning. In obtaining a variety of information, technology is the key in this regard. Technology also provides unlimited media that can support or even be a solution when the learning process cannot be done directly.

Technology has a role in the learning process. Lisiswanti, et al (2015:102) suggest that learning media in the form of machines (technology) is seen as the application of knowledge in the form of electronic media or other learning machines occupying a strategic position in facilitating and facilitating learning. The ability to understand and use technology is known as technological literacy.

Understanding requires students to seek information from various sources so that students can distinguish which sources are relevant and irrelevant to learning. This is one of the library literacy activities. Library literacy is a skill regarding fiction and nonfiction, references and collections, understanding the Dewey Decimal System as a classification system in libraries, using catalogs and indexes, obtaining information, papers, and research.

Library literacy and technological literacy activities are applied to the training section of each indicator. Literacy activities will increase students' understanding of various sources of relevant and valid information. The information they searched for was not only sourced from books and the internet but also from various media such as newspapers and magazines. Then students will be directed and guided by using various technologies during the process of completing the exercise tasks through technological literacy activities.

Understanding learning materials requires the ability to collect, use, process, and assess information (Cahyadi 2018:141). Libraries are one of the largest sources of information, having skills related to library basics will make it easier to obtain information. So that scientific writing can be done. Not only scientific work material, the ability to obtain information is also very much needed in the learning process.

Research conducted by Mangnga (2015) also shows that the library is very influential on the learning process in schools. He stated that there are several roles of libraries, namely libraries are very supportive of school educational achievements, libraries are very important and must exist in every school at all levels of education, library management must be carried out in accordance with its objectives and functions. Thus, skills in understanding the basics of the library have an influence on student achievement in school.

After the students have finished participating in the three learning activities, it is followed by the process of determining the level of ability and understanding of students on scientific work material called evaluation. The evaluation in this module consists of 10 multiple choice questions and 1 description question. Discussion of the answers to each evaluation question is described in the answer key with scoring criteria. This section supports basic literacy activities because students are required to read and write.
The function of the glossary is to provide preliminary knowledge about several terms that will later be found in various learning activities so that students will more easily understand learning. Like the concept map, the column containing the glossary is colored green and the text is black for better contrast and legibility. Glossary reading activities are included in basic literacy.

Pillay (2020) published an article entitled “Embracing Multiliteracy For Teaching And Learning In Higher Education”. He stated that multiliteracy learning plays an important role in creating an effective learning environment. Multiliteracy is also supported by increasing student literacy activities before starting learning. This article also emphasizes that active learning strategies must be based on multiliteracy, cultural and linguistic diversity, and multimodal textual practices so as to create a dynamic learning environment that will equip students with the skills needed to face a rapidly changing world. Thus, the use of multiliteracy-based modules can improve students' literacy skills.

5 Conclusion

Various literacy activities can be applied to teaching materials, to improve students' understanding abilities. These various literacy activities are referred to as multiliteracy, including basic literacy, media literacy, library literacy, technological literacy and visual literacy. Basic literacy activities almost cover all parts of teaching materials in the form of modules, such as learning objectives and materials, writing observations. The provision of stimulus at the beginning of the learning process is carried out by carrying out media and visual literacy activities. library literacy in the module, which provides direction and activities related to library basics, such as seeking information from relevant sources. Visual literacy in the module can be seen in the use of images that serve as explanatory material for learning. And technological literacy in this module is the use of various technologies in learning such as mobile phones and laptops.

References

The Effectiveness of Developing Teaching Materials for Writing Explanatory Texts Sourced From the Interpretation of the Quran in Class XI MAPN 4 Medan

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Abstract. The effectiveness of teaching materials in the form of modules obtained an average pretest score of 67% in the 'Enough' category and an average posttest score of 86.4% in the "Very Good" category. Seen an increase in the value between the pretest and posttest through the calculated difference of 19.4%. So that the overall results of the study show that explanatory text teaching materials sourced from the interpretation of the Qur’an are declared effective for use in the learning process.

Keywords: Module teaching materials, explanatory texts, texts from the interpretation of the Quran.

1 Introduction

Learning Indonesian is a something very important activity for build thoughts and insights, and method look student to something language. Learning Indonesian is not only learn things base in speak however covers related area with language. An educator of course have role important in teach learning Indonesian with creative, innovative, and build liveliness during the learning process teach Indonesian language learning. Because in the learning process teach, the teacher has role important in lead condition class [3]. Claims addressed to the teacher is expected capable realize desire community that has gave trust to schools and teachers in educate [2]. Like moment this, see condition now that a lot occur mischief teen who the more increase, the role that can be done by an educator is attempted build learning process teach with make participant educate have knowledge by Islamic. So that everything Thing the behavior of the participants educate permanent directed and not fall in the more away by association free. Then one things that can made as teaching materials at school nuanced Islamic is learn sourced text from the interpretation of the Qur’an.
One how can developed by educator for used as teaching materials, namely with blend something existing text with interpretation the Qur’an. As is known that Al-Qur’an is guidelines for adherents of Islam. So that from Al-Qur’an alone could made as good guide as guidelines for learning text in Indonesian and of course could customized with needs text the though not on the eyes religious lessons.

MAPN 4 Medan is one of the equal senior high school, because madrasah schools in the learning process same as use 2013 curriculum only just all applied thing in MAPN 4 Medan school is based on values Islamic and may said nuanced in values Islam based on the Qur’an. Certainly, not surprising when teachers who teach also need learning modules. The use of modules in the teaching and learning process is one of the ways that teachers can choose to reduce learning saturation and facilitate students in teaching materials that may be difficult to understand. The use of the module itself is one of the easiest teaching materials to make because it does not cost too much money and has qualified skills [4]. The module is said to be a set of teaching materials that are neatly arranged so that it is expected that the teacher is only a companion or facilitator in learning [5].

One of the teaching materials that can be written in the form of a module is an explanatory text. Explanatory text is one of the texts taught in Indonesian language learning which is included in the type of material that is factual. This is because the explanatory text contains a number of useful facts to broaden insight, knowledge, and additional information for readers [6]. In general, it can be said that an explanatory text is a text that discusses natural events and social events in it which are based on facts. As stated, the explanatory text must explain the natural and social processes that occur around it [1]. There are stages in compiling an explanatory text, this stage consists of three stages, namely a general statement which is interpreted as an introduction to the matter being discussed, the second stage is a series of explanations, and the third stage is interpretation [11].

In addition to building a text using a predetermined structure, in writing an explanatory text, linguistic characteristics are also needed. Linguistic characteristics are included as one of the elements that build a language or sentence in a text [10]. Based on the structure and linguistic characteristics contained in the explanatory text, students will be asked to write an explanatory text in accordance with the existing linguistic structure and characteristics. Then students write explanatory texts that are sourced from the interpretation of the Qur’an with restrictions on natural phenomena in the form of eclipse phenomena and social phenomena in the form of poverty. The Qur’an is a holy book intended for Muslims that gives instructions to the right path and has a function as welfare and happiness for mankind, both for individuals and for groups [7]. The Qur’an has many benefits and everything that is needed if you want to study it more deeply. One thing that can be done is to read and understand the interpretation of the Qur’an itself.

The natural phenomenon in the form of an eclipse is one of the phenomena that must occur on this earth. But its circulation has a time and procedure that can be explained in science. Even so the circulation between the earth, moon, and sun has been described in the Qur’an. This movement that has occurred has been stated in the Qur’an which can be seen first through Surah Yunus verse (10): 5

Based on the verse above, it is explained that Allah ordained it to happen without a purpose, it must have a purpose in it. So that the indication of the signs of Allah's power in the calculation
of the days in a lunar month can be calculated through the place of its orbit. The Qur'an also explains the same thing about the social phenomenon, namely poverty, which is contained in Surah Al-Mudatsir (74): 42-44.

2. Method

In this study using research and development (R & D) methods. This research method is a method of developing learning materials. The purpose of this research is to develop explanatory text teaching materials sourced from the interpretation of the Qur'an at Madrasah Aliyah Persiapan Negeri 4 Medan. The development model used in this study is the Borg and Gall development model adapted by Sugiyono [9] saying that there are 10 steps in conducting research or creating a product and then testing it which is described in the image below.

The developed teaching materials will be analyzed using the validation of a team of material experts and teaching material design experts. Assessment will be given using a rubric developed by the researcher by modifying expert opinion according to needs. The criteria for assessing teaching materials are of course based on the suitability of teaching materials sourced from the interpretation of the Qur'an and fully guided by the syllabus as well as to see the effectiveness of the explanatory text writing module that is sourced from the interpretation of the Qur'an. Then the data that has been obtained is then analyzed quantitatively descriptively, namely by calculating the percentage of indicators for each category in the teaching materials developed through the formula:

\[ X = \frac{\sum x}{n} \]  

Information:
- \( X \) = average
- \( x \) = total value
- \( n \) = sum of values

Then it is calculated to get the percentage through the formula below

\[ \text{score percentage} = \frac{\text{number of indicators per category}}{\text{total number of indicators per category}} \times 100\% \]  

3 Result and Discussion

The results of the pretest and posttest were obtained from tests performed to student with giv trial test for see effectiveness learning with use module text sourced explanation from the
interpretation of the Qur’an. Test this conducted to participant educate class XI IA 1 Madrasah Aliyah Persiapan of the State 4 Medan with a total of IA 35 students. Then will seen acquisition results write text sourced explanation from the interpretation of the Qur’an before and after use teaching materials in the form of module with based on criteria effectiveness use module. Following is the criteria.

**Table 1. Criteria Effectiveness Module Usage**

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Very good</td>
<td>85% ≤ x ≤ 100</td>
</tr>
<tr>
<td>B</td>
<td>Well</td>
<td>70% ≤ x ≤ 84%</td>
</tr>
<tr>
<td>C</td>
<td>Enough</td>
<td>55% ≤ x ≤ 69%</td>
</tr>
<tr>
<td>D</td>
<td>Not good</td>
<td>40% ≤ x ≤ 54%</td>
</tr>
<tr>
<td>E</td>
<td>Very Not Good</td>
<td>0% ≤ x ≤ 39%</td>
</tr>
</tbody>
</table>

Acquisition the results of the pretest obtained value 2345 with the average value obtained IA 67% with 'enough' criteria. While the posttest value obtained score whole of 3025 with 'very good' criteria. So that could said that module teaching materials write text sourced explanation from the interpretation of the Qur’an could used as additional teaching materials because experience enhancement grades obtained by students.

**Table 2. Difference between Pretest and Posttest scores**

<table>
<thead>
<tr>
<th>Group</th>
<th>Total value</th>
<th>Average</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest (before)</td>
<td>2345</td>
<td>67%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Posttest (after)</td>
<td>3025</td>
<td>86.4%</td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, can be seen that effectiveness learning Theory text explanation when the pretest is obtained score whole of 2345 with an average of 67% while for effectiveness teaching materials using module text sourced explanation from the interpretation of the Qur’an get score whole of 3025 with an average of 86.4%. Difference percentage from the pretest and posttest scores were 21.25% with score more posttest percentage good from percentage pretest value. So that could concluded that use module teaching materials developed more effective. For see distribution frequency student pretest score attached in table as following.

**Table 3. Distribution Frequency of Learning Outcomes Pretest Score Writing Explanatory Text sourced from the Tafsir of the Qur’an**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-56</td>
<td>4</td>
<td>11.42%</td>
</tr>
<tr>
<td>57-63</td>
<td>4</td>
<td>11.42%</td>
</tr>
<tr>
<td>64-70</td>
<td>20</td>
<td>57.14%</td>
</tr>
<tr>
<td>71-76</td>
<td>5</td>
<td>14.28%</td>
</tr>
<tr>
<td>77-83</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>84-90</td>
<td>2</td>
<td>5.7%</td>
</tr>
<tr>
<td>Amount</td>
<td>35</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table distribution frequency obtained through the assessment that has been explained in section attachment, so that obtained criteria evaluation for determine score results study students. Based on table distribution frequency above seen that students who earn the value of 50-56 is 4 students with acquisition percentage namely 11.42%, students who get grades 57-63 totaling 4 students with acquisition percentage namely 11.42%, students who get the value of 64-70 is 20 students with acquisition percentage namely 57.14%, students who get the value of 71-76 is 5 students with acquisition percentage that is 14.28%, students who get the value of 77-83 is 0 so that score percentage is also 0%, and students who get grades 84-90 totaling 2 students with acquisition percentage 5.7%.

Value test results posttest is results obtained after doing test with use module write text sourced explanation _ from the interpretation of the Qur'an. During the posttest, students get results obtained have good difference from results test before use module. For see distribution frequency student posttest scores attached in table as following.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-83</td>
<td>9</td>
<td>25.7%</td>
</tr>
<tr>
<td>84-86</td>
<td>11</td>
<td>31.42%</td>
</tr>
<tr>
<td>87-89</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>90-92</td>
<td>11</td>
<td>31.42%</td>
</tr>
<tr>
<td>93-95</td>
<td>4</td>
<td>11.42%</td>
</tr>
<tr>
<td>96-98</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Amount</td>
<td>35</td>
<td>100%</td>
</tr>
</tbody>
</table>

Intervals obtained through score calculations that have been attached to section attachment. Based on table distribution frequency above seen that students who earn grades 80-83 totaling 9 students with percentage that is 25.7%, students who get grades 84-86 totaling 11 students with acquisition percentage namely 31.42%, students who get the value of 87-89 is 0 students with acquisition percentage i.e. 0%, students who get grades 90-92 total 11 students with acquisition percentage namely 31.42%, students who get the value of 93-95 is 4 so that score percentage is also 11.42%, and students who get the value of 96-98 is 0 students with acquisition percentage 0%.

Based on results percentage earned from the pretest and posttest there ‘are enough’ difference significant in learning Theory text explanation before use module and after use module text sourced explanation from the interpretation of the Quran based on from results table assessment above. Through this module, it is easier for students to learn explanatory texts sourced from the interpretation of the Qur'an.

Therefore, the module developed is good to be applied to class XI students. Especially for students who go to Islamic-based schools because they contain the Qur'an to be adapted to the explanatory text material. So that students can learn two things at once, namely natural phenomena or social phenomena that can be found in the Qur'an. This can make students better understand that everything in the world has been explained in the Qur'an. For that, humans are just ordinary creatures and have no power.
4 Conclusion

Based on the results of the research and discussion regarding the development of the explanatory text module sourced from the interpretation of the Qur'an for the students of class XI Madrasah Aliyah Persiapan Negeri 4 Medan, it can be concluded that the results obtained in the pretest and posttest testing of students in class XI Madrasah Aliyah Persiapan Negeri 4 Medan by using the explanatory text module. Sourced from the interpretation of the Qur'an was declared effective with an average score at the pretest of 67% in the 'Enough' category and the score at the posttest an average of 86.4% in the category of 'Very Good'. So it can be seen that there is an increase in the value between the pretest and posttest through the calculated difference, which is 19.4%. This assessment is carried out using the results of tests that have been carried out on students with the effectiveness criteria obtained, namely very good.

References

Busy Book Learning Media Development to Improve The Reading Ability of Children Aged 5-6 Years at Bungong Kupula Kindergarten Pasie King

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Abstract. This study aims to improve the reading ability of children aged 5-6 years in Bungong Kupula Kindergarten. This study was designed using a 4-D model (four D model) consisting of 4 main stages, namely: Define, Design, Develop, and Disseminate. The research was conducted during the 2020-2021 academic year pandemic. The data collection techniques for this study were 1) a questionnaire validation sheet from a team of experts, 2) a questionnaire response sheet for students and teachers, 3) an observation sheet for the reading ability test of children aged 5-6 years. The results showed that the busy book media was very feasible and effective in improving reading learning which had implications for the average score of the child's initial test, which was 34.54 and on the final test it increased to 68.18 with an increase in the score of 33.64.

Keywords: busy book media, reading ability

1 Introduction

Language development is an aspect of cognitive development where thinking skills, such as recognition, grouping, stage comparison, and estimation are required. Children's thinking patterns focus on the ability to understand symbols that can interpret past experiences. Susanto (2014: 74) concludes that language development in children does not start from words to letters and then becomes experience, but starts from actions that become letters and develop into words. That is, the success of reading in school already has a record of language which is a major component in the child's personality.

Understanding of language is very important in the development of children before the age of 6 years. The process of learning language in early childhood is focused on speaking skills, skilled in verbal and nonverbal (symbolic) communication. Instilling understanding in symbolic mastery, children need practice in reading and writing.

Reading is one of the four important components of language. Reading is an activity that uses the five senses to understand the written content of what is read. Reading is a fundamental skill that is important to learn and a measure of success in education, at work, and elsewhere.
According to Syafruddin, et al (2011: 70) reading is a way to get information and knowledge and understand that writing carries a message by recognizing labels, signs, other forms of writing, and the environment. Children who can read certainly go through stages of development. The development of children's reading skills consists of four stages including: (a) Stages of emergence of understanding related to writing; (b) Stages of interpreting images; (c) Stages of reading identification; and (d) Advanced and fluent stages in reading.

Reading activity can essentially be taught to toddlers. Montessori in Mutiah (2010: 165) concludes that learning to read is not a difficult learning activity to implement. The process of learning to read is very effective to be carried out in the age range of 4.5 years to 6 years.

Kindergarten teachers must be demanded to be more innovative and productive in improving children's ability to learn, especially at an early age which must be combined between learning while playing or playing while learning. Widayati (2009: 2), suggests that through the implementation of good learning media will play a role in improving the quality of the learning process carried out by teachers.

Based on early observations that were tried on group B children at Bungong Kupula Pasie Raja Kindergarten on July 6, 2020, it was found that teachers teach children to read using illustrated reading books that have been distributed to children, but this is not optimal because children in general are still lacking able to recognize letters. Every time the teacher asks the child to read, the child still needs the teacher's guidance in pronouncing the letters and the child's enthusiasm is still lacking in learning to read. While on development indicators, recognizing letters and words in children aged 5-6 years.

One method that can be done by kindergarten teachers is to use learning media that can attract the attention of students in reading so that reading skills will accompany them. One of the learning media that can be tried is the Busy Book learning media. Busy Book is a book made of flannel with bright colors and various and comfortable for children containing daily activities that aim to increase children's creativity and reading skills. The purpose of introducing busy books to early childhood is intended not only to improve reading skills, it can also increase children's interest through entertaining methods, improve children's motor, psychological, skills and emotional skills.

2 Theoretical Summary

2.1 Reading Ability of 5-6 Years Old

Reading is the translation of symbols and sounds into meanings that require sensory movement. Children who practice reading must be able to practice but the sounds of different letters and be able to compare the sounds with their writing. Reading should be an easy and natural way if the kindergarten teacher continues to often tell children about recorded words.

Reading can also be understood as a way to master something that is implied in the explicit. It means mastering the meaning contained in the recorded words. Reading is an activity of extracting data from reading, either in the form of notes or paintings or charts. Idris and Izul (2015: 14) suggest that reading is a complex activity by collecting a large number of separate activities, including interpretation, imagination, observing and remembering.
Reading is an activity that has the concept of accuracy and understanding simultaneously. In reading, mechanical skills are needed where children must recognize letter shapes, linguistic elements and the ability to spell reading. Children also have to understand what they read and understand the relationship between words and their surroundings so that their learning becomes more meaningful.

Making children love to read is not an easy job and certainly not something that cannot be done. At the reading development stage, children aged 5-6 years enter the bridging reading stage where they begin to train children to distinguish letter sounds, word meanings, and sentence rules together so that they can improve children's reading skills. However, parents and kindergarten teachers are not encouraged to force children to read letter by letter. Cultivate an interest in reading in children and then children will be sympathetic to what they want to read.

Children aged 5-6 years need something concrete to easily understand what they see. According to Montessori in Mutiah (2010: 165) the sensitivity of children will grow in the age range of 3-5 years which is indicated by the sensitivity of children to develop. This responsive era is an effective era for adults and teachers in sharing experiences or training with children by providing actual examples or in the form of cheerful demonstrations that will be more efficiently obtained by children.

2.2 Busy Book Learning Media

According to Arsyad (2011: 3) media is an intermediary that connects the sender of the message to the recipient. Media in a wider scope contains people, modules, or events that enable students to gain insight, expertise and action. In other words, reading books, teachers and the school environment are media. According to Briggs in Zaman (2010: 4) media are various physical forms that can give messages and stimulate children to learn, including books, tapes, films and others.

Learning media that are well structured aim to stimulate the emergence of a mental formation process in each child. In which, communication is formed between children and the media or so that there is an interaction between the teacher (sender) and child (recipient) and the learning process can occur.

Learning media is a basic need for early childhood schools. The world of children is synonymous with games, because games can train children's development, especially reading skills. Early childhood education is required to be a creative teacher so that learning remains fun. Alice (2010) added that the existence of learning media can train children to be media literate so that children are smarter faster and of course can be responsible for the media they use. This means that the media is very important for children in learning in order to increase intelligence and a high sense of responsibility so that in addition to getting knowledge, children also get character values.

Learning media is a significant part of the way of learning. The choice of tools and their adaptation to the learning module will greatly ensure the success of the child in the way of teaching practice. Tools made of cloth material are very comfortable when given to young children. Busy book is one of the tools made from patterned flannel and can certainly attract children's attention in practicing.

For Gaity (2014: 19) "a busy book is an interactive training tool, made of flannel which is built into a novel with a bright motif". Busy books are generally aimed at children aged 6 months to preschool, contain simple game activities that can trigger a child's soft motor development such
as comparing colors or shapes, attaching by inserting threads into existing fabrics, and attaching buttons. Not only does it make children busy with schedules in each positive activity, it also identifies independent learning from an early age.

*Busy books* can make children busy with schedules (*busy*) with various activities in it. Children will have a busy schedule of fiddling with each page according to the activities on that page. Each page offers different activities so that it can improve children's skills and creativity, especially in improving reading skills.

### 3 Research methods

The model used in this study is the development of the 4-D model (four D model) proposed by S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel (1974:5). The form of 4D development consists of 4 main stages, namely: *Define* (definition), *Design* (Composing), *Develop* (Development), as well as *Disseminate* (Deployment).

In this research, descriptive analysis method is used. Descriptive analysis method is applied by using descriptive statistics. Descriptive statistics are statistics used to analyze information by defining or describing the initial information that has been collected without containing general or generalized conclusions (Sugiyono, 2012: 207).

The data obtained is data about the state of *busy book learning media* for children aged 5-6 years group B Bungong Kupula Pasie Raja Kindergarten. This information is summarized through the validation of material experts, learning media experts, linguists, language experts, a questionnaire questionnaire for 11 children filled in by category teachers and 8 teachers. The research instrument was given by expert validators, teachers and students who were made in the form of a Likert scale that had been submitted scores as shown in Table 1 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Answer Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very good</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Well</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Not good</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Not good</td>
<td>1</td>
</tr>
</tbody>
</table>

(Sugiyono, 2012: 137)

After that, the data were analyzed using descriptive statistics (average score and percentage), namely making the percentage of indicators for the use of *busy book upgrading media* for each category that had been made. The percentage of this score can be calculated by the following equation:

$$\text{Score percentage} = \frac{\text{Total Indicator Scores Per Category}}{\text{Number of Indicators Total Category}} \times 100\%$$

Calculation of research data using the above equation to obtain a score in the form of a percent. The classification of the score will be changed in the form of a percentage (Sugiyono, 2012: 140). After that it is interpreted with quantitative sentences listed in Table 2.
Table 2. Criteria for the Percentage of Learning Media Indicators *Busy book*

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage Interval</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>80% X 100%</td>
<td>Very good</td>
</tr>
<tr>
<td>B</td>
<td>60% X 80%</td>
<td>Well</td>
</tr>
<tr>
<td>C</td>
<td>40% X 60%</td>
<td>Currently</td>
</tr>
<tr>
<td>D</td>
<td>20% X 40%</td>
<td>Not good</td>
</tr>
<tr>
<td>E</td>
<td>0% X 20%</td>
<td>Very Not Good</td>
</tr>
</tbody>
</table>

(Sugiyono, 2012: 137)

After the presentation in the form of a percentage, the next stage is to ensure the feasibility level of the media is based on the results of the presentation that has been held. To confirm the type of suitability of this upgrading tool, the Likert scale measurement ratio is used. By measuring the Likert ratio, the variables to be measured are presented as variable indicators, after which the variable indicators are used as a reference in the preparation of instrument items which can be in the form of statements or problems. The answers for each item using a Likert scale with a range from very positive to negative (Sugiyono, 2012: 135).

The data obtained is information in the form of values which are then grouped with reference to the *Likert scale measurement*. There are 4 types that become the parameters of the feasibility of learning media in this research by using a scale. The feasibility of the perspective in the development of *busy book learning media* can use Table 3 below.

Table 3. Percentage Scale of Media Eligibility

<table>
<thead>
<tr>
<th>Scale in Percent</th>
<th>Value Scale</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 – 100%</td>
<td>4</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>75 – 84%</td>
<td>3</td>
<td>Worthy</td>
</tr>
<tr>
<td>56 – 74%</td>
<td>2</td>
<td>less worthy</td>
</tr>
<tr>
<td>&lt; 55%</td>
<td>1</td>
<td>Not feasible</td>
</tr>
</tbody>
</table>

(Vuryanti in Franata, 2012: 65)

In the table above, the percentage of score scale achievements and explanations in seeing the feasibility level of research results obtained from the validation of material experts, learning media experts, linguists, teachers and group B children aged 5-6 years refers to the feasibility standard of this feasibility indicator, the feasibility of presenting and the feasibility of learning media produced on *busy book learning media*.

From the calculation results that have been obtained, it is further clarified into several categories, namely:

Table 4. Rating Categories

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>80%-100%</td>
<td>Very Well Developed (BSB)</td>
</tr>
<tr>
<td>60%-79%</td>
<td>Developing as Expected (BSH)</td>
</tr>
<tr>
<td>30%-59%</td>
<td>Start Growing (MB)</td>
</tr>
<tr>
<td>10%-29%</td>
<td>Undeveloped (BB)</td>
</tr>
</tbody>
</table>

Adaptation: Aqib (2011: 41) and Ministerial Regulation No. 58 Year 2009
4 Research Result

4.1 Research Results on the Feasibility of Busy Book Media based on the Syllable Method to Improve Reading Ability of Children aged 5-6 Years in Bungong Kupula Pasie Raja Kindergarten

The results of the feasibility of busy book learning media based on the syllable method can be seen from the responses of teachers and students which are shown in the following table.

Table 5. Teacher's Response

<table>
<thead>
<tr>
<th>No</th>
<th>Teacher's Response</th>
<th>Answer</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>The busy book</em> media based on the syllable method makes it very easy for teachers to teach students to read</td>
<td>Yes</td>
<td>6</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>2</td>
<td><em>The busy book</em> media based on the syllable method makes it easier for teachers to attract children's attention in studying marine vehicle material</td>
<td>Yes</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td><em>The busy book</em> media based on the syllable method helps teachers to encourage students' activity and creativity</td>
<td>Yes</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td><em>The busy book</em> media based on the syllable method makes it very easy for teachers to learn about marine vehicles</td>
<td>Yes</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td><em>Busy book</em> media based on the syllable method can help teachers train students' cohesiveness</td>
<td>Yes</td>
<td>3</td>
<td>37.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>5</td>
<td>62.5%</td>
</tr>
<tr>
<td>6</td>
<td><em>Busy book</em> media based on the syllable method has a size that is suitable for early childhood</td>
<td>Yes</td>
<td>7</td>
<td>87.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>7</td>
<td><em>Busy book</em> media based on the syllable method has a good cover and arouses the curiosity of students</td>
<td>Yes</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>8</td>
<td><em>Busy book</em> media based on the syllable method has colors that attract the attention of students</td>
<td>Yes</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>9</td>
<td><em>Busy book</em> media based on the syllable method displays beautiful picture quality</td>
<td>Yes</td>
<td>7</td>
<td>87.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>10</td>
<td><em>Busy book</em> media based on the syllable method displays clear letters and easy-to-understand sentences</td>
<td>Yes</td>
<td>7</td>
<td>87.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>1</td>
<td>12.5%</td>
</tr>
</tbody>
</table>
Based on the results of the analysis of teacher needs above, it produces an average score of 88% with a very decent category, so basically teachers need media in the learning process to improve early childhood reading skills.

Table 6. Student Responses

<table>
<thead>
<tr>
<th>No</th>
<th>Child Response</th>
<th>Answer</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The busy book media based on the syllable method makes it very easy for me to learn to read</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>The busy book media based on the syllable method makes the marine vehicle material even more fun</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>The busy book media based on the syllable method encourages my activity and creativity</td>
<td>Yes</td>
<td>9</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>2</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>The busy book media based on the syllable method makes it very easy for me to learn about marine vehicles</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td>The busy book media based on the syllable method makes me play together with friends</td>
<td>Yes</td>
<td>9</td>
<td>81.81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>2</td>
<td>18.18%</td>
</tr>
<tr>
<td>6</td>
<td>busy book media based on the syllable method has a size that is suitable for my age</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>busy book media based on the syllable method has a good cover and arouses my curiosity</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>8</td>
<td>busy book media based on the syllable method has a color that catches my attention</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>9</td>
<td>busy book media based on the syllable method displays beautiful picture quality when I play it</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>10</td>
<td>busy book media based on the syllable method displays clear letters and easy-to-understand sentences</td>
<td>Yes</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Based on the table above shows that students’ responses to busy book learning media based on the syllable method developed with an average value of 96% are considered very feasible, so it can be concluded that there is no need for revision, only teacher control is needed when students playing busy book media based on the syllable method so that children stay compact in learning and playing with friends.
4.2 Results of the Effectiveness of Busy Book Learning Media based on the Syllable Method to Improve Reading Ability of Children aged 5-6 Years in Bungong Kupula Pasie Raja Kindergarten

Based on the results of the research on the reading ability of children in group B of Bungong Kupula Pasie Raja Kindergarten, there were differences in the initial test conducted through observation and the final test aimed at differentiating the results of children's reading ability before and after using the media. Between the initial test and the final test there was a significant increase, which is shown in the following table:

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Score Interval</th>
<th>Number of children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre-Test</td>
</tr>
<tr>
<td>1</td>
<td>Very Well Developed</td>
<td>80 – 100</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Growing As Expected</td>
<td>60 – 79</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Start Growing</td>
<td>30 – 59</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Undeveloped</td>
<td>10 – 29</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 7. Recapitulation of Children's Reading Ability Pre-Test and Final Test

Table 6 shows that in the initial test the child did not get the criteria for developing very well and developing as expected. The highest child score was obtained only on the criteria for starting to develop as many as 4 people and the remaining 7 children obtained the criteria for not developing. While in the final test, 4 children obtained the criteria for developing very well, 6 children obtained the criteria for developing as expected, 1 child obtained the criteria for starting to develop and none of the children obtained the criteria for not developing. Thus, it can be said that the reading ability of children has increased from before the use of busy book media based on the syllable method. For more details, it can be seen in the following graph:

Thus the busy book learning media based on the syllable method in group B Bungong Kupula Pasie Raja Kindergarten which was developed based on the validity of the material, media and language as a whole is very good and feasible to use. This is in accordance with the constructivist learning theory (in Mutiah, 2010: 80) which describes that children are active in constructing or
compiling knowledge and experience, not passive recipients. The acquisition of knowledge received by children during the learning atmosphere is obtained through complete experiences. This implies that learning is not only based on mastery of the material, but also on efforts so that children are able to use their minds effectively and efficiently so that emotional involvement and creative abilities dominate.

5 Conclusion

Based on the formulation, objectives, results and discussion of the research on the development of busy book learning media based on the syllable method to improve the reading ability of children aged 5-6 years in Bungong Kupula Pasie Raja Kindergarten which have been described, the conclusions are as follows:

The feasibility level of busy book learning media based on the syllable method based on the results of the feasibility of the teaching staff revealed the need and desire for busy book learning media based on the syllable method in the learning process with an average value of 88% in the "Very Eligible" category, while the response to the use of this learning media, there is an interest in learning, easy learning media and foster cohesiveness in learning in groups even though busy book media is based on the limited syllable method with an average value of 96% including "Very Eligible".

The effectiveness level of busy book learning media based on the syllable method based on the results of the effectiveness indicates that children's reading ability is higher through the use of busy book learning media based on the syllable method when compared with the use of book media with an average score of the child's initial test which is 34.54 and becomes 68.18 on the final test. Thus it can be seen that there is a tendency to increase reading ability obtained from the children's scores for the initial and final tests of 33.64. Therefore, the use of busy book learning media based on the syllable method in the learning process is more effective in encouraging the reading ability of group B children in Bungong Kupula Pasie Raja Kindergarten.

References


Development of Auditory Intellectually Repetition (AIR) Collaborative Investigation Learning Model in Improving the Ability of Writing Text Reports of Observation Students of Class X SMK Negeri 11 Medan

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Abstract. This research is motivated by the existence of problems in learning to write text reports on observations. The problem stems from the complexity of the material process for writing observational report texts, which often become material that is less attractive and students' enthusiasm in learning non-creative observational report material. Based on this, this study aims to produce an auditory, intellectually, repetition (AIR) collaborative investigative group model in improving the ability to write observational report texts for Class X SMK Negeri 11 Medan. The research method used is the method of research and development of the Thiangarajan system using 4-D Define, Design, Develop, Deseminate. The development stages are the initial study phase, initial product development, and product testing. The results of material expert validation on the feasibility of the material obtained an average of 89.1% with the category "Very good" For the graphic assessment by design experts obtained an average of 95.1% with the category "very good". Product trials were carried out in three stages: individual testing, small group trials, and limited field trials. Individual trials with an average of 86.1% in the very good category, small group trials with an average of 91.2% in the very good category, and limited field trials with an average of 88.99% in the very good category. The effectiveness of the collaborative AIR model of the investigative group on the text material of the observation report was declared effective. The pretest obtained an average of 63 and the posttest obtained an average of 78. The difference between the pretest and posttest is 15%, which indicates that learning with the Investigation Group Collaborative AIR learning model is better than before.

Keywords: learning model, air, investigation group, development

1 Introduction

Active learning activities carried out by students are skills in the learning process, where students are able to respond to what is the ongoing and more effective learning goal. Trisdiono
[1] argues that there are several things that must be done in active learning students namely; a) students actively make observations as a step in multiplying information with the help of questions prepared by teachers and students; b) students understand the concept through discussion activities with friends, making products, and presenting learning outcomes; c) the teacher provides reinforcement by ensuring students' understanding; d) the teacher checks the assignment of the material. Effective learning as a supporter of student learning, namely students grow their knowledge and personal experience with the interaction in the surrounding environment.

The selection of strategies, methods or learning models that are better and according to the criteria, is a way that must be done by the teacher as a supporter of learning achievement. Not only that, teachers must also be able to master and design learning models well so that the learning process can be carried out better and more structured. The three main problems faced (1) How is the process of developing the AIR model (auditory, intellectually, repetition) of collaborative investigative groups in improving the ability to write text reports on student observations. (2). How are the results of the validation of the development of the AIR model (auditory, intellectually, repetition) of collaborative investigative groups in improving the ability to write text reports on observations that are feasible to use on students. (3). How are the results of the limited trial, the application of the development of the AIR model (auditory, intellectually, repetition) collaborative investigative group in improving the ability to write text reports on the results of observations effectively used by students. AIR learning model (Auditory Intellectually Repetition) Investigation Group Collaboration as problem solving in improving student observation report writing.

1.1 Learning Outcomes

Talking about learning outcomes, the notion of learning outcomes consists of two words 'results' and 'learning'. In KBBI [2] results have several meanings: 1) Something held by a business, 2) income; acquisition; fruit. While learning is a change in behavior or responses caused by experience while Abdurrahman [3] states that learning outcomes are abilities obtained by children after going through learning activities. According to him, children who are successful in learning are successful in achieving learning goals or instructional goals. Then Subroto [4] means that learning is "(1) leading to change, (2) That the change is essentially the acquisition of new skills, (3) That the change occurs because of a deliberate effort". Thus, from the opinions of these experts, it can be concluded that learning outcomes are a student effort obtained through a learning process. Where in the process students get achievements and changes in behavior patterns, both attitudes and knowledge.

1.2 Learning Model Development

Learning model development is an activity or process carried out to produce learning models based on existing development theories Hamdani [5]. In line with that, Mulyatiningsih [6] also

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2 KBBI, Kamus Besar Bahasa Indonesia, (2016).
states that the research and development stages of learning systems can be analyzed from a series of tasks, in carrying out their main tasks, starting from designing, implementing to evaluating learning. Based on expert opinion regarding the development of learning models, it can be concluded that the development of learning models is a design model that already exists and is carried out in a structured manner in a concept of innovating, producing, designing so that the learning model can later be used as a reference in a learning system.

1.3 Learning model AIR (Auditory Intellectually Repetition) Investigation Group Collaboration

The AIR Learning Model was first introduced by Dave Meier [7]. Meier is an educator, trainer, as well as the initiator of the accelerated learning model. The AIR learning model approach stands for auditory, intellectually and repetition. According to Linuwih & Sukwati [8] the AIR learning model is a cooperative learning model that can increase student activity and can also motivate students to improve student achievement. In line with that Huda [9] the AIR learning model is one of the learning models that emphasizes three aspects, namely auditory (listening), intellectually (thinking), repetition (repetition). In the AIR learning model, there are three things that become the approach in this model, namely: A – Auditory – Hearing, I – Intellectually – Thinking, R – Repetition – Consolidation. Then the learning model that supports the involvement of each student in the learning process, one of which is the group investigation learning model. Talking about the group investigation learning model, this learning model is a learning model that can be used in overcoming a competitive and individualistic learning weakness. The group learning system can make students interrelated or help each other in the learning process Trianto [10]. This model was first developed by Herbert Thelan then updated and researched by Shlomo and Yael Sharan at Tel Aviv University. Sudjana [11] suggests that Group Investigation was developed by Herbert Thelen as an effort to combine teaching strategies oriented to the development of the academic study process. Slavin [12] suggested six learning steps using the Group Investigation Model, namely: grouping, planning, investigation, organizing, presenting, evaluating.

1.4 Observation Report Text

According to Kosasih [13] the observation report is an essay that describes a phenomenon or event based on observations. So the observation report is a record of a written statement as a result of procedures to explain information about facts or results of supervision of certain

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8 Linuwih, S., & N.O.E. Sukwati. Efektifitas Model Pembelajaran Auditory Intellectually Repetition (AIR) Terhadap Pemahaman Siswa Pada Konsep Energi Dalam. (Jurnal Pendidikan Fisika Indonesia), 2014, 10 (2) : 158-162
12 Slavin. cooperative learning teori, riset dan praktik. (Bandung: Nusa Media), 2005.
activities or events. In line with Priyatni [14] the text of the observation report is a text that conveys information about something as it is as a result of systematic observation and analysis, not embellished with a personal response about the object being reported [14]. From the descriptions of the opinions of these experts, it can be concluded that the observation report, it can be concluded that the observation report is an activity or act of seeking a truth or fact on an event, occurrence, or an object with a systematic observation or research process as accurate handle to be able to provide knowledge information.

2 Research Method

This research was conducted from October to December 2021 at SMK Negeri 11 Medan involving 32 students of class X. The types of research carried out by the author in this study were quantitative research, qualitative research and development research. Research The development of this learning model will also be supported by using guidelines Thiagarajan system development research method uses 4-D Define, Design, Develop, Disseminate. The types of research conducted by the author in this research are quantitative research, qualitative research and development research.

3 Result and Discussion

The process of developing the collaborative AIR model of the investigative group on the text of the observation report is carried out in four stages, namely the definition stage, the design stage, the development stage and the dissemination stage. we can see in Figur 1 below:

![Fig. 1. Syntax of Group Investigation collaborative AIR learning model.](image)

The process of developing the collaborative AIR model of the investigative group on the text of the observation report was carried out in four stages, namely the definition stage, the design

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stage, the development stage and the dissemination stage. The results of the development of the AIR learning model Investigation group collaboration in the form of syntax (steps of learning model) from 3 steps to 9 steps of learning model stages. At the initial product to 2 material experts there are 2 design experts. The results of material expert validation on the feasibility of the material obtained an average of 89.1% with the category "Very good". For the graphic assessment by design experts obtained an average of 95.1% with the category "very good". tial product development stage, product design and validation are carried out. At the product trial stage, there are three ways, namely individual trials, small group trials and limited field trials. Individual trials obtained an average percentage of 86.1 in the "Very good" category, small group trials obtained an average percentage of 91.2 in the "Very good" category. The limited field trial obtained an average percentage of 88.99 with the "Very Good" category. Based on these data, it is found that the AIR learning model is suitable for use by teachers and students in learning. Then the development of the collaborative group investigative AIR model on the observation report text material was declared effective.

<table>
<thead>
<tr>
<th>trials</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>individual test 86.1%</td>
<td>Average</td>
<td>Average</td>
<td>15%</td>
</tr>
<tr>
<td>small group test 91.2%</td>
<td>Percentage (50%)</td>
<td>Percentage (65%)</td>
<td></td>
</tr>
<tr>
<td>limited test 88.9%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is evidenced by the test of student learning outcomes in writing the text of the observation report. At the time of the pretest, the average was 63 and at the posttest, the average was 78. The difference between the pretest and posttest was 15%, which indicates that learning with the Investigation Group Collaborative AIR model is better from the previous.

4 Conclusion

The effectiveness of the collaborative investigation group AIR model on the text material of the observation report was declared effective. This is evidenced by the test of student learning outcomes in writing the text of the observation report. At the time of pretest obtained an average of 63 and at the time of posttest obtained an average of 78. The difference between pretest and posttest is 15. Thus, the results of learning to write the text of the observation report after using the AIR Collaborative Group Investigation learning model improved better than before using it.

Acknowledgment. The author would like to thank all those who have supported the implementation of this research. Hopefully the results of this research will be useful for we all.
References

Development of Teaching Materials for Writing Folklore Texts Based on Text Engineering in Class X Students of SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency

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Abstract. This type of research is a development research that will produce products in the form of textbooks for writing folklore texts based on text engineering based on test findings in the field. This study aims to obtain teaching materials for writing folklore texts based on engineering texts and also to find out: (1) Describe the process of developing teaching materials for writing folklore texts based on engineering texts, (2) Describe the appropriate of writing engineering-based folklore texts, (3) Describing the effective of developing teaching materials for writing folklore texts based on text engineering. This type of research includes Borg and Gall research and development. The subject of this research is teaching materials for writing folklore texts based on text engineering. The population of this research and development is the tenth grade students of SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency.

Keywords: teaching materials, folklore texts, text engineering

1 Introduction

Education is a dynamic force in life of every individual, which affects development of physical, power, soul, social, and moral. The development of education is something should happen in line with life changing culture. Therefore, an ideal education is expected to be able to prepare students through guidance, teaching or training activities in order to achieve a good quality of education.

Education is not antipathy or allergic to development of such science, but instead becomes a subject or pioneer in its development. People who are interested in education are required ability with tendencies, including a learning increasing system developing with the ease of providing education.

Educational concerns are a priority to be improved is related to education quality, especially the learning quality. From various conditions and potentials that exist, efforts can be made to improve these qualities are to develop learner-oriented learning. In a study, learner-oriented can be done by
building a learning system allows learners have ability to learn more interesting, interactive, and variedly [1].

The government has made curriculum updates to improve education quality by establishing in 2013 curriculum. Curriculum development in 2013 was carried out internal challenges and external challenges. Internal challenges related to education demands refer to the 8 National Education Standards and factors of Indonesia population development. External challenges relate to future challenges, necessary competencies in the future, perception of society, development of knowledge and pedagogics, as well as various negative phenomena fore [2].

Indonesia materials in class X is a folklore text. Permendikbud Number 024 in 2016 competence explain knowledge and quality of competence in folklore texts; Basic Knowledge Competencies 3.7 Values identify and obtained contents in folklore both oral and written; 3.8 Values comparing folklore and linguistics. Basic Skills Competencies 4.7 Folklore retelling content heard and read; 4.8 Develop folklore into short story form by paying attention content and values.

Indonesia learning folklore texts for class X aim to enable students to be able to values identify and contained content in folklore both oral and written. Learners are able to develop folklore content texts are heard and read. However, reality obtained, in writing learning activity and understanding folklore texts becomes something difficult and far from expectations. Cause students difficult for writing folklore texts occurs lack a teaching materials availability and a teacher-centered learning process. This activity make students bored and results in a low students ability understand the lesson and explore their skills.

Learning will be able to be carried out optimally if the teaching materials used in the learning can be implemented properly. Teaching materials are materials or subject matter that are arranged systematically, which are used by teachers and students in the learning process. Teaching materials are a set of learning tools or tools that contain learning materials, methods, boundaries, and evaluation methods that are systematically and interestingly initiated in order to achieve the expected goals, namely achieving competencies or subcompetences with all their complexity Widodo & Jasmadi (in Lestari, 2013:1) [4]. This understanding explains that a teaching material must be designed with instructional rules so that it can be used by teachers, helping and supporting the learning process. Learning materials or materials are basically the "content" of the curriculum in the form of subjects or fields of study with topics/subtopics and their details (Ruhimat, 2011:152) [5].

Updating a set of learning plans, lesson materials, and guidelines for organizing activities in the teaching and learning process, is one of the competencies of professional teachers to express feelings and thoughts aesthetically and logically (Purwitasari, 2014:298) [6]. In this situation, teachers are expected to understand the principles of developing learning resources. Teachers as educators need to manage and develop learning resources. Educators are professionals who are in charge of planning and implementing the learning process, as well as assessing learning outcomes.

The results of an interview with Drs. Tambunan Sibuea, M.Pd., a teacher of Indonesian subjects in class X of SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency, It is known that there are still many students who have not been able to understand the content of the folklore text so they have not been able to retell the folklore text.
This is in accordance with the fact that occurred at the place where the research was held, that there are still many students who have not been able to understand and have not been able to identify folklore texts. As in class X-IPA 4, the results of learning folklore texts showed that out of 30 students only 10 students were declared complete with scores of 85 and 75, while other students were declared not to have been achieved with an average score of 62-72 or as many as 20 students were declared incomplete in identifying folklore texts. Most students feel bored, when the learning of folklore texts that contain a lot of folklore, sagas, and fairy tales takes place the teacher only explains not accompanied by direct study. This is certainly one of the many things faced by teachers and students in the teaching and learning process that has been carried out.

In writing skills, various sources and experiences can be used as material to be poured in the form of writing. In writing activities, the student does not have to write something that has never existed, but he can write various things, modifying the read writing, creating another version of a piece of writing, it can even construct various writings into a piece of writing or break a piece of writing into several pieces of writing [7]. The most important is a student must take advantage of various things in the process of writing creativity.

In the context of writing creativity, students must have a high awareness and understand what is written. Piaget (in Gani, 2000:2), understanding is a process of intellectual adaptation that with new experiences and ideas is interacted with what is already known to a person who is learning to form a new structure of understanding [8]. He added that in one's mind there is a structure of initial knowledge (schemata). Each schemata acts as a filter and facilitator for new ideas and experiences. The schemata organizes, coordinates, and intensifies the basic principles. Through contact with new experiences, schemes can be developed and changed, that is, by processes of assimilation and accommodation (Rahayu, 2017:345-346) [9].

One form of the new experience contact is the contact between students and teachers. The contact is in the form of a conducive interaction that is built together. Interaction with the teacher, according to the views of constructivists, is not the activity of transferring knowledge from the teacher to the student. In this context, the activities of the teacher allow the student to build his own knowledge. Teachers participate in the learning process by forming knowledge, creating meaning, seeking clarity, being critical, and justifying Bettencourt (in Rahayu, 2017:346).

One of the tasks of the teacher is to create a conducive atmosphere so that students can build knowledge, associate old knowledge with new ones, as well as be critical of the knowledge gained. The conducive atmosphere allows students to actualize themselves through writing activities (Rahayu, 2017: 346). In this writing activity, several strategies are needed to improve students' skills. One of the strategies that can be used is text engineering.

Text engineering is very interesting to be used as one of the strategies in improving language skills, in this case students' creative writing skills. For this reason, this technique needs to be implemented, especially in the engineering activities of literary texts that are associated with a specific purpose [10].

In a study, literary text engineering can be applied, for example engineering a poem into prose or drama, engineer a play into prose or poetry, engineer prose into a poem or play, engineer a story until it becomes longer and more specific, engineer literary works to the point of being simple,
engineer regional literature to become national literature, engineer national literature into regional literature, engineer the literature of a certain region until it becomes the literature of another region, engineer classical literature into contemporary or modern literature, engineer literature commonly consumed by adults into children's literature, and so on (Rahayu, 2017:347).

Teaching materials for writing texts based on text engineering make students independent and motivated to know new things, so they need innovations in learning, such as text engineering that has never been done in learning at school. This is one of the strategies that can be used by teachers, namely by designing teaching materials for writing folklore texts based on text engineering. The development of teaching materials for writing folklore texts based on text engineering is expected to help teachers and students in the teaching and learning process so that students' writing skills and critical thinking skills improve.

Pujawan, et al (2014: 227) conducted research on the development of teaching materials with the results of research showing the effective of the use of teaching materials in general can be categorized as good and able to improve student learning outcomes [11]. So with the design of the development of learning teaching materials Indonesian which is directed at efforts to build students' writing and critical thinking skills through teaching materials for writing folklore texts based on text engineering, it is hoped that it will be able to have a positive impact and motivate students to follow the learning process.

Based on the description of the background above, the problems in this study can be identified as follows:

1) Learning variations need to be carried out in schools, so learning is more interesting, creative, and innovative.
2) Lack of teaching materials availability
3) The lack of creativity and teachers in design teaching strategies variability makes students not motivated to learn independent
4) There are still many students are not able to understand folklore
5) Text engineering-based folklore text learning has never been done.

As for the formulation of the problem in this study are:

1) How is developing textbooks process as teaching materials for writing folklore texts based on text engineering?
2) How is the appropriate for writing folklore texts based on text engineering?
3) How is developing teaching materials effective for writing folklore texts based on text engineering?

2 Theoretical Basis

The basic concept in teaching is a conscious effort made by educators consciously, intentionally, and with full responsibility to bring students into physical and spiritual adults as well as social adults so that later they become people who are able to carry out physical tasks as well as think, behave, willingly, mature and can live normally forever and dare to be responsible for his attitudes and actions to others [12].
Learning is a process of thinking from those who do not know to become aware of those who cannot become capable with the aim of making changes in knowledge about various fields of science both in terms of knowledge, skills and positive attitudes [13].

Teaching materials are a set of information that students must absorb through fun learning. Learners must really feel the benefits of teaching materials or subject matter after he learns them. Therefore, a subject matter or teaching material must be able to arouse students’ enthusiasm for learning, so that the teaching materials provided can be useful for students [14].

Writing skill is one of the language skills that is very important to support how to communicate properly and correctly to someone, especially in written communication. Writing is presenting ideas, opinions, feelings or attitudes in written form to be conveyed to certain audiences [15].

Mahsun (2014:1) argues that text is a way to understand language. Functional language or language that is carrying out certain tasks in the context of the situation [16]. All examples of living language that take part in the context of a situation are called texts. Thus, the text is an expression of a statement of a social activity that is verbal.

Folklore is a group of stories that live and develop from one generation to the next which is called folklore because the story lives and develops in the community and all levels of society know the story of Djamaris (in Danandjaja 2013:8) [17].

Sutjaja (2006:25) explains that the word engineering (otak-tik) in Indonesian is equivalent to the word engineering in English. Etymologically, the word engineering is derived from Middle English, namely wendtou, from Old French, namely engigneor, and it could also be from Middle Latin, namely ingenitor which means 'contriver'; or from the word ingenire which means 'to contrive', or from the Latin ingenium which means 'ability' [18].

Rahayu, (2017:346) engineering techniques can not only be applied in the fields of biology, botany, and genetics, but can also be applied in texts. Text engineering is only focused on text. Various literary texts were simplified to produce simplified versions for the needs of primary and secondary education in England. Various folk stories that exist in Japan are engineered or engineered. Engineering or engineering is done, for example, to continue the content of the story. This can be seen from the work of Lafcadio Hearnl in his book entitled Kwaidan. Hearn's engineering has added to the treasures of Japanese folklore.

In learning activities, literary text engineering can be applied, for example engineering poetry into prose or drama, engineering drama into prose or poetry, engineering prose into poetry or drama, engineering a story to become longer and specific, engineering literary works to be simple, engineering regional literature to become national literature, engineering national literature into regional literature, engineering certain regional literature to become other regional literature, engineering classical literature into contemporary or modern literature, engineering literature commonly consumed by adults into children's literature, and so on [19]. Rahayu, (2017:346-347) reports that the basic principles that need to be applied in this engineering are (1) having a certain engineering strategy, (2) setting the target audience, (3) understand the psychology of the reader, and (4) understand the cultural context.
3 Method

This research is a research development (Research and Development / R&D). This method is used to develop and create teaching materials for writing folklore texts based on text engineering in Indonesia language learning for high school class X. To be able to produce teaching materials, research is first used that is a needs analysis and tests the effective of teaching materials so that they function properly in school.

This research was conducted at SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency, on Lintas Sumatera, Labuhan Batu Utara Regency, Aekkanopan. the research was carried out in the middle semester of 2021/2022 academic year.

The population of this research is students of class X SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency. To see effective of the teaching materials developed, researchers only took samples using random sampling techniques or random samples, or mixed samples. Researchers took samples totaling 30 students and 7 teachers.

In this study, the R&D (Reserch and Develoment) Sugiyono development research model used, because in accordance with the objectives to be achieved. Product of teaching materials is a textbook to develop learning write folklore texts. In Sugiyou development research there are ten procedures [20], which is as follows:

1) Potention and problems; researchers conducted interviews with teachers and students about process of learning Indonesia language in class X
2) Collect information; researchers collect data based on information got through needs analysis questionnaire. Next, researchers use the data as planning material to problem resolve.
3) Product design; researchers start to make teaching materials
4) Design validation; material experts assess worthy of learning aspects and aspects of material content, media experts assess worthy of display and presentation aspects, while teachers assess aspects of material content, learning, display and presentation
5) Design improvements; design reapair are made after design expert gives an assessment
6) Product trial; product trial after being declared worthy by the validator, product trial subject are students class X SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara
7) Product revision; product will be revised based on assessment of the questionnaire, suggestions and criticiscl from students. the trial was carried out in three step, that is individual trials, small group trials and limited field trials
8) Trial usage; Textbooks are used in the learning process of writing folklore texts based on text engineering. This trial was conducted to find out the weaknesses and strength of product
9) Product revision; if there are weaknesses in the product, the product is revised again to make it better
10) Bulk production; if the product made has been declared feasible in testing, then the product can be bulk productuin to be applied and used in learning.
Data collection technique in research using a questionnaire, that is:

1) Questionnaire to Measure Appropriate of Teaching Materials
2) Questionnaire to Measure Effective of Teaching Materials
3) Appropriate Test Instruments for Experts

The data obtained is data about state of Indonesia language teaching materials for writing folklore texts based on text engineering. This data is collected through expert validation. Assessment instruments for validators, individual trial, small group, and limited field group made in form a Likert scale has been given a score.

<table>
<thead>
<tr>
<th>Numbr.</th>
<th>Answer</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Verry Good</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Good Enough</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Not Good</td>
<td>1</td>
</tr>
</tbody>
</table>

Then the data were analyzed descriptive quantitative, calculate percentage of indicators for each category in developed teaching materials, with the formula:

\[
\text{Score percentage} = \frac{\text{Number of indicators for each category}}{\text{Number of indicators total category}} \times 100\% \tag{1}
\]

From the results of calculations using formula above, a number is produced form of a percent, then interpreted with qualitative sentences, according to the table below:

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage Interval</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>81% ≤ X &lt; 100%</td>
<td>Verry Good</td>
</tr>
<tr>
<td>B</td>
<td>61% ≤ X &lt; 80%</td>
<td>Good</td>
</tr>
<tr>
<td>C</td>
<td>41% ≤ X &lt; 60%</td>
<td>Middle</td>
</tr>
<tr>
<td>D</td>
<td>21% ≤ X &lt; 40%</td>
<td>Good Enough</td>
</tr>
<tr>
<td>E</td>
<td>0% ≤ X &lt; 20%</td>
<td>Verry Good Enough</td>
</tr>
</tbody>
</table>

4 Results and Discussion

4.1 Teaching Material Development Process

First step, researcher to do observations at SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency and directly interview to Indonesia language teachers and students for needs analysis. Questionnaire result were determined by distributing questionnaires to 7 teachers and 30 students, by first outlining definition of text-based engineering teaching materials.

To find out needs analysis data, data will be displayed in the Table 1.
Table 3. Needs Analysis Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Information Type</th>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Teachers</td>
<td>Students</td>
<td>Amount</td>
</tr>
<tr>
<td>1</td>
<td>Knowing or not familiar with text-based engineering teaching materials</td>
<td>- Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Using or not using text-based engineering teaching materials</td>
<td>- Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Required or not required text-based engineering teaching materials</td>
<td>- Yes</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

From the data, the following conclusions: (1) all teachers and students stated that they were not familiar with text-based engineering teaching materials; (2) all teachers and students also stated that they didn’t use text-based teaching materials in the learning process; (3) Most of the teachers and students (87.80%) stated that they needed text-based engineering teaching materials in the learning process and only a small (12.19%) stated that they did not require.

Can be concluded that the development of text-based engineering teaching materials is really needed by teachers and students in the learning process. Results interviews with teachers of Indonesia teaching language stated that they needed text-based teaching materials to support learning process, as variations that were creative, innovative, efficient, and effective.

The first step of product design carried out by validation content of material and validation learning design, product revisions, to do assessments and suggestions by the teacher. First product of teaching materials developed are teaching materials shaped a textbook. In the textbook content is:

1) Preface
2) Table of Contents
3) Materials 1, 2, 3, and 4
4) Summary
5) Glossary
6) Bibliography
7) Indexes, and
8) Author profile.

4.2 Appropriate of Teaching Materials

Validation content of material product, to find out the opinion of material experts about appropriate of content, presentation appropriate, and language appropriate. Validation was carried out by Dr. Elly Priharti Wuriyani, S.S., M.Pd., is a Postgraduate Lecturer at Universitas Negeri Medan and Dr. Surya M Hutagalung, M.Pd., is a Postgraduate Lecturer at the Universitas Negeri Medan.

Assessment by material experts on each aspect is totally determined by the average score of each criteria. Average percentage of results assessment by the material expert is assessed based aspects and indicators of assessment. There are three aspects assessment carried out by material experts on
developed teaching materials, that is content appropriate, presentation appropriate, and language appropriate.

Table 4. Material Expert Assessment of Content Appropriate Aspects

<table>
<thead>
<tr>
<th>Numb.</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material Suitability</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Material Accuracy</td>
<td>84.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Material Update</td>
<td>78.7%</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Push Curiosity</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>84.55%</strong></td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Overall shows that the learning materials in teaching materials are declared "Very Good" (84.55%). Appropriate presentation aspects overall results are summarized in the table.

Table 5. Material Expert Assessment Appropriate Aspect of Presentation

<table>
<thead>
<tr>
<th>Numb.</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Presentation Technique</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Learning Presentation</td>
<td>85.8%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Presentation Equipment</td>
<td>89.3%</td>
<td>Very Good</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>87.5%</strong></td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Appropriate presentation aspects, overall it shows the learning materials in teaching materials are stated to be "Very Good" (87.5%). Appropriate language aspects overall results are summarized in the table.

Table 6. Material Expert Assessment of Language Appropriate Aspects

<table>
<thead>
<tr>
<th>Numb.</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Straightforward</td>
<td>75.8%</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Legibility</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Presentation Equipment</td>
<td>85%</td>
<td>Very Good</td>
</tr>
<tr>
<td>4</td>
<td>Conformity with level of development students</td>
<td>93.7%</td>
<td>Very Good</td>
</tr>
<tr>
<td>5</td>
<td>coherence of thoughts</td>
<td>70%</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>Use of terms, symbols and icons</td>
<td>85%</td>
<td>Very Good</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>82.8%</strong></td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Aspect language appropriate in the teaching materials as a whole is stated "Very Good" (82.8%). Overall about appropriate of content, appropriate of presentation and appropriate of language is summarized in the table.

Table 7. Results of Material Expert Assessment on Content Appropriate, Presentation Appropriate and Language Appropriate

<table>
<thead>
<tr>
<th>Numb.</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content Appropriate</td>
<td>84.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation Appropriate</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Language Appropriate</td>
<td>82.8%</td>
<td>Very Good</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>84.9%</strong></td>
<td>Very Good</td>
</tr>
</tbody>
</table>
Teaching materials aspects of content appropriate, presentation appropriate and language appropriate obtained an average percentage is 84.9% included in the "Very Good" category. The average percentage results the material expert’s assessment about appropriate of content, appropriate of presentation and appropriate of language in the following picture.

Validation learning design was carried out by 2 design experts, that is Dr. Evi Eviyanti, M.Pd. and Dr. Daulat Saragih, M. Hum., lecturer at the Universitas Negeri Medan. Assessment of teaching materials design is carried out to improve quality appearance of the teaching materials developed.

Overall, results assessment components size of teaching materials, cover design of teaching materials and design components content of teaching materials are summarized in the table.

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Size of teaching materials</td>
<td>78.7%</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Cover design of teaching materials</td>
<td>87.7%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Design component content of teaching materials</td>
<td>84%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>83.4%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Overall in each component obtained an average of 83.84% with the criteria of "Very Good". The average percentage results assessment of 2 design experts validators about components size of teaching materials, cover design of teaching materials and design components content of teaching materials in the following picture.
Result from percentage assessment of 2 design expert validators as a whole on each component, an average of 83.84% "Very Good" criteria. This means design of teaching materials for writing folklore texts based on text engineering has been developed can meet demands of learning needs in class X SMA Negeri 1 Kuala Hulu, Labuhan Batu Utara Regency.

4.3 Assessment of Indonesia Language Teachers on Teaching Materials

Assessment is done by Drs. Tambunan Sibuea, M.Pd., and Imelda, S.Pd., as Indonesia language teacher at SMA Negeri 1 Kuala Hulu, Labuhan Batu Utara Regency. The assessment is carried out about information that will be used to improve developed product quality. The results of Indonesia language teacher's response to teaching materials for writing folklore texts based on text engineering can be seen in table.

<table>
<thead>
<tr>
<th>Numb.</th>
<th>Indicator</th>
<th>Average Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overall appearance of teaching materials is attractive</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>The language used in teaching materials is easy to understand</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Presentation of material in teaching materials arranged systematic</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>4</td>
<td>The material is in accordance with learning objectives</td>
<td>87.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>5</td>
<td>Learning activities stimulate students' critical thinking skills</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>6</td>
<td>Use of images in teaching materials is clear</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>7</td>
<td>The types of activities in the teaching materials</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>8</td>
<td>Latest information in teaching materials accordance with development of science and technology</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>9</td>
<td>Use symbols in accordance with existing rules</td>
<td>100%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>
Teaching materials help students understand learning materials for writing folklore texts 100%  Very Good
The teaching materials used are different from the usual teaching materials 100%  Very Good
Teaching materials can be studied independently by students 70%  Good
Teaching materials practice students enrich students’ knowledge 70%  Good
Teaching materials make it easier for teachers to evaluate students 70%  Good
Teaching materials make it easier for students to express their opinions in oral or written form 70%  Good

| Total score | 87.6% | Very Good |

The teacher’s response teaching materials for writing folklore texts based on text engineering about an average percentage of 87.6% with the criteria of "Very Good". This means teaching materials for writing folklore texts based on text engineering have been developed can meet demands of learning needs will be taught to students in class X.

4.4 Usage Trial

1) Results of Student Responses Teaching Materials Individual Trials. Individual trials were carried out at SMA Negeri 1 Kuala Hulu, Labuhan Batu Utara Regency on 3 students of class X. The purpose of individual trial is to identify product deficiencies and student responses to developed product.

<table>
<thead>
<tr>
<th>Numb</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality of learning materials</td>
<td>89.2%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Technical quality/display</td>
<td>86.8%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>88%</strong></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>

Based on the assessment table tendencies in individual trials on quality aspects learning materials and technical quality/display of Indonesia teaching materials, the percentage with an average score obtained is 88% with the criteria of "Very Good".

2) Results of Student Responses Teaching Materials in Small Group Trials. Small group trials were conducted by 5 students of class X.

<table>
<thead>
<tr>
<th>Numb</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality of learning materials</td>
<td>87%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Technical quality/display</td>
<td>87.2%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>87.1%</strong></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>
Based on the assessment table tendencies in small group trials on quality aspects of learning materials and technical quality/display of Indonesia teaching materials, the percentage obtained with an average score of 87.1% in the "Good" criteria.

3) Results of Student Responses Teaching Materials Limited Field Trials.

Table 12. Assessment of Text-based Engineering Teaching Materials Limited Field Trials at SMA Negeri 1 Kualu Hulu, Labuhan Batu Utara

<table>
<thead>
<tr>
<th>Numbr.</th>
<th>Component</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality of learning materials</td>
<td>92.4%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Technical quality/display</td>
<td>91.7%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>92%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Based on the assessment table tendencies in the limited field trials on quality aspects of learning materials and technical quality/display of Indonesian teaching materials, the percentage obtained with an average score of 92% with the criteria of "Very Good".

4.5 The Effective of Student Learning Outcomes Using Teaching Materials

The effective of student learning outcomes can be obtained by giving trial tests using teaching materials have been developed. This was done with the aim of seeing extent which students' understanding folklore text material was increased by using the teaching materials developed by the researcher in this study.

Description of Pretest Data. Data analysis was carried out on learning outcomes before using teaching materials for writing folklore texts based on text engineering obtained an average score 52.33% with assessment criteria "Not Good" category. Its mean, the value achieved by students in material for writing folklore texts has not reached expectations, so it needs to be improved again.

Table 13. Frequency Distribution of Pretest Scores Before Using Text-Based Teaching Materials

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-37</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>38-46</td>
<td>9</td>
<td>20%</td>
</tr>
<tr>
<td>47-55</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>56-64</td>
<td>10</td>
<td>33.3%</td>
</tr>
<tr>
<td>65-73</td>
<td>1</td>
<td>3.33%</td>
</tr>
<tr>
<td>74-82</td>
<td>4</td>
<td>13.3%</td>
</tr>
<tr>
<td>Σ</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

Students score 29-37 were 3 people or 10%, score 38-46 were 9 people or 20%, score 47-55 were 3 people or 10%, score 56-64 were 10 people or 33.3%, who score 65-73 were 15 people or 3.3%, and those score 74-82 were 4 people. So the total number of students is 30 people.
**Description of Post-test Data Learning Outcomes Using Text Engineering-Based Teaching Materials.** Data analysis was carried out on learning outcomes after using teaching materials for writing folklore texts based on text engineering obtained an average score of 75.56% assessment criteria "Good" category. Its mean, score achieved by students in material for writing folklore texts is Complete.

**Table 14.** Frequency Distribution of Posttest Scores Learning Outcomes After Using Text Engineering-Based Teaching Materials

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-73</td>
<td>10</td>
<td>33.33%</td>
</tr>
<tr>
<td>74-77</td>
<td>13</td>
<td>43.3%</td>
</tr>
<tr>
<td>78-81</td>
<td>2</td>
<td>6.66%</td>
</tr>
<tr>
<td>82-85</td>
<td>1</td>
<td>3.33%</td>
</tr>
<tr>
<td>86-89</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>90-93</td>
<td>1</td>
<td>3.33%</td>
</tr>
<tr>
<td>∑</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

After students are treated by getting learning using teaching materials to write folklore texts based on text engineering, student learning outcomes before and after using teaching materials experienced a significant increase, that is 23.33%. It is known the average value of students before (pretest) using teaching materials is 52.33% and average score after using text-based folklore writing teaching materials (posttest) was 75.56%. From the frequency distribution table, it is known the average score individual students is above the KKM (minimal complete criteria) score, which is 70.

**Table 15.** The Average Summary Pretest and Posttest

<table>
<thead>
<tr>
<th>Numbr.</th>
<th>Group</th>
<th>Average value</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before (Pretest)</td>
<td>52.33</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>After (Posttest)</td>
<td>75.56</td>
<td>23.33</td>
</tr>
</tbody>
</table>

The table shows the difference between pretest to posttest has been done previously. The value obtained is 22.33% with an average pretest is 52.33% "Not Good" criteria and a posttest average is 75.56% "Good" criteria. It can be concluded learning uses teaching materials to write folklore texts based on text engineering can improve student learning outcomes in Indonesia subjects, especially material for writing folklore texts and effective used as teaching materials.

**5 Conclusion**

The developing process of teaching materials for writing text-based folklore texts begins with a needs analysis, interviews and literature surveys for class X Indonesian students and teachers at SMA Negeri Kualuh Hulu, Labuhan Batu Utara Regency. Based on needs analysis results, interviews with Indonesia language teachers and a literature survey, it was concluded development
of text-based engineering teaching materials is very much needed by teachers and students in the learning process.

Teaching materials appropriate of developed for writing folklore texts based on text engineering in class X SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency, meet requirements and are suitable for use as individual teaching materials, based material assessment experts and learning design experts. Based material assessment of 2 material experts as a whole, teaching materials aspects of content appropriate, presentation appropriate and language appropriate obtained an average percentage is 84.9% included “Very Good” category. From the results assessment percentage of 2 design expert validators as a whole on each component, an average is 83.84% was obtained "Very Good" criteria. Its means, the design of teaching materials for writing folklore texts based on text engineering has been developed can meet demands of learning needs in class X SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency.

The effective teaching materials developed for writing folklore texts based on text engineering in class X SMA Negeri 1 Kualuh Hulu, Labuhan Batu Utara Regency, proved effective based on student learning outcomes in the folklore text writing test with an increase in score is 23.33%. The average gain of students in the folklore text writing test before using developed teaching materials was 52.33%, while the average gain after using teaching materials was 75.56%.

References

Development of A Non-Text Book of Characterization of Sitapak Variety of Shallots in Samosir Regency, North Sumatera

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Abstract. Books used to gain knowledge are textbooks. Textbooks are not enough to obtain information, so non-text books are needed. One of the important materials to be included in non-text books is biodiversity because diversity in Indonesia is very high, one of which is the Sitapak variety of shallots. The purpose of this study was to determine the feasibility and responses of students to non-text books based on research on the Sitapak variety of shallots. This type of research is R & D (Research And Development) with a 4D model, carried out in February 2021-February 2022 at Medan State University. The data collection technique used is the documentation technique of the book's feasibility data by a team of experts. The data analysis technique is done by changing the score into a value and then interpreting it. The instruments in this study are validation sheets for validators and student responses to books. The results showed that the non-text book characterizing the Sitapak Shallots was declared feasible and could be used based on the material expert validator with an average score of 94.2% (very good), learning design expert with an average rating of 89.9% (very good). Based on linguists with an average rating of 86.6% (very good), and based on layout experts with an average rating of 81.75% (very good). Thus, the Sitapak variety of shallot non-text book was declared feasible to be produced and used.

Keywords: Book development, non-text books, characterization, Sitapak shallots

1 Introduction

Books used to gain knowledge are textbooks. However, not all science is contained in textbooks. This is because the textbooks are arranged based on the curriculum so that the information or knowledge in the textbooks is limited, so additional books are needed to add information and knowledge in the form of non-text books. An important material that needs to be included in non-text books is biodiversity. Biodiversity is important to study because biodiversity has economic and consumptive values that can be used for humans and the environment. In addition,
by studying biodiversity, it is hoped that attitudes will emerge to protect, avoid extinction, and can preserve the existing diversity.

One of the important types of flora included in non-text books is the Sitapak variety of shallot (Allium ascalonicum L. var. Sitapak) because it is very rarely published in books and its existence is already threatened with extinction. The literature review was carried out in 3 locations in the city of Medan, namely the Unimed Digital Library, bookstores, as well as the Medan City Library and Archives. This has an impact on the lack of knowledge of Unimed Biology students about the Sitapak variety of shallots.

Based on the results of the Unimed Biology Student needs analysis conducted in February 2021, only 40.25% of students familiar with the Sitapak variety of shallots were in the low category. The low knowledge of Unimed Biology students about the Sitapak variety of shallots cannot be separated from the limited learning resources they have. It is necessary to develop a non-text book about the Sitapak variety of shallots. Apart from the lack of books about the Sitapak variety of shallots, shallots also have good health benefits. Indonesia has many local varieties of shallots as an important source of germplasm for the purpose of breeding high-yielding varieties. In North Sumatra, the Samosir area is known for its shallot production as the prima donna of agricultural products. This is because the agroecology in this area is very friendly and supports shallot farming (Sunaryono and Soedomo, 1989). Samosir has long been famous for its local shallots.

Apart from being a rich source of germplasm, the Sitapak variety of shallots is almost extinct due to imported shallots and seeds that the government has started to import into the Samosir region (Purwantoro and Fitri, 2005). This variety has the advantages of a very distinctive aroma, fragrant and pungent, redder and shiny color, spicier taste, less water content even though its size is smaller than other varieties. Shallots are very potential to be developed in Samosir Regency, North Sumatra, because the suitability of the land owned by the area is sufficient to support the growth of horticultural crops with high economic value.

Students of the Biology Department of Unimed stated that it was necessary to develop a book on the Sitapak variety of shallots in accordance with the average score obtained, which was 97.8%. The results of the analysis support research on the development of non-text books about the Sitapak variety shallot which can later be used to increase the insight or cognitive of Unimed Biology Students about the Sitapak variety shallot. Based on this background, the researchers conducted a study on "Development of a Non-Text Book Based on Research on the Characterization of Sitapak Varieties of Shallots (Allium ascalonicum L. var. Sitapak) in Samosir Regency, North Sumatra". The results of this study are in the form of non-text books with the type of knowledge enrichment that can be used as alternative media or sources of supporting knowledge about the Sitapak variety of shallots.

2 Research Methods

Observational research on the Sitapak variety of shallots has been carried out from February 2021 to October 2021 for students of the Biology Department of UNIMED in Medan. This type of research is R & D (Research And Development) using a modified 4-D model until the Development stage. The instrument used in this development research consisted of a validation sheet instrument for expert validators (material experts, learning design, language, and layout
design), questionnaires or questionnaires for the needs of UNIMED Biology students. The development of the validation sheet was carried out based on Puskurbuk (2014).

The procedure in this study refers to the 4D development model consisting of 4 stages, namely the definition stage, the design stage, the development stage, and the deployment stage. However, in this study only up to the development stage. The techniques used in this case are documentation techniques from book feasibility data by material experts, learning design experts, linguists, layout design experts and individual product testing 3 people, small groups of 15 people, and a limited group of 30 Unimed Biology students. The feasibility data test and book trial from both experts and Unimed Biology students were carried out by scoring the indicators in each aspect. The scoring rubric uses a Likert scale with a score range of 5 (as Table 1). Then add up the overall score of each indicator and each existing aspect and look for the average of each aspect and sub-aspect.

<table>
<thead>
<tr>
<th>Table 1. Book Assessment Rubric</th>
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<tbody>
<tr>
<td><strong>Answer</strong></td>
</tr>
<tr>
<td>Very good</td>
</tr>
<tr>
<td>Well</td>
</tr>
<tr>
<td>Pretty good</td>
</tr>
<tr>
<td>Not good</td>
</tr>
<tr>
<td>Not good</td>
</tr>
</tbody>
</table>

Source: Sugiyono (2015)

The analysis technique is to calculate the feasibility value (from experts and UNIMED Biology students) and product trials. The data that was originally in the form of a score was converted into a value form by using a formula. $P = \frac{\sum Q}{\sum R} \times 100$

Information:

$P =$ the value obtained for each aspect or each sub-aspect observed.

$Q =$ score obtained by each aspect or each sub-aspect observed.

$R =$ the maximum score for each aspect or each sub-aspect observed.

After the data is converted into values, the data analysis is simplified and interpreted in order to obtain conclusions regarding the feasibility of the developed book. The book eligibility criteria are categorized into Table 2.

<table>
<thead>
<tr>
<th>Table 2. Book Eligibility Criteria</th>
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</thead>
<tbody>
<tr>
<td><strong>Level Achievement</strong></td>
</tr>
<tr>
<td>81 - 100</td>
</tr>
<tr>
<td>61 - 81</td>
</tr>
<tr>
<td>41 - 61</td>
</tr>
<tr>
<td>21 - 40</td>
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<td>0 - 20</td>
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</tbody>
</table>

Source: Sugiyono (2013)
3 Research Result

3.1 Results of the defining stage

The basic problem found is that there is no book containing shallots. The results of the literature review in that place have not found any non-textual books about the Sitapak variety of shallots, both in general and in particular. Then an analysis of the needs of students in the Department of Biology at the State University of Medan was carried out, it was found that Unimed Biology students did not know or knew the Sitapak variety red onion with an average of 59.75% and who knew about the onion an average of 40.25%.

Another problem found is the existence of Sitapak shallots are almost extinct. Likewise, sources regarding the Sitapak variety of shallots owned by Biology Students with an average score of 38.73 were still relatively low. Meanwhile, for the needs of Biology students regarding the development of books on the Sitapak variety of shallots, the average score of 97.8 is very high.

3.2 Design Phase Results

The design stage, the goal is to design media that can increase the knowledge of UNIMED Biology students regarding the Sitapak variety of shallots and the preparation of the instrument. The selected media is a non-text book in the form of a knowledge enrichment book, then an initial design is made in the form of a non-text book outline that will be developed. The elements contained in the developed research-based book are: 1) Book Cover; 2) Book Identity; 3) Preface; 4) Table of Contents; 5) Image List; 6) List of Tables; 7) Chapter 1. Introduction; 8) Chapter 2. Sitapak Variety of Shallots; 9) Chapter 3. Distribution of Sitapak Variety of Shallots; (10) Chapter 4. Characterization and kinship of Sitapak Variety of Shallots Based on Accession; 11) Chapter 5. Genetics and Biology of Sitapak Shallots; 12) Chapter 6. Content and Benefits of Sitapak Shallots; 13) Chapter 7. Research related to the Sitapak Variety of Shallots; 14) Bibliography ; 15) Glossary ; 16) Index; 17) Author Biography.

3.3 Development Stage Results

At the development stage, a validation process is carried out on the books that have been developed. The validation process was carried out to several expert validators consisting of material experts, learning design experts and layout design experts to obtain suggestions, input, comments, and improvements to the developed book. Then the initial revision is carried out according to the suggestions, input, comments, and improvements from each validator. After the book is declared valid by the validator, the next step is to conduct development trials by looking at the responses of lecturers and students to the developed book. Test book developed for students majoring in biology. The data obtained from the research results of the questionnaire assessment sheet were then analyzed and then interpreted in the form of qualitative sentences.

3.4 Eligibility of the Expert Team

Material Expert Validation Eligibility. Based on Table 3 then obtained the average assessment of the material expert is 94.2% with a very good category. These results indicate that the research-based introduction to the Sitapak variety of shallot (Allium ascalonicum L. Var. Sitapak) in the material section is feasible to produce. This is because the books that have been made have met the indicators in the assessment components as follows: (1) the feasibility of the material (completeness of the material, the authenticity and truth of the material, the up-to-date material, sources of material), (2) the feasibility of the presentation (presentation
techniques, utilization of materials and material suitability). Before this book is feasible for production, there are several revisions suggested by the validator.

<table>
<thead>
<tr>
<th>Table 3. Material Expert Validation Eligibility</th>
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<tbody>
<tr>
<td>No</td>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
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</table>

Eligibility of Learning Design Expert Validation. Based on Table 4, then the average assessment of the two learning design experts is 89.9% with a very good category. These results indicate that the research-based introduction to the Sitapak variety of shallots in the learning design section is feasible to produce. This is because the books that have been made have met the indicators in the assessment components as follows: (1) suitability of the material (completeness of material, breadth of material, and depth of material), (2) systematic delivery of material, (3) book efficiency, (4) linguistics (conformity with the rules of the Indonesian language and the use of terms and symbols).

<table>
<thead>
<tr>
<th>Table 4. Percentage of Learning Design Expert Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
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<td>4</td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
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<tr>
<td>7</td>
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</table>

Layout Expert Validation Eligibility Table. Based on the results of Table 5, then the average assessment of the layout design expert is 81.75% with a very good category. These results indicate that the book developed in the layout design section is feasible to be produced. This is because the books that have been made have met the indicators in the assessment components as follows: (1) the book cover design is appropriate; (2) book layout design; (3) typography; and (4) illustrations. Before this book was worthy of production, there were several revisions suggested by layout design experts.

<table>
<thead>
<tr>
<th>Table 5. Layout Design Expert Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
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<td></td>
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</tbody>
</table>
Eligibility of Linguist Validation. Based on the results of Table 6, the average assessment of linguists is 86.66% with a very good category. These results indicate that the book developed in the language section is feasible to be produced. This is because the books that have been made have met the indicators in the assessment components as follows: (1) use of language, (2) writing of language and terms, (3) coherence and coherence. Before this book is feasible for production, there are several revisions suggested by linguists.

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>Average (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Language Usage</td>
<td>80</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Writing Language and Term</td>
<td>80</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Coherence and Cohesiveness</td>
<td>100</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>86.66</strong></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>

3.5 Product Rating Trial

Individual Product Trial. Individual assessment is carried out by 3 students by assessing 4 components, namely material, language, presentation, and graphics. Individual test graphs can be seen in Figure 1.

![Figure 1](image1.png)

Fig.1. Results of Research-Based Book Assessment in Small Group Trials (N= 3)

In collecting responses through google forms, students also commented on books, including: interesting book covers, book contents supported by other research results. The average student response assessment based on the components of material, language, presentation, and graphics is 87.2% and is classified as very good.

Small Group Product Trial. Individual assessment is carried out by 3 students by assessing 4 components, namely material, language, presentation, and graphics. Individual test graphs can be seen in Figure 2.
In collecting responses through google forms, students also commented on books, including: clarifying the pictures in the book, good and interesting book covers. Revision is done by reviewing again according to the suggestions in the comments column provided and revising the parts that can be improved. The average assessment result in the small group trial was 83.88% which was included in the very good category.

**Limited Group Product Trial.** Limited group trials were carried out in 1 class consisting of 30 students as shown in Figure 3.

Respondents in product trials with an average of 86.5% which are included in the very good category. Respondents gave positive and good comments such as this book has a good and attractive appearance and stated that the presentation of the book was good and clear. No revision suggestions were found in the comments column.

### 4 Discussion

The development of a research-based non-text book on the Sitapak variety of shallots uses the modified Thiagarajan (4D) model at the development stage. At the definition stage, it is analyzed and found problems, weaknesses and the need for a condition that is the root driving
The Sitapak variety of shallot non-text book was then tested for validation by 4 expert validators, namely lecturers who are experts in the fields of material, learning design, language, and layout. The non-text book product developed must be intended for students majoring in biology to enrich their knowledge and understanding of the Sitapak variety of shallots. Research-based non-text books on Sitapak variety shallots were assessed by validators of material, learning design, language, and layout experts with average scores of 94.2%, 89.9%, 86.6%, and 81.75%, respectively, which is included in the very good category and deserves to be produced and can be used by students, researchers, and readers in general. The results of developing a non-text
book on Sitapak variety shallots have been revised according to the suggestions of each validator. The Regulation of the Minister of National Education of the Republic of Indonesia Number 2 of 2008 explains that books that are eligible to be used as reading sources have standard criteria, namely the feasibility of the content/material, the feasibility of presentation, the appropriateness of the language, and the feasibility of the graphic/layout.

The pattern of presentation of a material will be considered good if the material is presented in a consistent, systematic, and sequential manner so that it can assist in understanding the content of the material. The placement of images in the book must be in accordance with the material discussed. Pictures must also have captions so that readers can observe the pictures without turning the pages of the book (Martin, 2012). According to Kurniasari (2014) books must describe material that is adapted to the development of science and technology. Accordingly, this research-based book includes research procedures accompanied by tools and materials used that can involve students to conduct experiments/mini research independently. According to Oktaviana (2015), research-based books have a good influence on strengthening students' understanding of abstract concepts in books for a more contextual understanding (Rofi, 2014). In line with the results of Yahya's research (2010), it shows that the increase in the development and application of research-based curricula has led to a strengthening in the quality of learning, and has triggered changes in increasing the space for student involvement. This is an indicator that learning can be combined and matched with the research domain. Research-based books can be chosen as a means of developing research results and are flexible.

According to Kurniasari (2014), the provisions in making books are relevant to the goals of national education and in accordance with the abilities to be achieved. The book development process then collects various information from various library sources, such as textbooks, scientific articles, journals, mass media, then packaged according to student needs and written with a systematic framework (Husamah, 2015 in Aspahani, 2019). According to Pangastuti (2016), books must be presented in a sequential, straightforward manner, the material develops knowledge, fosters motivation to think further, the presentation of material develops physical activity, is good enough in motivating students to be creative, innovate, and apply based on tools, materials, stages. work, and presentation content. Sentences are presented simply with a maximum of 30 words per sentence to make it easier for readers to understand sentences (Wallwork, 2013 in Aspahani, 2019).

The validation of linguists aims to see the order of language, effectiveness, communicativeness, consistency and use of language in accordance with good and correct Indonesian and appropriately used in the preparation of research-based non-text books about the Sitapak variety of shallots. Grammar improvement aims to make it easier for students to understand when reading research-based books about the Sitapak variety of shallots. After the revision of the validator, the book was declared good and suitable for use. According to Prastowo (2012), language standards include; use good and correct Indonesian, terminology adheres to enhanced spelling, clarity of language used, language suitability, ease of reading. Do not use the same grammatical structure with multiple meanings (Wallwork, 2013). The readability of a reading for the reader is based on the level of difficulty or maturity of the discourse (Kusuma, 2018). The same thing was said by Dewi and Arini (2018) in Harahap (2020) that a reading with a good level of readability will affect the reader in increasing interest in learning and memory.

Validation of the feasibility of graphics is assessed by layout design, the purpose of this validation is to assess the quality of the size of the book, the appearance of the book, illustration images and layout of writing that makes the reader interested. The average validation results
from layout experts is 86.5% which is included in the very good category. This shows that this book has included the criteria that a book should have. According to Putra (2011) in Harahap (2020) that books should contain illustrations that attract readers and pictures that do not cause reader misunderstanding. In line with Suswina (2011) in Harahap (2020) that learning biology has the condition that there must be pictures in order to explain the processes in it.

Improvements to the graphic aspect of the book were carried out by changing the type of writing on the cover of the book with clearer and more consistent writing. Then improve the layout of the cover with a more attractive and brighter and describe the contents of the book. Thus the cover of the book is in accordance with the contents of the book so that it can attract interest in reading and make it easier for readers to know the contents of the book as reflected in the cover of the book according to the research conducted (Kurniasari, 2014). Improvements to the graphic aspect of the book were also carried out by changing the numbering of each image in the book according to the hierarchy and making a list of the images. In accordance with the characteristics of the presentation of non-text books, which are loose, creative, and innovative so that they are not subject to the provisions of the learning process and systematics that are determined based on the science of education and teaching (Puskurbuk, 2008).

Based on individual, small group, and limited group trials conducted with scores of 87.2%, 83.88, and 82.56%, respectively, that students are interested in reading research-based non-text books. Students are interested in the book, especially based on the content and images presented, which are considered interesting and able to increase their curiosity and motivation to read. Picture textbooks perform well in teaching, when text and pictures are combined, reading performance and retention is improved compared to text-only books. This is in accordance with the opinion of Wibowo (2016) that a good book is attractive, easy to understand, motivates the reader, and is clear.

Research-based non-text books about the Sitapak variety shallots, overall from the average number of each validator material expert, learning design expert, linguist, and book layout expert are included in the valid criteria with a very good category so that they can be used as additional reading material for students. Although according to each validator the book has been valid, improvements must still be made based on suggestions, input, corrective comments submitted by the validator. In accordance with the opinion of Lepiyanto and Pratiwi (2015) a product that has been declared good by the validator, still needs to be improved because the book has suggestions from several experts.

5 Conclusion

The non-text book characterizing the Sitapak Shallot variety was declared feasible and could be used based on the results of validation by material expert validators, learning design experts, layout experts, and linguists with successive scores of 94.2%; 89.9%; 81.75%; and 86.6% which fall into the very good category.

The non-text book on the characterization of the Sitapak Variety of Shallots was also declared feasible based on student responses with an average individual, small group, and limited group assessment of 87.2%, respectively; 83.88; 82.56% which fall into the very good category.
References

The Effectiveness of Teaching Materials for Procedure Text Themed Medan Traditional Culinary for Students Class VII MTs. Aisyiyah North Sumatra

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Abstract. The achievement of learning objectives in the classroom depends on the creativity of the teacher as a facilitator. Planning in learning activities is the main thing that must be done so that learning can run effectively. Based on the results of initial observations made by researchers on January 26, 2021 at MTs. Aisyiyah North Sumatra, students still experience obstacles that often arise in teaching and learning activities, especially in procedural text material with an average score of 65.71. This research is included in the type of research and development (R&D). The effectiveness of teaching materials for procedure texts with the theme of Medan traditional culinary shows an increase of 17.21% from 65.71% pretest results to 82.92% posttest results. The overall results of this study indicate that the teaching materials of procedure texts with the theme of Medan traditional culinary are declared effective to be used in the learning process.

Keywords: Teaching materials, procedure texts, Medan traditional culinary

1 Introduction

The achievement of learning objectives in the classroom depends on the creativity of the teacher as a facilitator. Teachers are required to be creative and innovative so that the desired learning objectives can be achieved. Planning in teaching and learning activities is the main thing that must be done so that learning can run effectively. One of the steps that can be taken in achieving effective learning objectives is to use teaching materials. Teaching materials are very important learning tools. Teaching materials are learning support tools that include learning materials, methods, limitations, and the possibility of evaluation, as well as gaining the ability and some ability to achieve the desired goals in all their complexity[1].
The teaching materials referred to in this discussion are learning media and assessment sheets, all of which are used to explain and convey information and messages from learning resources to students[2]. In line with this, Hamdani stated that teaching materials are all forms of materials that are made and placed sequentially to help teachers and supervisors engage in educational and learning activities to create an environment and atmosphere in which students can learn[3]. The teaching materials referred to in this study are teaching materials in the form of modules. Modules are printed teaching materials that are arranged to be used independently by learning participants[4]. Then the module can also be interpreted as a book written to allow students to learn independently with or without teacher guidance[5].

The use of teaching materials in the form of modules in learning is considered important because it can provide assistance and facilitate teachers in teaching and learning activities. The teaching materials used must be in accordance with the curriculum and student needs. Student needs can include the characteristics of students who are the main targets in the learning objectives. These characteristics include social, cultural and the environment where students live. Thus, the teaching materials used can activate the involvement and activeness of students in the learning process.

Based on the results of initial observations made by researchers on January 26, 2021 at MTs. Aisyiyah North Sumatra, students still experience obstacles that often arise in teaching and learning activities, especially in procedural text material. Text is an activity or event in language, which can be in the form of spoken or written[6]. The low ability of students in writing is the main problem. Writing is one of the productive skills in 2013 Curriculum learning.

Writing activities are a means to express ideas and feelings in written form with the hope that they can be understood by readers and also function as an indirect communication tool. The low ability of students in writing, especially on procedural text material, becomes a problem in the learning process that must be resolved. The obstacle experienced by students in the procedural text material is the limited knowledge of the students about the linguistic rules in the procedure text. Students' ability in writing procedural texts is evidenced by the acquisition of student assignments with an average score of 65.71 and still not passing the Minimum Completeness Criteria (KKM) in the Indonesian language field of study, which is 75. Researchers are interested in using teaching materials with the theme of Medan traditional culinary in improving student learning outcomes.

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The term culinary is a language transfer taken from a foreign language so that there is confusion in the meaning that what is meant is the art of processing or serving delicious dishes, it is wrong, the correct terminology is gastronomy\(^7\), while the word traditional is a habit that comes from ancestors, which has been passed down from generation to generation and is still practiced today\(^8\). The teaching materials for procedure texts with the theme of Medan traditional culinary contain procedure texts about Medan traditional cuisine, especially the Malay Deli traditional culinary. The use of teaching materials for procedure texts with the theme of Medan traditional culinary can contribute to creating effective learning for students.

2 Research Methods

This research is included in the type of research and development (R&D) using data analysis on the assessment of learning outcomes in writing procedure texts using qualitative analysis techniques. This study involved students of class VII-3 MTs. Aisyiyah North Sumatra. The class was then given a test twice, namely pre-test and post-test. The steps taken in this research are:

1. The initial stage is to provide information to the school about the research to be carried out and make a schedule for the implementation of pretest and posttest.

2. The research was carried out in class VII-3 MTs. Aisyiyah North Sumatra, totaling 28 students.

3. The instrument used is in the form of student learning outcomes tests in the form of procedural tests that are carried out by students based on learning procedure text material using modules.

3 Result And Discussion

The effectiveness test was carried out by giving a written test in the form of a written description of the procedure text with the theme of Medan traditional culinary which was given to 28 students in grades VII-3 MTs. Aisyiyah North Sumatra. This test is carried out in 2 stages, namely the pretest stage and the posttest stage. The pretest stage was carried out to determine the students' ability in writing procedure texts using teaching materials published by the Ministry of Education and Culture in 2017 or before using the Medan traditional culinary-themed module on procedure text materials, while the posttest stage was carried out with the aim of knowing students' abilities in writing procedure texts after using the module with the theme of Medan traditional culinary.


The results of the pretest and posttest will then be seen and compared how student learning outcomes on the procedural text material and its effectiveness can be concluded. The results of the data obtained from the pretest and posttest stages can be seen in table 3.1 below.

**Table 3 Pretest and Posttest Result Data on Procedure Text Material**

<table>
<thead>
<tr>
<th>No.</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>65</td>
<td>85</td>
</tr>
<tr>
<td>2.</td>
<td>65</td>
<td>75</td>
</tr>
<tr>
<td>3.</td>
<td>65</td>
<td>90</td>
</tr>
<tr>
<td>4.</td>
<td>60</td>
<td>83</td>
</tr>
<tr>
<td>5.</td>
<td>75</td>
<td>80</td>
</tr>
<tr>
<td>6.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>7.</td>
<td>65</td>
<td>85</td>
</tr>
<tr>
<td>8.</td>
<td>60</td>
<td>78</td>
</tr>
<tr>
<td>9.</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>10.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>11.</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>12.</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>13.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>14.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>15.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>16.</td>
<td>60</td>
<td>78</td>
</tr>
<tr>
<td>17.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>18.</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>19.</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>20.</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>21.</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>22.</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>23.</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>24.</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>25.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>26.</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>27.</td>
<td>70</td>
<td>83</td>
</tr>
<tr>
<td>28.</td>
<td>80</td>
<td>90</td>
</tr>
</tbody>
</table>

Based on the data in the table of student learning outcomes at the pretest and posttest stages above, it can be seen that the pretest stage (initial test) in writing procedure texts is 1840 with an average score of 65.71 with the criteria "enough". While the posttest stage (final test) students obtained a total of 2322 with an average score of 82.92 with "good" criteria. Thus, the teaching material in the form of a procedure text module with the theme of Medan traditional culinary is declared effective and can be used as a companion or additional teaching material for class VII MTs/SMP students due to an increase in student scores from the pretest stage to the posttest stage.
3.1 Description of Pretest Data Learning Outcomes Before using Teaching Materials Text Procedures Themed Medan Traditional Culinary

The results of data analysis on student learning outcomes in procedure text material before using procedure text teaching materials with the theme of Medan traditional culinary obtained an average score of 65.71% with the criteria of “enough”. Several aspects or indicators are also a reference for assessing student learning outcomes in writing procedure texts before using the module. The aspects assessed were the completeness of the title aspect with an average score of 14.28%, the completeness of the text structure aspect with an average score of 18.39%, the completeness of the linguistic aspects of the text with an average score of 16.96%, the completeness of the EYD with a score of an average of 8.39% and the completeness of the coherence aspect with an average score of 7.85%. So, it can be concluded that the scores achieved by students in writing procedural texts on the pretest still need to be improved.

The results of the pretest scores carried out on 28 students can be seen in the frequency distribution table in Table 1 below.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 – 63</td>
<td>13</td>
<td>46</td>
</tr>
<tr>
<td>64 – 67</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>68 – 71</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>72 – 75</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>76 – 79</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80 – 83</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>∑</td>
<td>28</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the frequency distribution table above, it can be seen that students who scored 60-63 were 13 people with a percentage of 46%, students who scored 64-67 were 6 people with a percentage of 21%, students who scored 68-71 were 4 people with the percentage of 14%, students who scored 72-75 totaled 2 people with a percentage of 7%, students who scored 76-79 were 0 with a percentage of 0% or no students scored 76-79 and students who scored 80-83 totaling 3 people with a percentage of 11%. For more details, the frequency distribution table in the pretest can be described in the following histogram form.

![Fig.1 Frequency of Pretest Score Results Before Using Procedure Text Teaching Materials with the theme of Medan Traditional Culinary](image-url)
3.2 Description of Post-test Data Learning Outcomes After using Teaching Materials Text Procedures Themed Traditional Medan Culinary

The results of data analysis on student learning outcomes in procedure text materials after using procedure texts teaching materials with the theme of Medan traditional culinary obtained an average score of 82.92% with the criteria of "good". Several aspects or indicators are used as a reference for assessing student learning outcomes in writing procedure texts after using teaching materials in the form of modules. The aspects assessed were the completeness of the title aspect with an average score of 20.0%, the completeness of the text structure aspect with an average score of 23.75%, the completeness of the linguistic aspect of the text with an average score of 19.82%, the completeness of the EYD with a score of an average of 10.0% and the completeness of the coherence aspect with an average score of 8.96%. So, it can be concluded that the scores achieved by students in writing procedure texts at the post-test have increased from the previous results (pretest).

The results of posttest scores on 28 students can be seen in the frequency distribution table in Table 2 below.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 - 77</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>78 - 80</td>
<td>9</td>
<td>32</td>
</tr>
<tr>
<td>81 - 83</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>84 - 86</td>
<td>12</td>
<td>43</td>
</tr>
<tr>
<td>87 - 89</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>90 - 92</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Σ</td>
<td>28</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the frequency distribution table above, it can be seen that students who scored 75-77 were 2 people with a percentage of 7%, students who scored 78-80 were 9 people with a percentage of 32%, students who scored 81-83 were 2 people with the percentage of 7%, students who scored 84-86 were 12 people with a percentage of 43%, students who scored 87-89 were 0 with a percentage of 0% or no students scored 87-89 and students who scored 90-92 totaling 3 people with a percentage of 11%. The results of the frequency distribution above can be seen in the form of a histogram in Figure 2 below.
Based on the results of the pretest and posttest on the procedural text material carried out by students of class VII-3 MTs. Aisyiyah North Sumatra experienced an increase in learning outcomes in the learning process by using procedure text teaching materials with the theme of Medan traditional culinary so that there was effectiveness in teaching materials on the learning outcomes of class VII MTs/SMP students.

4 Conclusion

The use of teaching materials in the form of a procedure text module with the theme of Medan traditional culinary is declared effective in improving student learning outcomes in the procedural text material. This is supported by student learning outcomes which have increased after using the module.

References

Improving The Ability of Problem Solving in Physics Using Android-Based Teaching Materials

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Abstract. This study aims to develop interactive teaching materials to improve the problem solving. The research used Research and Development (R&D) method that develop by Robert Maribe Branch with the ADDIE development model that includes Analysis, Design, Development, Implementation, and Evaluation. The validity of teaching materials was obtained from material and media experts. The practical was obtained from students and one teacher. Student trials included small groups of 5 students and field trials of 20 students. The results showed that the interactive teaching materials developed were valid and suitable to be used based on a very good assessment category by the experts with a percentage score of 87% by material experts and 86% by media experts. Teaching materials are also practical which can be seen from the results of student needs. The effectiveness of teaching materials can be seen from the impact of these teaching materials which can improve students' problem solving abilities with an n-gain analysis of 0.49 (medium category). Based on this description, the interactive teaching materials that have been developed are valid, practical, and effective so that they can improve problem solving skills.

Keywords: R&D research, interactive teaching materials, problem solving

1 Introduction

The development of science and technology increasingly encourages renewal efforts in the use of technological results in the learning process. The learning process carried out in educational units must be carried out in a fun, interactive, inspiring, challenging, fun, and motivating way for students to participate actively, and develop creativity according to their talents and interests. In addition, learning must also be carried out to develop students' physical and psychological aspects. This is following Permendikbud number 22 in 2016 concerning Standards for Primary and Secondary Education Processes. The development of teaching materials is one way to increase the creativity of educators. Educators are required to be creative to make teaching materials that are interesting, innovative, varied, and by the level of student needs. Teaching materials are an important component of learning. Students' reading
interest in Indonesia is still relatively low. This is known from the percentage of students who visit the school library or regional library. Rapid technological developments change student learning patterns.

According to Djamarah & Bahri (2002) problem solving method is not just a teaching method but also a method of thinking, because in solving problems using a method that starts from looking for data to drawing conclusions. Prastowo (2011:327) said the rapid development of information technology turned out to have a broad impact to the area of teaching materials, one of which is that the application of these teaching materials has various forms of variation, some are in the form of game questions, and some are in the form of teaching materials. This is certainly a positive side of information technology for the world of education.

Based on the results of observations made in one of the high schools in the city of Medan, most of the students have used technology in their daily lives. This can be seen from the completeness of the digital facilities owned by the school, for example holding the Computer-Based National Examination independently, wifi facilities, and adequate computer laboratories. Students on average already have a smartphone or laptop, and a private internet network. The lack of variation in the physics learning process can result in teacher communication in delivering teaching materials to students ineffective and inefficient, allowing for differences in understanding of physics concepts between teachers and students. If left unchecked, it can result in the low quality of the student learning process which results in the low problem-solving ability of students in physics subjects. Problem-solving skills are needed by students in learning physics. This is because problem-solving activities can help students to construct new knowledge and facilitate learning physics (Mukhopadhyay, 2013).

The development of teaching materials can answer or solve problems or difficulties in learning (Depdiknas, 2008). The interactive teaching materials developed in this study were modified by making them an application that can be used or studied using an android tablet/smartphone. The choice of android is due to its very high popularity of android. Previous research conducted related to this development conducted by (Simon 2019) revealed that interactive-based learning can improve student learning achievement, while the results of Ari's research (2016) show that problem-based teaching materials accessed on smartphones can build students' problem-solving abilities.

Based on the descriptions above, the researcher is interested to develop an interactive teaching materials that is valid, practical, and effective.

2 Methods

This type of research to develop interactive teaching materials used Research and Development (R&D) method that develop by Robert Maribe Branch with the ADDIE development model that includes Analysis, Design, Development, Implementation, and Evaluation. The aim of this study was to develop Android-Based teaching materials with qualities (valid, practical and effective) that could improve the ability of problem solving. The research carried out includes the analysis stage which consists of material analysis, situation analysis, analysis of aspects of teaching materials, and analysis of student characteristics, and the design stage, namely the preparation of storyboards, then the development stage which consists of preparation, manufacture, review and editing, assessment by experts, and the implementation stage, namely the teaching materials trial. The last stage is the evaluation of teaching materials by teachers and students as respondents that aims to determine the quality
of android-based interactive teaching materials that have been developed. The scope of this assessment is as follows: (a) aspects assessed by material experts and aspects of learning and content aspects, (b) aspects assessed by media experts are aspects of display and programming, and (c) aspects assessed by teachers and students covers aspects of use.

3 Results and Discussion

3.1 Analysis

Analysis is the first phase of this research. At this phase, We need to carried out needs analysis, curriculum analysis, and analysis of student characteristics. According to the findings of researches' observations, pupils generally follow learning activities pretty effectively. Less active learning occurs when lectures are used as the teaching approach. The teacher will assign pupils to work on the questions they have been given from the interactive teaching materials in order to engage the class. When the teacher provided the assignment, the researcher saw that several pupils who had previously been less active became active. Because they can make learning more enjoyable and effective, these interactive teaching tools are thought to be able to improve students' excitement for participation in their studies. For this reason, teaching materials that stimulate learning and help students develop their problem-solving skills are important. They should also inspire students to learn both on their own and in collaboration with teachers.

3.2 Design

Design is the second stage in the development of teaching materials. The result of the design stage is a flowchart that describes the sequence and structure of teaching materials, a storyboard that includes a template design plan, and also an interface design. The flowchart that has been made is then used as a guide for designing storyboards so that a planning design is produced by the structure of teaching materials. Flowcharts are used to see how the application's material is presented in order. The user will first arrive at the start page of the application, which contains the name of the instructional material. The user will then be sent to the home page's main menu, where there are numerous menu buttons to access different pages. Basic competences, indicators, content with sub-materials, questions and conversations, assessments, references, and pages to show the compiler's profile are all included on these pages.

Including navigation buttons, page layouts, text placement, and other elements found in teaching materials, the storyboard design comprises the basic design for the appearance, layout, and determination of content in teaching materials.

3.3 Development

Development is the stage of product development and testing, where the results of the analysis and design are developed into a finished product.

1) Product development
The design that has been made using the iSpring Suite 10 software, is then implemented into product development in the form of an application using the Website 2 Apk Builder Pro software.

![Image 1](Image 1.png)

**Fig 1.** Display of the teaching materials in Android

2) Evaluation of media experts and subject matter experts

An evaluation of the media is done to judge the validity of the content and the visual appeal of the interactive educational materials developed for Android.

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>Score</th>
<th>Maximum Score</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Display</td>
<td>32</td>
<td>36</td>
<td>90%</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>Programming</td>
<td>11</td>
<td>12</td>
<td>92%</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>Language</td>
<td>16</td>
<td>20</td>
<td>80%</td>
<td>Valid</td>
</tr>
</tbody>
</table>

**Table 2 Results of Validation by Material Experts**

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Score</th>
<th>Score Maximum</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Display</td>
<td>18</td>
<td>20</td>
<td>90%</td>
<td>Valid</td>
</tr>
<tr>
<td>2 Learning Materials</td>
<td>23</td>
<td>28</td>
<td>82%</td>
<td>Valid</td>
</tr>
<tr>
<td>3 Content</td>
<td>24</td>
<td>28</td>
<td>86%</td>
<td>Valid</td>
</tr>
<tr>
<td>4 Usefullness</td>
<td>10</td>
<td>12</td>
<td>83%</td>
<td>Valid</td>
</tr>
<tr>
<td>5 Language</td>
<td>19</td>
<td>20</td>
<td>95%</td>
<td>Valid</td>
</tr>
</tbody>
</table>
3.4 Implementation

The implementation stage is the stage where the teaching materials that have been produced are used in learning. This Android-based interactive teaching material is in the form of an application, which is sent via student group WhatsApp. Students can download the .apk file and install it on their respective smartphones.

1) Small Group Test
A small group consisting of 5 students.

Table 3 Results of Assessment of Teaching Materials by Small Groups

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content</td>
<td>92%</td>
<td>Practice</td>
</tr>
<tr>
<td>2</td>
<td>Graphic</td>
<td>85%</td>
<td>Practice</td>
</tr>
</tbody>
</table>

2) Large Group Test
A large group consisting of 20 students.

Table 4 Results of Assessment of Teaching Materials by Large Groups

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>Percentage</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content</td>
<td>87%</td>
<td>Practice</td>
</tr>
<tr>
<td>2</td>
<td>Graphic</td>
<td>83%</td>
<td>Practice</td>
</tr>
</tbody>
</table>

3) Teacher Response

Table 5 Results of Assessment of Teacher Response

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Usefulness</td>
<td>92%</td>
<td>Practice</td>
</tr>
<tr>
<td>2</td>
<td>Design and Display</td>
<td>96%</td>
<td>Practice</td>
</tr>
</tbody>
</table>

4) Test students’ problem solving skills
Interactive teaching materials are used in 3 meetings. The first meeting, the teacher uses teaching materials as a tool in instilling the initial concept of sound waves in students, this is done so that students know the description of the material to be studied. The second meeting, the teacher uses teaching materials as a tool in explaining the nature of stationary waves on sound-producing devices. The third meeting, the teacher uses teaching materials as a tool in explaining the intensity and level of sound intensity.

4 Evaluation

The last stage of this development is to evaluate the teaching materials that have been implemented. Evaluating what is meant in this case is to clarify the use of teaching materials in improving students' problem solving abilities in the physics subject of sound wave material. Measurement of the increase in students' problem solving abilities by giving students problem
solving ability questions, where the questions were given two treatments, namely, before using teaching materials and after using teaching materials (pretest and posttest).

<table>
<thead>
<tr>
<th>No</th>
<th>Treatment</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Average Pretest Score</td>
<td>40.24</td>
</tr>
<tr>
<td>2</td>
<td>Average Posttest Score</td>
<td>70.16</td>
</tr>
<tr>
<td>3</td>
<td>Maximum Score</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>N-Gain</td>
<td>0.49</td>
</tr>
<tr>
<td>5</td>
<td>Conclusion</td>
<td>Medium</td>
</tr>
</tbody>
</table>

5. Conclusion

Based on the results of research and discussion that have been described in this study, it can be concluded that Android-based interactive teaching materials developed to improve problem solving skills are valid. This can be seen from the percentage score of the material expert team's assessment of 87% and the percentage of the media expert team's assessment score of 86% in the very good category. Android-based interactive teaching materials to improve problem-solving skills are practical when used. This can be seen from the results of student questionnaires and teacher responses which state that these teaching materials meet the needs of students from an attractive appearance, language that is easy to understand so that it is practical for students to use. Android-based interactive teaching materials to improve problem-solving skills have been effective, which can be seen from the impact of these teaching materials which can improve students' problem-solving abilities. The results of data processing with N-gain analysis showed that teaching materials were able to improve students' problem solving skills with an N-gain calculation of 0.49 (medium N-gain category).

References

Development of Persuasive Text Teaching Materials based on the Discovery Learning Method in Class VIII SMP GKPI Padang Bulan Medan TP 2021/2022

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Abstract. This study aims to develop persuasive text teaching materials based on the discovery learning method for class VIII junior high school students. The steps used are the ADIE development model which consists of analysis, design, development, implementation, and evaluation. Research teaching materials products get an average assessment of material experts 97.82% in the very appropriate category, 96.2% in the design expert assessment in the very appropriate category, the Indonesian language teacher assessment in 90.3% in the very feasible category. Tried the product three times, namely individual trials, small groups and limited field, with the average number of individual student assessments being 89.1%, trials on small groups of ten students with an average of 90.8% and a limited field test was conducted on 30 students of SMP GKPI Padang Bulan Medan with an average of 92.4 very feasible categories. The effectiveness of persuasive text teaching materials assisted by the discovery learning method is obtained from student learning outcomes carried out in two stages, namely at the pre-test and post-test. The results obtained at the pre-test were 2,132 with an average of 71, this value was categorized as "enough" and did not meet the KKM score of 75. After using persuasive text teaching materials assisted by the discovery learning method and post-testing the total score of students increased to 2,431 with an average of 81 categorized as "good". This shows that persuasive text teaching materials assisted by the discovery learning method bring good development and are effectively used by class VIII students of SMP GKPI Padang Bulan Medan.

Keywords: teaching materials, persuasive texts, discovery learning

1 Introduction

Education is an important component needed by a nation in an effort to advance the quality of its country, through education will be born generations of nations with integrity, character and especially piety to God Almighty. In accordance with the Law of the Republic of Indonesia No. 20 of 2003 contains the National Education System chapter 1 article 1, "Education is a conscious and planned effort in order to create a learning atmosphere in which students can develop their potential to have religious spiritual strength, self-control, personality, noble
character, and skills needed by the community, nation and state” by giving each individual the opportunity to develop all their potential to improve the quality of education, namely improving the curriculum, improving the learning system and changing the strategy of educators or teachers in the learning process in schools.

The quality of education is expected to be of high quality. Efforts to improve the quality of education have begun with the construction of many schools to support education. Teachers are the spearhead in carrying out educational goals in the field and a crucial element in the realization of an efficient and quality education system. RPP is one of the learning tools prepared by the teacher as a motor to lead students towards a good understanding in education. RPP at least contains objectives, Core Competencies, Basic Competencies, Achievement Indicators Competencies, teaching materials, teaching methods, learning resources, learning stages and evaluation of learning outcomes. The current curriculum in Indonesia is the 2013 curriculum. Through the 2013 curriculum, it is hoped that students will grow and develop into productive, innovative, creative, and affective individuals.

Teaching materials become a part of the lesson plan that the teacher needs to prepare. Teaching material is a learning material that is designed systematically, which presents the competencies achieved by students as a whole during learning activities (Herliandry, 2020:15). However, the teaching materials provided are not fully in accordance with the needs of students. The teaching materials used in schools have not been sufficiently able to stimulate students in obtaining their knowledge, this can be seen from the results of the evaluation of students who are still much below the KKM (based on observations at Padang Bulan Private Junior High School Medan). Competencies that need to be achieved by students in each KD are in the form of knowledge and skills, so the teaching materials offered should enable students to be able to achieve them.

Modules are types of teaching materials that are fully and systematically arranged, which contain lesson plans and are arranged for students to understand learning. The module at least contains learning objectives, teaching materials, and assessments. The module is expected to be able to increase student learning motivation, so its development must consider the elements needed, namely: self-instructional, self-contained, stand-alone, adaptive and user friendly. However, the modules used by students in schools, especially SMP GKPI Padang Bulan Medan are not much different from those in their textbooks so that the contents are not as developed as the examples given in the package book and the same module is about Let's Supervise the DKI Jakarta Pilkada, Let's Join as Supervisors Election, Save Our Earth.

The preparation of the module should adjust the teaching methods used by the teacher, this will be simpler because the modules and methods used are arranged simultaneously. The learning methods offered in the 2013 curriculum are quite good learning methods, one method that has attracted the attention of researchers is Discovery Learning (DL).

Discovery Learning requires teachers to be good at engineering problems so that they stimulate students to find answers. The Discovery method expects students to be able to create, manipulate ideas to the stage of generalizing a material. One of the materials that requires discovery learning as a method in Indonesian language lessons in class VIII is persuasive text. According to the demands of the 2013 curriculum, it is at KD 3.14 (Knowledge) and 4.14 (Skills). KD 3.14 Examine the structure and language of persuasion texts in the form of suggestions, invitations, and considerations regarding actual problems (environment, social conditions, and/or cultural diversity, etc.) from various sources that are
heard and read. KD 4.14 Presenting persuasive texts (suggestions, invitations, directions, and considerations) in writing and orally by paying attention to the structure, language, or oral aspects. Persuasive text contains persuasion or solicitation. In the text, there are statements that trigger the reader to follow the directions intended by the author. So based on these things, the author is interested in conducting research on the Development of Persuasive Text Teaching Materials based on the Discovery Learning Method in Class VIII SMP GKPI Padang Bulan Medan TP 2021/2022.

2 Research Methodology

This research took place in class VIII at SMP GKPI Padang Bulan Medan in the 2021/2022 academic year with the number of research objects being 30 students. This research is Research and Development (R&D) by applying the ADDIE stages (Assume, Design, Development, Implementation, Evaluation) with the aim of developing Persuasive Text Teaching Materials based on the Discovery Learning Method in Class VIII SMP GKPI Padang Bulan Medan TP 2021/2022.

The ADDIE Research Model includes five steps, in this research the design form is

2.1 Analysis

In the first stage, the activities are to carry out the need for developing teaching materials based on the Discovery Learning learning method, conducting a feasibility analysis and requirements for developing teaching materials based on the Discovery Learning learning method. The development has just started with problems related to teaching materials in the form of modules that have been implemented. The problem occurs because the current use of teaching materials (modules) is still somewhat inappropriate with user needs, student characteristics, learning environment, technology, and others.

After analyzing the problem of urgency for the development of new teaching materials, researchers must also analyze the feasibility level and requirements for the development of new teaching materials. The process begins by answering the following questions:

a. Is the development of teaching materials based on the Discovery Learning method able to overcome the learning problems faced?

b. Do teaching materials based on the Discovery Learning method have facilities for implementation?

c. Are teachers able to use teaching materials based on the Discovery Learning method? The?

1. Design

This stage is a systematic process that begins with determining learning objectives, designing scenarios or learning activities, designing learning devices, designing materials and assessing learning outcomes. The design of teaching materials based on the Discovery Learning learning method is still conceptual in nature which will underlie further development. At this stage, the elements that will be compiled are:

a. Early learning design

The activity of this stage is learning design which will be packaged in the form of cover of teaching materials based on the Discovery Learning learning method and learning design.
b. Test preparation

Judging from the task analysis and the analysis of the material listed in the specification of the learning objectives, then a grid for the Daily Assessment (PH) is drawn up in order to assess students' abilities.

2.2 Development Stage

The development is in the form of preparing teaching materials based on the Discovery Learning method. At this stage, the method of each material is compiled, namely teaching materials, pictures, and others. The product can be said to be feasible to be applied in the learning process if the percentage is > 61%. Below is an assessment table regarding the results of product feasibility.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>81%-100%</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>61%-80%</td>
<td>Worthy</td>
</tr>
<tr>
<td>41%-60%</td>
<td>quite decent</td>
</tr>
<tr>
<td>21%-40%</td>
<td>not feasible</td>
</tr>
<tr>
<td>0%-20%</td>
<td>Very Inappropriate</td>
</tr>
</tbody>
</table>

2.3 Implementation Stage

In this stage, the design of teaching materials based on the Discovery Learning method that has been developed is implemented directly in the classroom. Teaching materials will be applied to the actual situation with the material delivered in accordance with the Discovery Learning method developed. After that, an initial evaluation is carried out to get feedback to the next stage.

2.4 Evaluation

In this step, the researcher provides an informative evaluation for data collection at all stages aimed at improving or perfecting the product being developed. The researcher clarified the data obtained from student responses from the implementation step, this was done because it focused on the feasibility of teaching materials based on the Discovery Learning method only.

3 Results and Discussion

The process of preparing persuasive text teaching materials based on the discovery learning method refers to the ADDIE research model. The process of developing persuasive text teaching materials based on the discovery learning method starts from the analysis phase by observing the feasibility and requirements for developing teaching materials based on the Discovery Learning learning method. The problems that occur consist of lack of time to reach the overall understanding of students, references to persuasive texts in this school are also very minimal. Students only have references in the form of textbooks and enrichment modules. The value obtained by students during the daily assessment of persuasion is also on average below the KKM with the highest score being 70.
The researcher also conducted a needs analysis by distributing questionnaires to Indonesian language teachers and 30 students (grade VIII-1) at SMP GKPI Padang Bulan Medan. The results obtained are: 100% of students and teachers have never specifically applied teaching materials in the form of persuasive text modules, they only used teaching materials provided by the school. 100% of teachers and students have never used the Persuasive Text module based on the Discovery Learning Method. Teachers and students feel that they need additional teaching materials regarding persuasive texts with a percentage of 98.62%.

Next is the design stage which aims to design persuasive text teaching materials assisted by the discovery learning method. The design phase starts from the form of the module cover, introduction, introduction, learning activities, summary, evaluation, answer key, bibliography and glossary. After that, product development is carried out. The activity of this stage is compiling and improving each material starting from learning materials, pictures, and others. Expert validation assessment and product testing in limited classes.

After product validation and improvement, then a limited field trial was carried out to see the results of using the module in the classroom which included measuring learning motivation and student learning outcomes. This stage took place three times starting from individual trials, small groups (10 students) and the product was implemented in actual classroom situations, namely students of class VIII-1 (30 students). During implementation, the method design that has been developed is applied to conditions in the real class.

Next is an evaluation, at this stage an assessment of students is carried out to assess the feasibility of persuasive text teaching materials assisted by the discovery learning method. After this stage is done, the writer concludes that the product developed is quite effective for teaching persuasive texts. The teaching materials of persuasive texts based on the discovery learning method are arranged differently from the teaching materials offered by schools. Persuasive text teaching materials in schools refer to modules and textbooks distributed by the Ministry of Education and Culture whose contents consist of identifying invitations, directions and considerations of persuasive texts, reviewing structures, presenting persuasive texts and competency tests. What is presented in the package book is not much different from what is in the module, the only difference being the form of exercise given. Meanwhile, persuasive text teaching materials in the form of modules offered by researchers refer to the discovery learning method, which is one of several learning methods promoted by K13. The discovery learning method refers to discovery, so it is hoped that after the teacher uses this method, students are able to 'create' something. This persuasive text material based on the discovery learning method in the learning activity steps consists of six steps, namely: Giving stimulation, problem identification, data collection, data processing, proof and conclusion drawing.

The front cover of the persuasive text learning module based on the discovery learning method depicts children laughing and learning, showing that persuasive text learning is fun and exciting learning. Next there is a picture of a woman standing on a podium giving a speech as an example of a persuasive text. The cover of the persuasive text module based on the discovery learning method is made dark blue in accordance with the uniform color of junior high school students.

The next sheet is the front page of the book which contains the KD to be achieved along with the name of the module compiler. Furthermore, the preface is in the form of the author's thanks to the parties involved when compiling a persuasive text module based on the discovery learning method. Next is a concept map in the form of an initial description of the
content that will be discussed in persuasive text materials based on the discovery learning method.

The introduction to the module contains the identity of the module, basic competencies, learning objectives, a brief description of the material and instructions for using the module for students. At the end of the introduction, the author adds a word of encouragement for students to be more active in reading. Next contains learning activities consisting of two activities, the first learning activity is about studying the structure and linguistic rules of persuasive texts. Lesson 1 activities are divided into two sub-materials, namely studying the structure of persuasive texts and interpreting the linguistic features of persuasive texts. The second learning activity contains the presentation of persuasive texts. In this learning activity, students are directed to write a persuasive text based on the appropriate linguistic structure and characteristics. The description of the material is also delivered in accordance with the discovery learning method which consists of 6 stages of learning like the previous materials. Furthermore, the final competency test contains 10 multiple choice questions and 5 fill-in questions that discuss the two learning activities. Next, there are answer keys for each module activity, bibliography and glossary.

The validation of persuasive text teaching materials assisted by the discovery learning method was obtained based on the validation assessment of a team of experts who were divided into two, namely material and design experts. The teacher's assessment then tested the product individually, in small groups and in a limited field. The material assessment validator was carried out by a material expert from the State University of Medan with an average assessment of material experts regarding persuasive text teaching materials based on the discovery learning method is 89.87%. Some things that need to be improved from persuasive text teaching materials based on the discovery learning method starting from writing the introduction converted into a preface, the introductory sub-chapter which must contain learning objectives because it was not previously included, a concept map that must contain the basic competencies to be achieved, then improve the content. activity 1, activity 2 to the final evaluation and improvement of some punctuation and writing. Then the teaching materials are improved and an assessment is carried out after the revision. The average result of the validator's assessment is 97.82% which is categorized as very feasible, so it is feasible to be applied in class VIII SMP materially.

The validation of the design expert assessment was carried out by a Medan State University lecturer with the average design expert validator's assessment of persuasive text teaching materials based on the discovery learning method is 91.26%, still needs to be improved on the cover in the form of reducing excessive images, including the author's name on the cover. the bottom right corner, fixed the module's font font, included the source and caption of the attached image, and removed the redundant watermark. Then the product improvement was made, the average result of the design expert's assessment was 96.2%, so the product was classified as very feasible for class VIII SMP by design.

The assessment was also carried out by Indonesian language teachers at SMPG GKPI Padang Bulan Medan. This assessment aims to determine the quality of teaching materials that have been developed so that they can adjust the cognitive abilities of students at the junior high school level. The result of the teacher's score regarding persuasive text teaching materials based on the discovery learning method is 90.3% which is in the very feasible category.
Then the product trial stage was carried out three times, namely individuals, small groups, and limited fields. The trial was carried out to identify weaknesses in the teaching materials and the responses of students regarding the teaching materials. Individual trials were given to three students of SMP GKPI Padang Bulan who were selected by purposive sampling through the recommendation of Indonesian language teachers at SMP GKPI Padang Bulan Medan with a total student assessment of 89.1% and classified as very feasible. The next trial was on a small group of ten students in class VIII SMP GKPI Padang Bulan Medan. The average results of the assessment of teaching materials in small group trials as much as 90.8% are categorized as "very feasible". Next, a limited field test was conducted on 30 students of SMP GKPI Padang Bulan Medan. The limited field test obtained an average of 92.4 which was categorized as very feasible.

It was concluded that there was an increase in students' assessment of persuasive text teaching materials assisted by the discovery learning method, seen from individual trials, the results of student assessment on this product were 89.1%, then product improvements were carried out and trials were carried out on small groups of student assessment results regarding teaching materials. It's 90.8%. Next, improvements and limited field tests were carried out and the average number of assessments was 92.4% which was categorized as very feasible. So the teaching materials of persuasive texts based on the discovery learning method are very suitable for use in class VIII SMP GKPI Padang Bulan Medan.

The effectiveness of persuasive text teaching materials assisted by the discovery-learning method is obtained from the results of student learning carried out in two steps, namely during the pre-test and post-test. Students are directed to make a persuasive text that is adapted to the structure and characteristics of the language. The results obtained during the pre-test were 2,132 with an average of 71, this value was categorized as "enough" and did not meet the KKM score of 75. Students above the KKM in the pre-test were 11 students and 19 students were below minimum value. The highest score is 83 and the lowest is 60.

After using persuasive text teaching materials assisted by the discovery learning method and conducting a post-test, the total score of students increased to 2,431 with an average of 81 categorized as "good". From the results of the study during the post-test, it was stated that no one was under the KKM, only 1 person got a score of 91, who got a score of 85-87 were 3 people, a score of 82-84 was 7 people, a score of 79-81 was 12 participants students and 76-78 as many as 7 students. This shows that persuasive text teaching materials assisted by the discovery learning method bring good development and are effectively used by class VIII students of SMP GKPI Padang Bulan Medan.

4 Conclusion

Conclusions were obtained from the formulation of the problem, objectives, results and discussion in the research and development of persuasive text teaching materials based on the discovery learning method in class VIII SMP GKPI Padang Bulan Medan. Conclusions are described as follows. The process of developing persuasive text teaching materials based on the discovery learning method is carried out based on the ADDIE research model which is carried out in five research steps. The first stage of the analysis was carried out by analyzing the need for persuasive text learning at SMP GKPI Padang Bulan Medan, the problems experienced by teachers and students along with teaching materials at school (packaged books and enrichment modules). Next is the design stage, the authors design persuasive text teaching
materials based on the discovery learning method adapted to the student's learning environment and learning videos that can help students' understanding. Furthermore, an assessment for the product was carried out by two material experts, two design experts, an Indonesian language teacher and students of SMP GKPI Padang Bulan Medan. Next is the implementation stage, the product is tested on individuals (3 people), small groups (10 people) and limited classes. Furthermore, an evaluation was carried out in the form of an assessment of the effectiveness of the product of persuasive text teaching materials assisted by the discovery learning method in class VIII SMP GKPI Padang Bulan Medan.

The form of persuasive text teaching materials based on the discovery learning method is arranged differently from the teaching materials offered by schools. Persuasive text teaching materials used in schools refer to modules and textbooks distributed by the Ministry of Education and Culture whose contents consist of identifying invitations, directions and considerations of persuasive texts, reviewing structures, presenting persuasive texts and competency tests. What is presented in the package book is not much different from what is in the module, the only difference being the form of exercise given. Meanwhile, persuasive text teaching materials in the form of modules offered by researchers refer to the discovery learning method, which is one of several learning methods carried by K13. The discovery learning method refers to discovery, so it is hoped that after the teacher uses this method, students are able to 'create' something. This persuasive text material based on the discovery learning method in the learning activity steps consists of six steps: giving stimulation, identifying problems, collecting data, processing data, proving and drawing conclusions. Examples and problems included in the teaching materials also include problems that occur around the learning environment of students so that they are easier to understand and apply.

The validation of the material assessment was carried out by a material expert from the State University of Medan with an average final assessment result of the validator being 97.82% in the very feasible category and the validation of the design expert assessment carried out by a lecturer at the State University of Medan with the average final assessment result of a design expert being 96.2%. The assessment was also carried out by Indonesian language teachers at SMP GKPI Padang Bulan Medan with a percentage of 90.3% being in the very feasible category. Next, a limited field test was conducted on 30 students of SMP GKPI Padang Bulan Medan and got an average of 92.4 which was categorized as very feasible.

The effectiveness of persuasive text teaching materials assisted by the discovery-learning method is obtained from the learning outcomes that come from two steps, namely the pre-test and post-test. The results of the pre-test were 2,132 with an average of 71, this value was categorized as "enough" and did not meet the KKM score of 75. After using persuasive text teaching materials assisted by the discovery learning method and post-testing the total score of students increased to 2,431 with an average of 81 categorized "good". This shows that persuasive text teaching materials assisted by the discovery learning method bring good development and are effectively used in class VIII SMP GKPI Padang Bulan Medan.
References

Development of Teaching Materials for Writing Essay Based on Metacognition in Class XII Students of SMA Nurcahaya Medan

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The Indonesian Language and Literature Study Program of Postgraduate School of Universitas Negeri Medan, Indonesia 2022¹,²,³

Abstract. This study aims to describe the process of developing metacognition-based essay writing teaching materials, validating the development of metacognition-based essay writing materials for class XII students of SMAS Nur Cahaya Medan, and the effectiveness of teaching materials for essay writing based on metacognition for class XII students of SMAS Nur Cahaya Medan. This type of research is research and development based on the Borg and Gall development model. The test subjects consisted of material experts, design experts, Indonesian language teachers and students of SMAS Nur Cahaya Medan. Data on the quality of these products were collected through questionnaires and essay writing tests. The results of this study indicate that the validation by material experts is declared feasible with an average acquisition of 91.48% in the very good category, the feasibility of presenting 94% in the very good category, the feasibility of language being obtained 93.75% in very good category, language feasibility obtained 93.75% in very good category, graphic feasibility obtained 90.00% in very good category, validation by design experts with an average acquisition of 90.00% in very good category, validation by material experts with an average of 90.00% obtained in the very good category. The average individual trial results obtained were 85.04% in the good category, the small group trial results obtained an average of 86.26% in the good category, and the limited field trial results obtained an average of 94.85% in the very good category. The effectiveness of teaching materials shows that the average value of the pretest (initial test) is 70.68% in the sufficient category and the average posttest score (the final score) is 81.40% in the good category.

Keywords: materials, teaching, writing, essays, metacognition

1 Introduction

Teaching materials are a set of learning tools or tools that contain learning materials, methods, limitations, and evaluation methods that are designed systematically and attractively in order to
achieve the expected goals, namely achieving competence or sub-competence with all its complexity (Widodo and Jasmadi in Lestari, 2007). This understanding explains that a teaching material must be designed and written with instructional rules because it will be used by the teacher to assist and support the learning process. Learning materials or materials are basically the "content" of the curriculum, namely in the form of subjects or fields of study with topics/subtopics and details (Ruhimat, 2011:152).

The fact is that currently teachers are less able to understand the concept of developing interesting learning resources and teachers only rely on a single textbook published by the Ministry of Education and Culture in 2005 as the main learning resource. This is evidenced by the results of interviews obtained from a teacher who teaches Indonesian subjects at SMA Nurcahaya Medan named Mrs Ginting. It is known that the learning resources used in the learning process only use one teaching material produced by the publisher of the Ministry of Education and Culture, entitled "Indonesian Language Student Book Grade XII Curriculum 2013". This is commensurate with previous research by Mina Syanti Lubis and Syahrul R (2015:2) in their journal volume 2 Number 1 stating that "when writing learning takes place, teachers still use teaching materials that are less interesting, the learning process is still teacher-centered so that students cannot learn independently, even though the ability, speed, and understanding of students are different and the teacher is still concerned with the results rather than the process.

Based on the problems described above, the authors are motivated to develop a metacognition-based teaching material, the goal is that students are more accustomed to expressing high-level feelings and thoughts with full attention and imagination into an essay and develop ideas and critical thinking skills as a form of construction improvement of essay writing skills.

Brian stated that in learning to write, metacognition is considered as one of the habitual dispositions or successes of the writer's mind, along with other attributes related to metacognition, such as self-regulation, motivation, attribution, meta-awareness and other habitual frameworks, such as flexibility. In fact, understanding metacognition has become part of an early mental model in learning to write cognition. Metacognition as a form of mental exercise that develops several important processes, both cognitive and non-cognitive and has an impact on the structure and function of the brain. The most basic cognitive process developed by the exercise of metacognition is awareness of what is being experienced in the body and mind (sensations, thoughts and emotions).

Research on the Development of Metacognition-Based Essay Writing Teaching Materials is designed so that the resulting learning process is valid for use by teachers and students in the process of teaching and learning activities in accordance with the potential contained in students. This research begins by analyzing the needs of the research subject, then it will be used in the development of metacognition-based essay writing teaching materials in Indonesian lessons. The resulting teaching materials are expected to support the implementation of essay writing learning by achieving maximum KKM numbers.
2 Research Methodology

This type of research is research and development (R&D). The location of the research was carried out on class XII students of SMA Private Nurcahaya Medan, which was located at Jalan Bunga Cempaka No. 41 Padang Bulan Selayang Medan. The data collection instrument in this study was in the form of a questionnaire given to material experts and media design experts as validators. Research and Development Research in education is a process used to develop and measure product validity. Thus the development research that will be carried out by the researcher is to develop a product in the form of a metacognition-based essay writing learning model design, then validate the teaching materials. Product validation was carried out by material experts, metacognitive experts, and high school Indonesian language teachers and then tested on class XII high school students so that it could be seen the feasibility of the learning model design product to be applied in learning to write essays.

The ultimate goal of this research will be to develop a product that can be used in learning. The scope is the development of metacognition-based essay writing teaching materials. The printed teaching materials are expected to be able to improve students' ability to understand metacognition-based essay writing.

3 Results and Discussion

3.1 The Process of Developing Metacognition-Based Essay Writing Teaching Materials

The process of developing teaching materials is carried out in several stages. The first stage is to conduct a field survey or needs analysis. This stage is carried out to understand the idea or idea so that the product developed is in accordance with the needs. This preliminary study was carried out by distributing questionnaires to 2 Indonesian language teachers and 16 students at SMA Negeri Nurcahaya Medan. Based on the results of the analysis, it was found that the teacher used a single textbook, namely the textbook produced by the Ministry of Education and Culture in learning to write essays at school and did not have other teaching materials as companions or supporters. This condition is of course less than optimal in exploring the material for writing essays for students. Phase II of the preparation of the initial product, at this stage the activities carried out are designing the material in the module and designing the structure of the module. Phase III product testing, The trial phase was carried out through several stages, namely, individual trials consisting of 3 students as samples, small group trials consisting of 9 students as samples and limited field trials consisting of 16 students. In individual trials, the average score was 85.04% with the criteria of "good". The small group trial obtained an average score of 86.26% with the criteria of "good". Furthermore, the limited field trial obtained an average value of 94.85% with the criteria of "very good".
3.2 Feasibility of the Process of Developing Metacognition-Based Essay Writing Teaching Materials

Table 1. Process of Developing Metacognition-Based Essay Writing Teaching Materials

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Expert Validation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Eligibility</td>
<td>91.48%</td>
</tr>
<tr>
<td>Serving Eligibility</td>
<td>94.00%</td>
</tr>
<tr>
<td>Language Eligibility</td>
<td>93.75%</td>
</tr>
<tr>
<td>Average</td>
<td>92%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Media Expert Validation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical size of teaching materials</td>
<td>93.75%</td>
</tr>
<tr>
<td>cover design</td>
<td>91.66%</td>
</tr>
<tr>
<td>Teaching material content design</td>
<td>84.21%</td>
</tr>
<tr>
<td>Average</td>
<td>90.00%</td>
</tr>
</tbody>
</table>

3.3 The Effectiveness of Metacognition-Based Essay Writing Teaching Materials

After conducting a wider trial, further testing the effectiveness of the product on student learning outcomes is carried out. The student learning outcomes can be known after the pre-test and post-test were held for class XII students of SMAS Nurcahaya Medan. The pretest is given before using the developed product and the posttest is given after using the developed product (material). The average value (mean) of student learning outcomes through the pretest is 70.68% and the posttest is 81.40%. Based on these results, it can be seen that the average value of student learning outcomes after using the media increased by a difference of 11.

Calculations obtained from the product effectiveness test show that the results of developing metacognition-based essay writing teaching materials are more effective than non-metacognition-based teaching materials. This is evidenced by student learning outcomes using metacognition-based with an effectiveness of 81.40%, while the effectiveness of non-metacognition-based learning is 70.48%. Based on this explanation, it can be concluded that metacognition-based essay writing teaching materials are effectively used and can improve student learning outcomes.
4 Conclusion

Based on the description of the research results above, conclusions can be drawn relating to the development of metacognition-based essay writing teaching materials, including:

The development of the module as a teaching material for metacognition-based essay writing based on the results of the needs analysis stated that the development of this module is very much needed by students and teachers in the learning process, because it can improve the quality of learning to be better and more interesting.

The use of the modules that have been developed is considered more effective than the textbooks used by the previous students. This is evident from the better student learning outcomes after using the developed module. This can be clarified by the acquisition of the pretest score at 70.68% in the "enough" category and the posttest score increased after using the module to 81.40% in the "good" category. Based on this, the product developed has been good and has been tested in improving the essay writing skills of class XII students of SMAS Nurcahaya Medan.

References

The Validity of The Encyclopedia Mandailing Ethnomedicine in The Area of Mount Sorik Marapi as a Student Learning Resource

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Abstract. This study aims to determine the validity of the encyclopedia Mandailing ethnomedicine in the area Mount Sorik Marapi as a student learning resource in ethnobotany. Subjects according to material experts, learning experts, design experts, responses from lecturers, and also responses from students. This type of research is development research using the ADDIE model. This research only reached the development stage. The results showed that based on the assessment of material experts of 85.5%, learning experts of 91.75%, and design experts of 96.67%, the average assessment of biology lecturers was 91.33%, and the average assessment of students by 89.33%. It can be concluded that the encyclopedia of ethnomedicine is appropriate to be used as a learning resource that can be used by students to support learning in ethnobotany courses.

Keywords: Encyclopedia, Ethnomedicine, Validity

1 Introduction

Indonesia is rich in plant diversity because of it is tropical rain forests. Indonesia has a total of 5490 taxa of medicinal plants, of the 5408 species that have been identified, 82 species can only be identified at the genus level because they are new species [1]. However, due to the large number of land conversions that result in habitat destruction [2], the taking of medicinal plants is not carried out sustainably [3], and the lack of knowledge of the community who considers medicinal plants only as wild plants [4]. Over time, these medicinal plants will decrease and even cannot be found in nature if there is no conservation effort.

Mount Sorik Marapi is one of the mountains located in Puncak Sorik Marapi District, Mandailing Natal Regency, North Sumatra. This mountain area is fertile because of it is great potential for natural disasters in the form of volcanic activity. It is known that people who live around Mount Sorik Marapi know the types of plants that can be used as medicine. However, along with the development of technology and information, more complete health facilities, and the number of modern medicines that enter, it is feared that this local knowledge will also
be eroded. There is a need for documentation of medicinal plants, one of which is in the form of a book.

The learning process cannot be separated from its components such as teachers, students, learning objectives, lesson materials, methods, learning tools/media, learning environment, and learning evaluation [5]. Learning media is one of the important components to be developed. The existence of learning media is needed in teaching and learning activities [6]. Learning media can be in the form of humans, objects, living things, and all components that can be used by teachers as tools to assist the learning process [7]. Learning media must be interactive, innovative, creative, and fun which makes students to further strengthen their initiative, perseverance, love, and attention to learning [8]. Books are a medium of learning that can be used in learning [9].

Based on the needs analysis of the development of ethnomedicine material books through filling out questionnaires for biology students, it is known that students have difficulties in studying ethnomedicine material. This is due to the lack of books as learning resources that can support the learning process on ethnomedicine material. Therefore, most students who have filled out research questionnaires need books that can be used as learning resources.

Learning resources are everything that can be used as a source to improve the quality of teaching and learning to achieve the objectives of learning [10]. Learning resources that can be used for students must be following the character and abilities of these students [11]. Learning will be better if learning resources are used optimally [10]. Good learning resources will provide convenience for students to obtain information, knowledge, and learning experiences in the learning process [12].

One source of learning is books. Books not only act as a source but also as a medium of delivery that plays an important role in the learning process [13]. Based on research [14] that less interesting textbooks will make students easily bored and less interested in learning, especially for students who do not understand the lesson. Likewise, students who master the lesson may reduce their academic knowledge.

Encyclopedias can be used as a source of student learning because the presentation of the material is interesting and accompanied by pictures that can increase student learning motivation. An encyclopedia is one of the reference materials that contain various kinds of information or knowledge in a basic and general nature for further information [15]. An encyclopedia is an alternative learning resource that is easy to understand and fun and very helpful to achieve learning objectives [16]. Encyclopedias are unique from other books because they are arranged alphabetically which makes it easier for readers to use them and have a list of terms accompanied by explanations of the terms [17]. From the explanation above, it is necessary to develop an ethnomedicine encyclopedia of the Mandailing ethnic in the Mount Sorik Marapi area which can be used as a learning resource by students.

2 Method

Types of research

This research is a Research and Development research. Development research is research that aims to develop new product designs, test the effectiveness of a product, design, and develop a product [18]. The research model uses the ADDIE (Analysis, Design, Development,
Implementation, and Evaluation model. In study this is restricted until on development stage, stage next will be discussed in another writing.

**Time and The place Study**

The book development implementation will be carried out from August 2021 to February 2022. The research site is at the Department of Biology, FMIPA, State University of Medan, which is located at Jalan William Iskandar Pasar V Medan Estate, Postal Code 20221, Medan.

**Data Collection Instruments and Techniques**

Research instruments to obtain data validity are in the form of validation sheets for expert validators (material experts, learning experts, and design experts), response sheets according to lecturers, and response sheets according to students. The validation sheet has different aspects and different indicators that are tailored to each individual's expertise. The score for validity uses a 4 scale assessment, namely: very valid, valid, less valid, and invalid. At the end of the validation sheet, there is a suggestion column written by the validator for book improvement.

**Development Research Procedure**

The development research procedure carried out is as shown in the flow chart shown in Figure 1.

![Flowchart of Encyclopedia Book Development](image)

**Figure 1.** The Flowchart of Encyclopedia Book Development

**Data Analysis**

The score results from the validation sheet provided by the validator are then presented as a percentage with the formula:

\[ P = \frac{F}{N} \times 100\% \]  \hspace{1cm} (19)

Information:

P = Percentage Score  
F = Total Score  
N = Total Score Maximum

The results of the percentage scores are then described using the categories in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Value Scale (%)</th>
<th>Validity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1.** Book Validity Criteria [20]
3 Results and Discussion

Results
The development encyclopedia book developed in this research uses the ADDIE research model (Analysis, Design, Development, Implementation, and Evaluation). However, the article this is only until on development stage. Each research result will be discussed as follows.

Book Development Design of Encyclopedia Mandailing Ethnomedicine

The encyclopedia Mandailing ethnomedicine in the area Mount Sorik Marapi was designed based on two stages, namely the initial stage which is the initial draft of the book which includes four components, namely: 1) the cover of the book; 2) the introduction to the book; 3) the contents of the book; 4) the cover of the book. While the second stage is in the form of combining the initial draft of the book with the results of the Mandailing ethnomedicine study or a comparison between the results of the Mandailing ethnomedicine study and the literature study.

Validity Results of Encyclopedia Mandailing Ethnomedicine

The encyclopedia Mandailing ethnomedicine that has been written and designed is then further validated by experts (material experts, learning experts, and design experts), as well as asking for responses from lecturers and students as book users. The results of the product validation of the encyclopedia Mandailing ethnomedicine are as follows.

Material Expert Validation

The results of the assessment according to material experts on the development of the encyclopedia Mandailing ethnomedicine can be seen in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Component Evaluation</th>
<th>Percentage Rating (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scope Theory</td>
<td>96</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td>2</td>
<td>Accuracy Theory</td>
<td>84</td>
<td>Valid, can be used but need small revision</td>
</tr>
<tr>
<td>3</td>
<td>Update and Contextual</td>
<td>82</td>
<td>Valid, can be used but need small revision</td>
</tr>
<tr>
<td>4</td>
<td>Obedience on Law Writing and Legislation</td>
<td>94</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td>5</td>
<td>Efficiency Book Ethnomedicine on Learning</td>
<td>85</td>
<td>Valid, can be used but need small revision</td>
</tr>
</tbody>
</table>
Based on the results of the assessment by the material expert validator in Table 2. The results obtained are 85.5% with very valid criteria, can be used but need minor revisions. Validation is carried out in terms of material coverage, material accuracy, up-to-date and contextual, compliance with laws and regulations, efficiency of ethnomedicine books in learning, linguistic components, conformity with Indonesian language rules, and use of terms. Thus, encyclopedia Mandailing ethnomedicine in the area of Mount Sorik Marapi has met the eligibility requirements in terms of material so that it can be used as a learning resource for students.

### Learning Expert Validation

The results of the assessment according to learning experts on the development of the encyclopedia Mandailing ethnomedicine can be seen in Table 3.

<table>
<thead>
<tr>
<th>No</th>
<th>Component Evaluation</th>
<th>Percentage Rating (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technique Presentation</td>
<td>96</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td>2</td>
<td>Presentation Theory</td>
<td>89</td>
<td>Valid, can be used but need small revision</td>
</tr>
<tr>
<td>3</td>
<td>Presentation Learning</td>
<td>85</td>
<td>Valid, can be used but need small revision</td>
</tr>
<tr>
<td>4</td>
<td>Completeness Presentation</td>
<td>97</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>91.75</td>
<td>Very valid, can be used but need small revision</td>
</tr>
</tbody>
</table>

Based on the assessment by the learning expert validator in Table 3, the average rating obtained is 91.75% with very valid criteria, can be used but needs minor revisions. The validation carried out by learning experts includes presentation techniques, presentation of material, presentation of learning, and completeness of presentation. Thus, encyclopedia Mandailing ethnomedicine in the area of Mount Sorik Marapi has met the eligibility requirements in terms of learning so that it can be used as a learning resource for students.

### Design Expert Validation

The results of the assessment according to design experts on the development of the encyclopedia Mandailing ethnomedicine can be seen in Table 4.

<table>
<thead>
<tr>
<th>No</th>
<th>Component Evaluation</th>
<th>Percentage Rating (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Component language</td>
<td>93</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td>7</td>
<td>Suitability with Rule Indonesian</td>
<td>75</td>
<td>Valid, can be used but need small revision</td>
</tr>
<tr>
<td>8</td>
<td>Use Term</td>
<td>75</td>
<td>Valid, can be used but need small revision</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>85.5</td>
<td>Very valid, can be used but need small revision</td>
</tr>
</tbody>
</table>

Based on the assessment by the design expert validator in Table 4, the average rating obtained is 85.5% with very valid criteria, can be used but need small revision.
Based on the assessment by design expert validators in Table 4, the average rating obtained is 96.67% with very valid criteria, can be used but needs minor revisions. Validation carried out by design experts includes book size, cover design, and book content design. Thus, the encyclopedia Mandailing ethnomedicine in the area Mount Sorik Marapi has met the eligibility requirements in terms of design so that it can be used as a learning resource for students.

**Assessment Results by Lecturer**

The results of the assessment according to lecturers on the development of the encyclopedia Mandailing ethnomedicine can be seen in Table 5.

<table>
<thead>
<tr>
<th>No</th>
<th>Component Evaluation</th>
<th>Percentage Rating (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Size Book</td>
<td>100</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td>2</td>
<td>Cover Design</td>
<td>94</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td>3</td>
<td>Book Content Design</td>
<td>96</td>
<td>Very valid, can be used but need small revision</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>96.67</strong></td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the assessment by two lecturers in Table 5, the average rating of 91.33% with very valid criteria, can be used but needs minor revisions. The validation carried out by the lecturer is seen from the aspect of the feasibility of content, book presentation, and also language. Thus, the encyclopedia Mandailing ethnomedicine in the area of Mount Sorik Marapi can be used as a learning resource for students.

**Assessment Results by Student**

The results of the assessment according to the student on the development of the encyclopedia Mandailing ethnomedicine can be seen in Table 6.

<table>
<thead>
<tr>
<th>No</th>
<th>Component Evaluation</th>
<th>Percentage Rating (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Lecturer 1</strong></td>
<td><strong>Lecturer 2</strong></td>
</tr>
<tr>
<td>1</td>
<td>Content Eligibility</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>2</td>
<td>Presentation Book</td>
<td>88</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>Language</td>
<td>92</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>91.33</strong></td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the assessment by two lecturers in Table 5, the average rating of 91.33% with very valid criteria, can be used but needs minor revisions. The validation carried out by the lecturer is seen from the aspect of the feasibility of content, book presentation, and also language. Thus, the encyclopedia Mandailing ethnomedicine in the area of Mount Sorik Marapi can be used as a learning resource for students.

**Table 5. Assessment Results by Lecturers**

**Table 6. Assessment Results by Student**
Based on the results of the assessment by students in Table 6, the average rating of 89.33% with very valid criteria, can be used but needs minor revisions. The assessment can be seen in terms of the appearance of the book, the topic of discussion, the presentation of the material, the use of language, and errors in the book. Thus, the encyclopedia Mandailing ethnomedicine in the area of Mount Sorik Marapi can be used as a learning resource for students.

5 Discussion

The results of the development research carried out were the Mandailing ethnic ethnomedicine encyclopedia in the Mount Sorik Marapi area. Encyclopedias are writings that contain explanations with various kinds of clear and easy to understand information all about sciences or specifically in a branch of science that is arranged in the article section with a topic [21]. The encyclopedia is equipped with various scientific information and is also supported by original photographs [22]. Encyclopedias can be used as learning resources because they have information with detailed explanations of certain topics and are accompanied by interesting pictures for readers [17].

The first step in this research is analysis. The analysis carried out is an analysis of the needs of student learning resources, an analysis of students' knowledge and skills, and an analysis of the material following the development of the book. This analysis stage is carried out to find out the needs of students for the availability of books and also serves as the main basis for developing books before moving on to the next stage of development [23]. From this analysis, it is known that the main problem for students is that students have difficulty when learning about ethnomedicine. This is due to the lack of handbooks that are used as learning resources.

The encyclopedia Mandailing ethnomedicine consists of 4 parts, namely: 1) the book cover which consists of the front cover and the back cover of the book; 2) the introduction section which contains the introduction, introduction, and table of contents; 3) the content section consists of the concept of ethnomedicine, the diversity of ethnomedicine in Indonesia and especially ethnomedicine in North Sumatra, the use of medicinal plants by the Mandailing ethnicity, and efficacious compounds in plants. This book is also equipped with scientific names, local names, families, general characteristics of plants, habitats, methods of use, and chemical content of medicinal plants; 4) the closing section consists of a bibliography, glossary, scientific name index, regional name index, and author’s biography.
The feasibility of the encyclopedia is assessed based on the average of the indicators that have been determined to be validated by expert validators (material experts, learning experts, and design experts) and then revised gradually according to suggestions and input from expert validators. The material expert assessment is 85.5% very valid category, can be used but need small revision (Table 2), learning expert is 91.75% very valid category, can be used but need small revision (Table 3), and design expert is 96.67% very valid category, can be used but need small revision (Table 4), the average assessment of biology lecturers is 91.33% very valid category, can be used but need small revision (Table 5), and the average assessment of 89.33% of students in the very valid category, can be used but need small revision (Table 6).

The same study was also conducted by [24] that based on the assessment of material experts, an average of 93.18% was obtained in the very valid category, the media expert assessment has change an average of 93.27% with a very valid category, based on the teacher's assessment of 92.5% in the very practical category, and based on student responses 93.75% in the very practical category. Likewise with research [25] based on the validation of material experts of 90.1%, media experts of 97.65%, teacher responses of 90.91% with each category being valid and also small-scale student responses of 90.95% and a large scale of 85.98%.

Research [26] that based on the validation of material experts is 91.1%, media experts are 91.7%, teacher responses are 88.53%, and student responses are 89.8% with each category very good. Research [27] based on material experts of 87.5%, media experts of 88%, teacher responses of 97% with each category very feasible, and student responses based on individual trials of 86.6%, small group trials of 93.3%, and a limited group trial of 97.3% with each category being a feasible category.

The use of encyclopedias as learning resources is able to improve student learning outcomes and understanding [28]. This is because the encyclopedia can be an enrichment material outside of the core material that is conveyed by the teacher to students so that the level of understanding is better. As a teacher, you should adjust the material with appropriate learning resources for students so that students' understanding increases in the learning process.

6 Conclusion

The results showed that based on the assessment of material expert is 85.5% very valid category, can be used but need small revision, learning expert is 91.75% very valid category, can be used but need small revision, and design expert is 96.67% very valid category, can be used but need small revision, the average assessment of biology lecturers is 91.33% very valid category, can be used but needed small revision. Thus, the encyclopedia Mandailing ethnomedicine in the area of Mount Sorik Marapi can be used as a learning resource for students.

References

Feasibility of Negotiation Text Module Based on the Qur'an and Hadith for Class X MAN 2 Model Medan Students

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{saripahhannumsiregar@gmail.com 1, rosmawatyharahap@gmail.com 2, surif@unimed.ac.id 3}

Indonesian Language and Literature Education Study Program, Postgraduate School of Universitas Negeri Medan, Indonesia, 2022

Abstract. The problem of this research is how the feasibility of the negotiation text module based on the Qur'an and Hadith for class X MAN 2 Model Medan students. This study aims to explain the feasibility of the negotiation text module based on the Qur'an and Hadith. The data collection technique used in this study was in the form of a questionnaire. The data analysis technique for the feasibility of the module used descriptive data analysis. The results showed that the negotiation text module based on the Qur'an and Hadith that was developed was feasible to use based on the results of material expert validation of 93.61%, design expert validation of 76.34%, religious expert validation of 94.53%.

Keywords: Feasibility, module, negotiation text, Al-Qur'an and Hadith.

1 Introduction

The module is one type of teaching material. Teaching materials are important in the implementation of learning. Learning will not run optimally if the teaching materials in its implementation are not adequate. This statement is in accordance with the opinion of Prastowo [1] which states that the teaching and learning process will be more effective and interactive when using adequate teaching materials. Adequate in this case is following the applicable curriculum, adjusting to the characteristics of students, and according to the conditions of the school environment.

The module teaching materials have several advantages. The advantage is that the module can be used by students as a means of learning independently without the presence of a teacher. The ability of students will not be the same as others even though they are in the same class. By using the module, these students can carry out learning activities according to the speed of their thinking and their abilities. The modules can be used whenever and wherever students are, not necessarily in the classroom, so that students' activities and learning outcomes can increase. Teaching materials in the form of modules are also easier for students to understand
for independent study because the language in the module are more communicative and interactive than other teaching materials.

In the current Covid-19 pandemic situation, module development is also very much needed because learning is done online. Online learning is usually done through zoom meetings, e-learning, social media, or WhatsApp groups. However, not all students have good connections to participate in online learning. Therefore, students must find the solutions so that they can study independently at home. In this self-study, it is very necessary to have a module. This is also expressed by Najjah, et al [2] the modules are ideal teaching materials to be used as independent learning media or distance learning.

Although not in a Covid-19 pandemic situation, the module can still be used, especially for schools that hold the SKS (Semester Credit System) program. MAN 2 Model Medan is one of the schools in the city of Medan that organizes learning with credits. MAN 2 Model Medan is also one of the schools in the city of Medan at the high school level with Islamic nuances. All students and teachers at MAN 2 Model Medan are Muslim. As Muslims, it is natural that learning is carried out based on the teachings of the Islamic religion. To explore the teachings of Islam, of course, one must refer to the sources of its teachings. The sources of Islamic teachings are described in the Qur'an Surah An-Nisa' verse 59, namely:

Translation of the Ministry of Religion 2002

O you who believe! Obey Allah and obey the Messenger (Muhammad), and Ulil Amri (holders of power) among you. Then, if you disagree about something, then return it to Allah (the Qur'an) and the Messenger (his Sunnah), if you believe in Allah and the Last Day. That is more important (for you) and better as a result. (An-Nisa'/4:59)

From this verse it can be concluded that the sources of Islamic teachings are the Qur'an, Hadith, and Ijtihad. The use of these three sources must be sequential, meaning that the first to be used as a legal guide is the Qur'an, then the Hadith/Sunnah of the Prophet. If it is not found in these two sources, then a third source is used, namely ijtihad.

One of the efforts to instill character values in accordance with Islamic teachings in students is to integrate Islamic teachings into a subject, even though it is not a religious subject. The material on religious subjects alone is not enough to instill the values of the Islamic character in students. One of the general subjects that can be integrated with the teachings of Islam is Indonesian. One of the texts in Indonesian class X is a negotiation text. The purpose of negotiation is to overcome or adjust differences of opinion or interests that exist on both sides in order to reach an agreement and mutually benefit. This is following the statement of Suherli et al [3] which states that negotiation is a bargaining process between one party (group or organization) and other parties (groups or organizations) with ways of deliberation to achieve mutual agreement.
From the texts taught in Indonesian subjects, especially negotiating texts, it will be a great opportunity that teachers can use as a basis for developing quality teaching materials, as well as inculcating Islamic character values. This is in accordance with the objectives of Islamic education by Kompri, [4] namely the realization of a Muslim personality who realizes Islamic teachings in aspects of life. However, based on observations of the Indonesian language teaching materials used by class X students at MAN 2 Model Medan, they are still the same as other schools, namely Textbooks from the Ministry of Education and Culture. There is no specific distinguishing feature between schools with Islamic nuances and public schools.

Therefore, it is necessary to develop a negotiating text module based on the Qur'an and Hadith. One of the stages in the development process is the validation stage. The validation stage is the stage to test the feasibility of the teaching materials developed. The feasibility of teaching materials must be met so that the teaching materials developed have good quality. Based on the problems above, the researcher is interested in conducting a research entitled “Feasibility of Negotiation Text Module Based on the Qur'an and Hadith for Class X MAN 2 Model Medan Students”.

2 Theoretical Basis

Modules as Teaching Materials

Teaching materials are one of the supporting tools for the implementation of learning. According Himawan et al, [5] teaching materials are important learning materials because of the role of teaching materials as a means of conveying messages from teachers (messages) to students (messages recipients). Prastowo [6] states that teaching materials are all materials (both information, tools, and texts) that are systematically arranged, can represent a complete set of competencies to be mastered by students and used in the learning process with the aim of planning and reviewing the implementation of learning.

One type of teaching material is a module. The module is one of the tools that students can use in independent learning and assist teachers in guiding and adding to their treasury of learning resources [7]. With the module, students are required to understand the material, find sources of information, and solve problems independently without the help of the teacher. This is in accordance with the demands of the 2013 curriculum that learning is carried out centered on student activity, and in accordance with the Covid-19 pandemic conditions which do not allow face-to-face learning. Daely [8] state that modules are teaching materials that are arranged in a complete and systematic way so that they can function to help students achieve learning goals and reduce students' dependence on teachers.

Based on some of the definitions above, it can be concluded that module teaching materials are one type of teaching materials that are designed systematically, attractively, and clearly by using grammar that is in accordance with the knowledge and age level of students so that it is easy for students to learn independently in order to achieve goals learning. Sasmito et al [9] states that modules are teaching materials in the form of print that are arranged systematically. This is different from Najiah's opinion [10] that the module is not only a print module, but can also be an electronic module (digital/e-module). In accordance with Najiah's opinion, in this
study, the modules developed were not only in the form of a print module, but also a module in the form of a pdf file.

Eligibility Criteria for Teaching Materials

According to Oktavia [11], teaching materials in the form of modules can be useful if they are easy to use and students’ learning motivation can be increased. Therefore, a good module according to Oktavia must describe the basic competencies that will be achieved by students, use good and easy-to-understand language, look attractive, and be equipped with illustrations.

The eligibility criteria for teaching materials are items that can be used as a tool to examine and determine the feasibility of teaching materials/teaching materials. Government Regulation No. 19 of 2005 concerning National Education Standards, article 43 paragraph 5, stipulates four criteria in assessing the feasibility of teaching materials, namely 1) content feasibility, 2) presentation feasibility, 3) language feasibility, and 4) graphic feasibility. The explanation of the four eligibility criteria for teaching materials based on the attachments of the instruments that have been set by BSNP is as follows.

1) Content Feasibility

Content feasibility is the feasibility of the substance or content of the material presented or exposed in the textbook. Feasibility of content includes sub-aspects (1) the suitability of the material with KI and KD, including the completeness of the material and the breadth of the material, (2) the accuracy of the material, including the accuracy of concepts and definitions; accuracy of facts and data; the accuracy of examples and cases; accuracy of drawings, diagrams and illustrations; accuracy of terms; accuracy of notations, symbols and icons; the accuracy of the literature references, (3) the up-to-dateness of the material, including the suitability of the material with science; showing the topic of past events/occurrences, and illustrations, (4) encouraging curiosity, including encouraging curiosity and creating the ability to ask questions.

2) Presentation Feasibility

Presentation feasibility is the feasibility of systematic and order of presentation of learning materials. Presentation feasibility criteria include (1) presentation techniques, including systematic consistency of presentation; the sequence of concepts, (2) the presentation of learning, including the involvement of students; student-centered; stimulate students’ ability to solve problems through illustrations, and (3) completeness of presentation, including examples of questions in each lesson; practice questions at the end of the learning activity; answer key to practice questions; introduction; list of contents; glossary; bibliography; and summary.

3) Language Feasibility

Language feasibility is the feasibility of using the language used to express ideas. The feasibility criteria for the language aspect include (1) being straightforward, including the accuracy of sentence structure; sentence effectiveness; and the standard of the term, (2) communicative, including the readability of the message; and accuracy; and accuracy of language use, (3) dialogical and interactive, including the ability to motivate messages and information; the ability to encourage critical thinking, (4) conformity with the level of
development of students, including the suitability of the intellectual development of students; and conformity to the level of emotional development of students, (5) coherence and integration of the flow of thought, including coherence and integration between learning activities; and coherence and coherence between paragraphs, (6) the use of terms, symbols, and icons, including the consistency of the use of terms;

4) Graphic Feasibility

Graphic feasibility criteria include (1) the size of the teaching materials, including the suitability of the size of the teaching materials with ISO standards (A4, A5, and B5); conformity with the content of teaching materials, (2) cover design of teaching materials (cover), which includes the appearance of layout elements on the front, back, and back covers in harmony with rhythm and unity and consistency; display a good center point; the colors of the layout elements are harmonious and clarify the function; the composition and size of the layout elements (title, author, illustration, logo, etc.) are proportional, balanced, and in tune with the layout of the content (according to the pattern); the size of the title of the teaching material is more dominant and proportional than the size of the teaching material, the name of the author; the color of the title of the teaching material contrasts with the color of the background; don't use too many typeface combinations; describe the content/teaching materials and reveal the character of the object; and the shape, color, size, proportion of objects according to reality, (3) the design of the content of teaching materials, including the placement of consistent layout elements based on the pattern; clear separation between paragraphs; print area and proportional margins; proportional adjoining page margins; appropriate spacing between text and illustrations; proper placement of learning activity titles, subtitles, illustrations, and captions; placement of decoration/illustration as a background does not interfere with the title, text, page numbers; placement of titles, subtitles, illustrations, and image captions does not interfere with understanding; don't use too many fonts; the use of letter variations (bold, italic, capital) is not excessive; normal text array width; spacing between lines of normal text arrangement; normal letter spacing; the level/hierarchy of titles is clear, consistent and proportional; word cut sign; able to express the meaning of the object; accurate and proportional form in accordance with reality; creative and dynamic.

Negotiation Text

Priyatni [12] states that text is an expression that functions to express meaningful ideas, both in the form of speech (oral) and in writing. This opinion is also supported by Suwandi [13] which states that text is a language used as a means of communication in a social process oriented towards a social goal. So, it can be concluded that the text is not only in the form of writing, but also in the form of oral. This is also supported by the opinion of Radani [14] which states that the text is a series of language expressions both orally and in writing contained in a context of situation and cultural context.

The text in Indonesian language learning curriculum 2013 based on Permendikbud No. 69 of 2013 there are 15 types of text, one of which is negotiation text. Farhan et al [15] defines negotiation in general as a social interaction that occurs between two or more, having different goals but both trying to resolve these differences through a way out in the form of dialogue in order to reach a mutual agreement. According to him, negotiation is important to learn because every human being cannot be separated from problems that must be resolved properly
through negotiations. Cahyaningrum [16] defines negotiation as a process used to reach agreement and agreement from the negotiators so as to obtain mutual benefits. Kosasih [17] gives the understanding that negotiation is a form of social interaction whose function is to reach an agreement between the parties who have different interests.

Harijanti [18] states that the meaning of negotiating text is a form of social interaction carried out by two or more parties with different interests but aiming to reach a mutual agreement. Rojiati [19] also explained that the negotiating text is a form of social interaction that aims to find a common solution between parties who have different interests. Suryandari [20] states that the negotiating text is a text that aims to reach an agreement, which has a different structure and language from other texts. Based on some of the opinions above, it can be concluded, text negotiation is a text used in social interaction in the form of bargaining about something that has a difference interest in achieving a agreement together and each other beneficial both verbally and writing.

Al-Qur'an and Hadith

Etymologically, the Qur'an comes from the words qara'a, yaqra'a, gira'atan or qur'anan which means to collect (al-jam'u) and collect (al-dhammu) letters and words. from one section to another on a regular basis. Rozak [21] defines the Qur'an as the word of Allah Swt. revealed to the Prophet Muhammad through the angel Gabriel. Waluyo [22] gives the definition that the Qur'an is a holy book that is a source in Islamic teachings that guides human life which was revealed by Allah Swt. to the Prophet Muhammad Saw., as an incomparable mercy to the universe.

Hadith according to Hidayat [23] are things narrated from the Prophet Muhammad Saw., either in the form of words, deeds, or decisions (takrir). This understanding is also supported by Kompri [24] which states that hadith is everything that is relied on the prophet Muhammad Saw., either in the form of words, deeds, provisions, hopes, or ideals.

Judging from the quality of its sanad and matan, or based on its strength and weakness, Hadith is divided into two groups, namely Maqbul Hadith and Mardud Hadith.

1) Maqbul Hadith is a Hadith that meets the requirements of qabul, namely the requirement to be accepted as a proposition in the formulation of law or to do good with it. The Maqbul Hadiths include Sahih Hadith and Hasan Hadith.

2) Hadith Mardud or also called Hadith Dha'if is a Hadith that does not meet the requirements of qabul.

Hadiths that can be used as guidelines for Islamic law as a source of Islamic teachings are the Maqbul (accepted) Hadiths. In addition to the Maqbul Hadith, the Mardud Hadith (Dha'if) is unacceptable and its use is not valid as a legal argument or source of Islamic teachings. So, the Hadith listed in the module that will be developed is Sahih Hadith.

3 Research Methods

The data collection technique used in this study was in the form of a questionnaire. Questionnaire is a data collection technique by giving a several number of questions to
respondents to answer. Data analysis techniques for the feasibility of teaching materials using descriptive data analysis. Descriptive analysis technique was performed using descriptive statistics. Descriptive statistics are statistics used in analyzing data by describing the data that has been collected as it is without intending to make conclusions that can be applied to the public or generalizations [25].

The data obtained are quantitative and qualitative data. Quantitative data comes from a Likert scale assessment questionnaire, while quantitative data is in the form of additional assessments or suggestions from the validator. Qualitative data is used to revise the module in accordance with the suggestions given by the validator. While quantitative data can be analyzed following the following steps:

a. Accumulating the scores obtained
b. Calculate the average total, using the following formula (1).
   \[ \bar{x} = \frac{\sum x}{n} \]  
   (1)
   
   Description:
   \( \bar{x} \) = average
   \( \sum x \) = total value
   \( n \) = total rating

c. Calculate the percentage obtained, using the following formula (2).
   \[ \% \text{ score} = \frac{\text{score earned}}{\text{max score}} \times 100\% \]  
   (2)
d. Interpreting the percentage data obtained into a criterion

| Table 1. Assessment Guidelines and Criteria for Interpreting Data |
|-----------------|-----------------|-----------------|
| Value | Percentage Interval | Criteria |
| A  | 81% ≤ X ≥ 100%  | Very good |
| B  | 61% ≤ X ≥ 80%  | Good |
| C  | 41% ≤ X ≥ 60%  | Currently |
| D  | 21% ≤ X ≥ 40%  | Not Good |
| E  | 0% ≤ X ≥ 20%  | Very not good |

In this development research, the minimum feasibility value is C (currently). Based on the results of assessments from experts, subject teachers, and student questionnaires, if they meet a minimum grade of C (currently), then the development of teaching materials (modules) based on the Qur'an and Hadith for Class X MAN 2 Model Medan students can be said to be feasible to produced and used.
4 Results and Discussion

Research Result

The feasibility of the negotiation text module based on the Qur'an and Hadith for class X students at MAN 2 Model Medan can be seen from the validation results carried out by experts, Indonesian language teachers at MAN 2 Model Medan, and field trials (individual, small groups, and limited groups).

Results of Module Validation by Material Experts

Validation of material experts on the negotiating text module based on the Qur'an and Hadith was carried out by two experts, namely the Postgraduate lecturer at the Universitas Negeri Medan. Material expert validation is carried out to assess the feasibility of the negotiating text material contained in the module. The feasibility of the assessed material consists of 3 assessment aspects, namely (1) content feasibility aspects, (2) presentation feasibility aspects, and (3) language feasibility aspects. The following are the results of the validation by the two material experts.

Table 2. Expert Validation Results on the Negotiation Text Module Based on the Qur'an and Hadith

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>X1</th>
<th>X2</th>
<th>Total</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content feasibility aspect</td>
<td>3.7</td>
<td>3.5</td>
<td>7.2</td>
<td>90.44%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation feasibility aspect</td>
<td>3.8</td>
<td>3.8</td>
<td>7.7</td>
<td>96.15%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Language feasibility aspect</td>
<td>3.8</td>
<td>3.8</td>
<td>7.6</td>
<td>95.19%</td>
<td>Very good</td>
</tr>
<tr>
<td></td>
<td>Total Average</td>
<td>3.8</td>
<td>3.7</td>
<td>7.5</td>
<td>93.61%</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Based on the table above, it can be described that the average percentage of material expert validation results is 93.61%. The average percentage obtained from the content feasibility aspect is 90.44% with the "very good" criteria, the presentation feasibility aspect is 96.15% with the "very good" criteria, and the language feasibility aspect is 95.19% with the "very good" criteria.

4.1.2 Results of Module Validation by Design Expert

The validation of the design expert on the negotiating text module based on the Qur'an and Hadith was carried out by one expert, namely a lecturer at the Faculty of Language and Arts, Universitas Negeri Medan. Design expert validation was carried out to assess the feasibility of graphics which consisted of 3 assessment indicators, namely (1) module physical size, (2) module cover design, and (3) module content design. The following are the results of the validation by design experts.

Table 3. Design Experts Validation Results on the Negotiation Text Module Based on the Qur'an and Hadith

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>X</th>
<th>Max Score</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Module physical size</td>
<td>3.5</td>
<td>4</td>
<td>87.5%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Module cover design</td>
<td>2.6</td>
<td>4</td>
<td>63.9%</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Module content design</td>
<td>3.1</td>
<td>4</td>
<td>77.6%</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Total Average</td>
<td>3.1</td>
<td>4</td>
<td>76.34%</td>
<td>Good</td>
</tr>
</tbody>
</table>
Based on the table above, it can be described that the average percentage of design expert validation results is 76.34%. The average percentage obtained from the indicators for assessing the module physical size is 87.5% with the "very good" criteria, the module cover design assessment is 63.9% with the "good" criteria, and the module content design assessment is 77.6% with the criteria "good".

Results of Module Validation by Religious Experts

The validation of religious experts on the negotiating text module based on the Qur'an and Hadith was carried out by two experts, namely lecturers at the Universitas Islam Negeri of North Sumatera. The validation of religious experts was carried out to assess the feasibility of using the verses of the Qur'an and Hadith in the negotiating text module based on the Qur'an and Hadith. The following are the results of the validation by the two religious experts.

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>X1</th>
<th>X2</th>
<th>Total</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aspect of presentation of the verses of the Qur'an and Hadith</td>
<td>3,7</td>
<td>4</td>
<td>7,7</td>
<td>95.83%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Aspect of meaning and interpretation of the Qur'an and Hadith</td>
<td>3,7</td>
<td>3,8</td>
<td>7,5</td>
<td>93.75%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Aspect of buying and selling based on the Islamic perspective</td>
<td>3,6</td>
<td>3,8</td>
<td>7,4</td>
<td>92.5%</td>
<td>Very good</td>
</tr>
<tr>
<td>4</td>
<td>Aspect of compatibility of the verses of the Qur'an and Hadith with the teaching materials</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>100%</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Total Average: 3,7 3,9 7,6 94.53% Very good

Based on the table above, it can be described that the average percentage of religious expert validation results is 94.53%. The average percentage obtained from the assessment indicators for the presentation of the verses of the Qur'an and Hadith is 95.83% with the criteria of "very good", the assessment of the meaning and interpretation of the verses of the Qur'an and Hadith is 93.75% with the criteria of "very good", the assessment of buying and selling based on the Islamic perspective is 92.5% with the criteria of "very good", and the assessment of the compatibility of the verses of the Qur'an and Hadith with the teaching material of the negotiating text is 100% with the criteria of "very good".

Results of Indonesian Language Teachers’ Responses to the Module

The response of the Indonesian language teacher is needed to assess the feasibility of the module when used in classroom learning. The teacher's response to the negotiating text module based on the Qur'an and Hadith was given by two Indonesian language teachers at MAN 2 Model Medan. Responses to the module consist of three aspects of the assessment, namely from the aspect of the module display, the material presentation, and the module benefits. The following are the results of the responses by the two Indonesian language teachers.
Table 5. Results of Teachers Responses on the Negotiation Text Module Based on the Qur'an and Hadith

<table>
<thead>
<tr>
<th>No.</th>
<th>Statement</th>
<th>X1</th>
<th>X2</th>
<th>Total</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Modul display</td>
<td>4</td>
<td>3,8</td>
<td>7,8</td>
<td>96.86%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Material presentation</td>
<td>3,7</td>
<td>4</td>
<td>7,7</td>
<td>95.83%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Module benefits</td>
<td>4</td>
<td>3,3</td>
<td>7,3</td>
<td>91.7%</td>
<td>Very good</td>
</tr>
<tr>
<td>Total Average</td>
<td>3,9</td>
<td>3,7</td>
<td>7,6</td>
<td>94.79%</td>
<td>Very good</td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, it can be described that the average percentage of Indonesian language teacher responses at MAN 2 Model Medan is 94.79% with the criteria of "very good". The average percentage obtained from the module display aspect is 96.86% with the "very good" criteria, the material presentation aspect is 95.83% with the "very good" criteria, and the module benefits aspect is 91.7% with the "very good" criteria.

Results of Student Responses to the Module

The trial was carried out three times, namely individual trials, small group trials, and limited group trials. Individual and small group trials were conducted on students who had high, medium, and low abilities. Small group trials were conducted to identify deficiencies in the developed product. While a limited field trials were conducted to identify the shortcomings of the products developed when used in a wider scope. Limited field trials were carried out in one class, namely in class X IPA 3 with a total of 35 students. The data on the results of student responses at the individual trial, small group trial, limited field trial stage to the negotiating text module based on the Qur'an and Hadith can be seen in the following table.

Table 6. Results of Student Responses to the Negotiation Text Module Based on the Qur'an and Hadith

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>Individual trial</th>
<th>Small group trial</th>
<th>Limited field trial</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material</td>
<td>80.56%</td>
<td>85.19%</td>
<td>88.89%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Language</td>
<td>85.42%</td>
<td>86.11%</td>
<td>87.86%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Interest</td>
<td>83.33%</td>
<td>84.44%</td>
<td>87.29%</td>
<td>Very good</td>
</tr>
<tr>
<td>Total Average</td>
<td>82.41%</td>
<td>85.19%</td>
<td>88.21%</td>
<td>Very good</td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of research on individual trials obtained an average total percentage of 82.41% with the criteria of "very good". The average percentage results obtained based on the assessment indicators from the material aspect of 80.56% with the criteria of "very good", from the language aspect 85.42% with the criteria of "very good", and from the aspect of interest 83.33% with the criteria " very good". Based on the results of research on small group trials, the total average percentage was 85.19% with the criteria of "very good". The average percentage results obtained based on the assessment indicators from the material aspect were 85.19% with the criteria of "very good", from the language aspect 86.11% with the "very good" criteria, and from the interest aspect it was 84.44% with the criteria " very good". Based on the results of research in a limited field trial, the total average percentage was 88.21% with the criteria of "very good". The total average percentage results obtained based on the assessment indicators from the material aspect of 88.89% with the criteria of "very good", from the language aspect 87.86% with the criteria of "very good", and from the interest aspect of 87.29% with the criteria "very good".
Discussion

Research on the development of teaching materials is carried out to produce teaching materials that are suitable for use. After the module is developed, the next step is to validate the module by experts and test it with students. The feasibility test was carried out on 4 aspects of the assessment in accordance with the BSNP, namely 1) content feasibility, 2) presentation feasibility, 3) language feasibility, and 4) graphic feasibility. This is also supported by the opinion of Oktavia [26] which states that the module teaching materials describe the basic competencies that will be achieved by students, use good and easy-to-understand language, look attractive, and are equipped with illustrations. However, the researcher modified the feasibility assessment by adding the feasibility to the religious aspect because the material in the module was integrated with religious knowledge about the verses of the Qur'an and Hadith. Therefore, validation is carried out by 5 experts, namely 2 material experts, 1 design expert, and 2 religious experts.

Material expert validators assess three aspects of feasibility, namely aspects of content feasibility, presentation feasibility, and language feasibility. The results of the feasibility of the material expert after the revision obtained the percentage of the overall average score of 93.61% with the criteria of "very good". So, it can be concluded that the negotiation text module based on the Qur'an and Hadith on the material aspect is valid.

The negotiation text module based on the Qur'an and Hadith which was developed from the aspect of the module content has been in accordance by the learning objectives that have been set. The learning objectives set are adjusted to the characteristics of Islamic students. The examples of negotiation texts displayed in the module are also in accordance with the characteristics of the students. This is done to match the characteristics of the module presented by Daryanto & Dwicahyono [27], which is user friendly. User friendly means friendly or familiar with the user. The use of simple, easy-to-understand language, examples that are close to students, and the use of common terms, is a form of user-friendliness.

Design expert validators assess the graphic aspects. The graphic aspect consists of three assessment indicators, namely the physical size of the module, the design of the cover of the module, and the design of the content of the module. The results of the feasibility of the design expert validator after the revision obtained the percentage of the overall average value of 76.34% with the criteria of "good". So, it can be concluded that the negotiation text module based on the Qur'an and Hadith on the design aspect is valid.

Religious expert validators assess four aspects, namely the presentation of the verses of the Qur'an and Hadith, the meaning and interpretation of the verses of the Qur'an and Hadith, buying and selling based on an Islamic perspective, and the suitability of the verses of the Qur'an and Hadith with the teaching material negotiation text. The results of the feasibility of the religious expert validator after the revision obtained the percentage of the overall average value of 94.53% with the criteria of "very good". So, it can be concluded that the negotiation text module based on the Qur'an and Hadith on the aspect of using the verses of the Qur'an and Hadith is valid.

In addition to validation by experts, two Indonesian language teachers were also asked for responses. Furthermore, the trial was carried out 3 times, namely individual trials, small group trials, and limited field trials. After the trial, a questionnaire was given to students to provide
responses to the negotiation text module based on the Qur'an and Hadith. Feedback from students is needed to find out the usefulness and ease of use of the module. According to Oktavia [28], teaching materials in the form of modules can be useful if they are easy to use and students' learning motivation can be increased.

The assessment of the negotiating text module based on the Qur'an and Hadith by the Indonesian language teacher after the revision was carried out, the average score percentage was 94.79% with the criteria of "very good". So, it can be concluded that the negotiation text module based on the Qur'an and Hadith based on the responses of the Indonesian language teacher is feasible/valid.

Furthermore, the trial was carried out 3 times, namely individual trials, small group trials, and limited field trials. In individual trials, the percentage of the average score was 82.41% with the criteria of "very good". In this individual trial, the lowest percentage value was obtained in the material aspect, namely 80.56%. Therefore, a revision was made to the presentation of the material. The material on the activity of constructing a negotiating text based on the Qur'an and Hadith needs to be equipped with examples and explanations. The essence of learning the negotiating text is to construct. So, the construction activities must be explained more clearly, starting from determining the topic to developing a negotiating text framework based on the Qur'an and Hadith. In the small group trial, the average score percentage was 85.19% with the criteria of "very good". In this trial, the lowest score was obtained at aspects of interest, namely 84.44%. Therefore, a revision was made to the appearance of the concept map to make it more attractive. Finally, in a limited field trial, the average score percentage was 88.21% with the criteria of "very good". After a limited field trial, not many revisions were made. Revisions are only in the form of correcting errors in writing letters, punctuation marks, sentences that are less effective and adding more examples of texts based on the Qur'an and Hadith. This is done based on suggestions from students who expect sample texts to make it easier to understand the negotiating text material based on the Qur'an and Hadith.

The results of the feasibility of the negotiation text module based on the Qur'an and Hadith are in accordance with the research conducted by Bambang Sri Anggoro, et al [29] in the journal Biodik: Scientific Journal of Biology Education with the research title Development of Al-Qur'an and Hadith-Based Biology Magazines in Biology Subjects for Class X Students at the SMA/MA Level, namely the results obtained that the development of Al-Qur'an-based teaching materials The Qur'an and Hadith received a very good response from teachers and students and deserve to be used as additional teaching materials for students.

5 Conclusion

Based on the results of research and discussion on the feasibility of the negotiation text module based on the Qur'an and Hadith, it was concluded that the developed Al-Qur'an and Hadith-based negotiation text module was suitable to use for class X students of MAN 2 Model Medan. This can be seen from the validation results obtained from material experts, design experts and religious experts, responses from Indonesian language teachers, and responses from students of MAN 2 Model Medan. The feasibility of the negotiating text module is not only seen from the assessment of the experts, but also from the responses of the module users, namely teachers and students.
References

Teaching Chemical Equilibrium in High School Using Android-Based Interactive Multimedia

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The Chemistry Educational Study Program of Postgraduate School of Universitas Negeri Medan, Indonesia 2022¹, Chemistry Department of Universitas Negeri Medan, Indonesia 2022²,³

Abstract. This study aims to determine the improvement of student learning outcomes using the developed multimedia, knowing the effect of learning motivation on student learning outcomes and knowing student responses. The study used the ADDIE model. The sampling technique was purposive sampling in XI grade. The data collection instruments included student learning outcomes and questionnaires on motivation and responses. The learning instrument data from the pretest and posttest were composed of multiple-choice questions analyzed with the Rasch model assisted by the Winstep program. Analysis of data on motivation and learning outcomes by test using SPSS. The results showed an increase in student learning outcomes with an average N-Gain of 0.66 in the medium category, the impact of learning motivation students towards learning outcomes with a percentage of 12.3%, and student responses obtained results of 81.25% in the excellent category.

Keywords: Interactive multimedia, android, motivation, student learning outcome, chemical equilibrium.

1 Introduction

At this time, the high escalation in the fields of science and technology has improved the quality of education, where the development of this technology facilitates learning in science, for example, in chemistry subjects [1]. The teacher's role, which was initially a limited source of learning for students in the 21st century, proliferates as a mediator and facilitator [2]. The use of technology is also able to influence the form of teaching activities so that they can move well [3]. It requires teachers to be able to apply technology in growing learning multimedia.

Chemistry curricula generally incorporate many abstract concepts at the core of further learning in chemistry and other sciences. These abstract concepts are important because subsequent chemistry/science concepts or theories cannot be easily understood if students do not adequately understand these underlying concepts. Chemical equilibrium is one of the subjects in which the scope of chemical equilibrium includes dynamic equilibrium,
equilibrium equations, and the relationship between $K_p$ and $K_c$. The concept of chemical equilibrium is central and complex in chemistry and is considered one of the most challenging matters in chemistry education [4].

Based on observations, questions, and answers from teachers at school, get information that the learning process uses textbooks, sometimes combined with PowerPoint media. In addition, there is an offline learning system (outside the network) with reduced effective study hours so that not all material can be explained in detail and in-depth, so the existing teaching media are not optimal enough. The need for innovation to increase learning effectiveness aims to increase student learning resources. The teacher also believes that Android-based teaching media will be interesting to use in the classroom because Android is ubiquitous and often used, so students will be pleased to use it. If the teaching media developed is practical and contains a summary of colorful and illustrated material, the teacher will be pleased to use it. The description above concludes that interactive multimedia can be used as an additional supplement when studying chemical equilibrium material. Its practical use without space and time limitations and audiovisual media can support learning activities [5] [6]. Therefore, through a combination of several media elements, it is hoped that the learning experience will be more meaningful so that interactive Android-based multimedia interactive has advantages, one of which is conveying messages so that the material is more precise [7].

Innovation is needed to increase learning effectiveness, which aims to increase learning resources for students. The learning process more compelling with various efforts, one of which is the use of Android-based interactive multimedia. [8] said that using mobile technology in the botanical learning process can increase motivation and provide a pleasant learning experience. Furthermore, there is a positive relationship between motivation and academic success. [9] mentioned the importance of considering interactive design in developing multimedia materials in the learning environment. The progress of learning media has been achieved significantly to add essential means to achieve educational goals more effectively and efficiently [10]. Research on the use of interactive multimedia using various application programs such as was put forward by [11], [12], and [13] has successfully developed. Moreover, [14], [15] and [16] has developed interactive media with Lectora Inspire. When used correctly as a massage tool, the steps and process of using the suitable interactive media will mobilize students' thoughts, feelings, fears, and desires, making the learning process more concrete [10].

The primary purpose of multimedia learning is not only to replace but also to complement the objectives, materials, methods, and evaluation instruments in the teaching and learning process referring to the general system. The multimedia aspect can stimulate the stimulus in the undertaken educational process. The hope is that the application of multimedia can direct changes in the learning environment and can be a criterion and encouragement, especially for participation in teaching, to improve learning outcomes, and as an alternative to education [17]. Learning media can also actively involve students in the learning process to increase students' comprehension of the taught material [18]. Many studies reveal the advantages of learning using multimedia, including increasing learning motivation [6], [19], [20]. This study aims to improve student learning outcomes and determine the impact of learning motivation on student learning outcomes and student response through enhanced multimedia content.
2 Research Methods

This type of research is development research using ADDIE model consist of 5 stage. The sample was one class. The study’s one-group pretest-posttest methodology. Combining literature studies allows for the analysis step. A literature study combines information and references related to the material based on the syllabus. The design stage involves determining ideas and identifying programs, compiling media content outlines, and designing flowcharts and storyboards. The third stage is the development stage, and researchers carry out the manufacture and design of applications. The researcher carries out the implementation stage after the application has been validated. Based on the overall activities completed to produce a product in the form of android-based interactive multimedia, the researcher analyzes the developed android-based interactive multimedia. The measurement of student learning outcomes has been through instrument testing including item fit, reliability, difficulty level, discriminatory, and distractor tests using the Winstep program in associated with the Rasch model. The data collection of students’ motivation and responses using questionnaire with Likert scale then converted the percentage to the assessment criteria. The improvement of student learning outcomes were counted using N-Gain formula. Linearity test and correlation test to analyze how learning motivation affects student learning results. The criteria for a valid test can be seen in Table 1.

<table>
<thead>
<tr>
<th>Validity Aspect of the Item</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unidimensional test</td>
<td>Scree Plot’s factor analysis result</td>
</tr>
<tr>
<td>Fit item test</td>
<td>0.5 &lt; MNSQ &lt; 1.5</td>
</tr>
<tr>
<td></td>
<td>-2.0 &lt; ZSTD &lt; 2.0</td>
</tr>
<tr>
<td></td>
<td>0.4 &lt; Pt Measure Corr &lt; 0.85</td>
</tr>
<tr>
<td>Item difficulty</td>
<td>Very difficult: (b) (measuring item) &gt; 2;</td>
</tr>
<tr>
<td></td>
<td>Difficult: (2 \leq b &lt; 1);</td>
</tr>
<tr>
<td></td>
<td>Moderate: (-1 \leq b &lt; 1);</td>
</tr>
<tr>
<td></td>
<td>Easy: (-2 \leq b &lt; -1);</td>
</tr>
<tr>
<td></td>
<td>Very easy: (b \leq -2).</td>
</tr>
<tr>
<td>Reliability Person/Item</td>
<td>Weak: &lt; 0.67</td>
</tr>
<tr>
<td></td>
<td>Adequate: 0.67 – 0.80</td>
</tr>
<tr>
<td></td>
<td>Good: 0.81 – 0.90</td>
</tr>
<tr>
<td></td>
<td>Very good: 0.91 – 0.94</td>
</tr>
<tr>
<td></td>
<td>Special: &gt; 0.94</td>
</tr>
<tr>
<td>Alpha Cronbach</td>
<td>(\text{Alpha Cronbach} &gt; 0.80) is a good category</td>
</tr>
<tr>
<td>Discriminatory</td>
<td>Adequate: 0.20 – 0.29</td>
</tr>
<tr>
<td></td>
<td>Good: 0.30 – 0.39</td>
</tr>
<tr>
<td></td>
<td>Very good: &gt; 0.40</td>
</tr>
<tr>
<td>Distractor</td>
<td>Known from the average logit value of the students who got the correct answer</td>
</tr>
</tbody>
</table>
3 Result & Discussion

Android-Based Interactive Multimedia

Android-based interactive multimedia has been developed according to the ADDIE stages, namely analysis, design, and development. It contains (a) Material Menu about chemical equilibrium; (b) Learning Video Menu; (c) Evaluation Menu; (d) User Guide Menu; and (e) Login and Logout Menu. Below is an overview of Android-based interactive multimedia in Figure 1.

Android-based interactive multimedia has been developed and used as one of the innovations in learning chemical equilibrium. Android Media has a menu of video tutorials and assessment questions. The tutorial includes videos to help you understand chemical equilibrium. The tutorial video can be opened when the device is connected to the internet, and when there is no internet, the video cannot be played. In addition, this learning tool is equipped with an assessment menu that contains two types of assessments, one of them called a diagnostic test. It gives feedback so the students can identify which test category they have not been able to. So as 2 forms of evaluation and feedback are provided, students are able to use it as evaluation material in understanding the material they learn.

Standardization of Research Instruments

Student’s learning outcome data was collected with multiple choice questions analyzed with the Rasch model assisted by the Winstep program. The Rasch model must fulfill several assumptions before being analyzed, namely the assumption of unidimensionality and local independence. With the Winstep program, the unidimensional assumption test meets the minimum criteria of 20% on the eigenvalue results, and the unexplained variance in the first contrast value was obtained at the eigenvalue 3.0. It is necessary to do a dominant factor analysis using Principal Component Analysis (PCA) to ensure that the items only measure one dimension (unidimensional) because one of the criteria is not accomplished.
PCA is determined by analyzing the dominant factor seen from the initial eigenvalue in Total Variance Explained. And it can also be seen from the scree plot graph. The scree plot can be seen in Figure 2.

![Figure 2. Eigenvalue Scree Plot Graph](image)

The graph showed that there is one sharp steepness from component 1 to component 2, while the graph slows from component 2 to the other components. Thus, the unidimensional assumption test is fulfilled so that the developed assessment instrument can measure what it should measure, and the local independence assumption is automatically proven [21]. After the analysis, it was concluded that the overall test items were quite feasible, and 16 questions were obtained.

**Students' Learning Outcomes**

Implementation of android-based interactive multimedia was carried out for 35 students in XI grade in the Natural Sciences Mathematics specialization group. The evaluation staged aimed to determine the difference in student learning outcomes after being given research treatment on chemical equilibrium material and to get the conclusion of students' motivation in learning chemistry. The researcher obtained data from the result of pretest, posttest and N-Gain of student learning outcomes after the implementation of the study can be seen in Table 2.

<table>
<thead>
<tr>
<th></th>
<th>Lowest Score</th>
<th>Highest Score</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>35</td>
<td>50</td>
<td>38.45</td>
</tr>
<tr>
<td>Posttest</td>
<td>44</td>
<td>100</td>
<td>79.74</td>
</tr>
<tr>
<td>N-Gain</td>
<td>0.09</td>
<td>1.00</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Data on improving learning outcomes in research provides information that students achieve an average N-gain score of 0.66 and are in the medium category. The increase in learning outcomes achieved was only in the moderate category due to various factors, one of which was a decline in student academics which was the effect of the online to offline transition process [22]. In this research, the researcher realized that class XI students had never done face-to-face learning while in the high school level. So that it affects the increase in academic
scores, which still do not meet the expected maximum results. Several studies that obtained N-Gain results in the medium category include research by [23], [24], and [25].

**Students’ Learning Motivation**

After the learning process was complete, students were given a motivational questionnaire to measure their level of motivation after being treated using android-based interactive multimedia. The questionnaire contains 25 statements and measures students’ extrinsic motivation, including six indicators: attention, belief, satisfaction, challenge, curiosity, and participation. The average level of student motivation is 82.65%, and based on the result, the attention indicator has the highest average score of 85.18%. Students find it helpful and are happy to learn chemical equilibrium with android-based interactive multimedia. This opinion was expressed by [26] and [27]. Students also feel that interactive multimedia fosters a more profound interest and curiosity about chemical equilibrium. It was also explained by [28] that the components of students’ interest and curiosity increased well after being taught using media based on Android.

**Hypothesis Test**

**Linearity Test**

After getting data on learning outcomes and student motivation, a linearity test will be carried out as an initial requirement for testing hypothesis. The prerequisite test consists of a linearity test at a significance level of 0.05 using SPSS 25 for windows. Tests to measure the dependent variable with independent variables that have a linear or insignificant relationship can be done with the if linearity test. The reference is if the significance value on linearity > 0.05 means that the independent and dependent variables have a linear relationship. The results achieved, namely the Sig value of 0.890 > 0.05, concluded a linear relationship between learning outcomes and student learning motivation.

**Correlation Test**

After the data analysis requirements test concluded that the two variables had a linear relationship, the next phase was to test the correlation to assess how closely the relationship between the two variables was. If the value of sig < 0.05, then Ho is rejected.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Sig</th>
<th>α</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_0$: There is an influence between motivation and student learning outcomes</td>
<td>0.039</td>
<td>0.05</td>
<td>$H_0$ rejected</td>
</tr>
<tr>
<td>$H_0$: There is no influence between motivation and student learning outcomes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on Table 3, the score is 0.039, indicating that for testing the hypothesis, it has a probability of 0.039 < 0.05, so Ho is rejected. Several studies that obtained positive results between motivation and student learning outcomes are [29] and [30].
The Impact of Motivation on Learning Outcomes

Linear Regression Test

The Linear Regression test investigates the magnitude of motivation's effect on student learning outcomes. This test is to obtain the coefficient of determination which measured (quantity) to define the relationship's strength level in the form of a percent (%). The results of the linear regression test obtained sig < 0.05, namely 0.039 < 0.05, meaning that there is an influence between learning motivation and student learning outcomes.

Coefficient of Determination

The influence percentage determined the correlation test's coefficient of determination. The coefficient of determination ($R^2$) value shows the rate at which all independent factors impact the dependent variable. The results of the coefficient of determination will be described in Table 4.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.351*</td>
<td>.123</td>
<td>.097</td>
<td>14.22566</td>
</tr>
</tbody>
</table>

Based on Table 4, the coefficient of determination (R Square) is 0.123, which means that the influence of the independent variable (learning motivation) on the dependent variable (learning outcomes) is 12.3%. Other factors influence the rest.

Students' Responses

Students fill out a response questionnaire consisting of 16 statements related to learning using Android-based interactive multimedia, and the proportion is 81.25%, with an excellent response category. Aspects of the display, learning video features, learning evaluations, and especially diagnostic tests as innovations can guide students to recognize their knowledge and recognize students in each category about the feedback presented at the end of the evaluation.

4 Conclusion

Some of the research conclusions reached based on the formulation of the problem, objectives, results, and discussion of the research, namely as follows: (1) The learning results of students learning with Android-based interactive media improved in a secondary school in Medan, which received an average gain of N 0.66 and was rated in the middle category; (2) There is an influence between learning motivation and student learning outcomes 12.3%; (3) Student responses to interactive media based on Android development scores were 81.25%, with a good response category.
References


Implementation Innovative of E-Module On Learning Non-Metallic Chemistry Based On KKNI Curriculum

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Abstract. The pandemic has become a concern in the field of education, which has made the conventional learning system switch to online; this means that educators innovate to create innovative teaching materials that access online and offline. The research objectives were to aim for (1) The improvement of student learning outcomes after being taught e-modules; (2) Student learning outcomes that met the minimum competency standards; (3) Student responses to e-modules. This study used test instruments and student response questionnaires. The research sample was 31 students of UNIMED chemistry education class 2020. The results showed an increase in student learning outcomes that achieved the high N-gain criteria of 0.74 and met the minimum competency standard, namely 80, and student responses were 89.04% in the excellent category, so the innovative KKNI-based e-module on oxygen and sulfur materials can be used as a reference for learning resources.

Keywords: Innovative Learning, KKNI, Inorganic Oxygen, and Sulfur.

1 Introduction

Research conducted about Epidemiology and pathogenesis explains transmission covid susceptible to health, so control moment this by reducing mobility, particularly in the education sector that requires learning online [1]. Early learning by the conventional switch is online [2]. Change system teaching at the university is also changing online. Educators must also innovate and make innovative source learning to reach destination learning [3]. one eye studying Required in structure curriculum study program education chemistry at University The State of Medan (UNIMED) is an eye looking inorganic chemical non-metal with a weight of 3 credits. Where eye studying this discusses non-metal elements like example, carbon, oxygen, silicon, hydrogen, boron, and others. Based on perceptions and interviews conducted by one of the lecturers, inorganic chemical non-metals at Medan State University obtained information that the learning process in the eyes studying inorganic chemical non-metal in 2020/2021 teaching still in the online learning process (in the network).

The need for chemistry teaching materials innovative effective for increase independence study students, understand draft chemicals with easy, knowledge, skill and help lecturer, as
well as student learning during the Covid pandemic [4,5]. The teaching materials used by
students in the chemistry education of the State University of Medan, are still not all tasks
integrated with the KKNI curriculum [6]. The need development source study interactive
innovation in chemistry education who can use online that can be accessed by large for push
spirit study [7]. The need to develop integrated learning media with technology to improve
students' scientific literacy skills and make learning easier [8]. Electronic modules are an
efficient source of teaching materials for students in chemistry learning that can be accessed
through smartphones or laptops, as well as easy application [9]. The use of innovative
modules based on the KKNI oxygen and sulfur to make it more attractive needs to be
combined with multimedia, an electronic module, by adding audio, video, animation, or
website applications to increase student enthusiasm for learning.

The software is used to compile innovative KKNI-based electronic modules with Flip PDF
Professional so that the material becomes more interesting, like a book, and can contain
multimedia according to user needs [10]. Understanding draft student increase by significant
moment use of the e-module in learning [11]. Based on the explanation above, this study aims
to determine the implementation of innovative e-modules based on non-metallic chemistry
KKNI on oxygen and sulfur materials.

2 Method

This investigation is Research and Development (R&D), which alludes to the ADDIE
(Analysis-Design-Development-Implementation-Evaluation) model [12],[13]. This research is
limited to the implementation and evaluation stages.

The method used in this study was Pre-Experimental Design in the form of a One-Group
Pretest-Postest Design. Namely, there is a pretest before giving treatment [14]. The research
design is shown in Figure 1.

![Fig. 1. One group pretest-Postest design](image)

Where:
- $X_1 =$ Pretest Score
- $X_2 =$ Posttest Value
- $Y =$ Treatment given

The sample in this study was 31 students of the Chemical Education Study Program batch
2020. Data collection began by giving a pretest to see the initial understanding. Next,
distribute the e-module link to the WhatsApp group that students can click on to access it
online. At the evaluation stage, posttests and response questionnaires were given to obtain data
on learning outcomes, improving learning outcomes, and student responses taught through
innovative e-modules based on KKNI. The research procedure is described in Figure 2.

![Fig. 2. E-Module Implementation Research Procedure](image)

The data used in the analysis is the Shapiro-Wilk normality test. After testing the hypothesis, a one-sample t-test is carried out, where the trial has provisions if the result is sig > 0.05, then Ha is rejected. Conversely, if the value of sig < 0.05, then Ha is accepted [15].

**Ho**: Student learning outcomes after using innovative e-modules based on KKNI non-metal chemistry on oxygen and sulfur materials developed cannot meet the minimum competency standards.

**Ha**: Student learning outcomes after using innovative e-modules based on non-metal chemistry KKNI on oxygen and sulfur materials can meet the minimum competency standards set or higher than the minimum requirements set values.

Student learning outcomes data were analyzed using N-gain to see the increase in learning outcomes with the formula:

\[
N - \text{gain Value} = \frac{Postest Score - Pretest Score}{maximum score - Pretest Score} \times 100\%
\]

To see the normalized N-Gain classification as shown in Table 1.
Table 1. Normalized N-gain values

<table>
<thead>
<tr>
<th>N-Gain Value</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-gain &lt; 0.3</td>
<td>Low</td>
</tr>
<tr>
<td>0.3 ≤ N-gain ≤ 0.7</td>
<td>Medium</td>
</tr>
<tr>
<td>N-gain &gt; 0.7</td>
<td>High</td>
</tr>
<tr>
<td>&lt;59 %</td>
<td>Very Bad</td>
</tr>
</tbody>
</table>

Student responses can be calculated using the formulas:

\[ P = \frac{f}{n} \times 100\% \]

The criteria for the percentage of student responses are in Table 2.

Table 2. Criteria for Percentage of Student Responses

<table>
<thead>
<tr>
<th>No.</th>
<th>Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80 – 100 %</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>60 – 79 %</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>40 – 59 %</td>
<td>Fairly Good</td>
</tr>
<tr>
<td>4</td>
<td>&lt;59 %</td>
<td>Very Bad</td>
</tr>
</tbody>
</table>

Where:

- \( P \) = percentage of student responses
- \( f \) = the number of scores obtained by students
- \( n \) = number of maximum scores

3 Result and Discussion

At this stage, the e-module that has been revised based on the validator's suggestion implemented in the chemical inorganic chemical only on material oxygen and sulfur. With the method spread, the e-module link to students through group WhatsApp could later access by students themselves.

Improving Student Learning Outcomes

Stage this aim for knowing results, learn, improve, and respond to students being taught by using e-module innovative based on the KKNI. Enhancement results study students obtained from result data pretest and posttest with count the value of N-gain (normalized gain) received by each student could see in Table 3.

Table 3. Enhanced N-Gain Value Data Learning Outcomes Student

<table>
<thead>
<tr>
<th>Amount Student</th>
<th>Average Value</th>
<th>N-Gain</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td></td>
</tr>
</tbody>
</table>

151
At stage this, the e-module that has been revised based on the validator’s suggestion was implemented. Based on Table 3. The average N-gain of students is 0.74, categorized as high N-Gain criteria, so it can be said that there is an increase in student learning outcomes (N-Gain) when students finish applying innovative e-modules based on the KKNI that have been developed. Student learning outcomes that meet the standards can be measured through a one-sample t-test using SPSS, aiming to prove the hypothesis. The first thing to do is to test for normality. The results of the normality test are as follows in Table 4.

Table 4. Normality Test of Learning Outcome Data

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov*</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic</td>
<td>Df</td>
<td>Sig.</td>
</tr>
<tr>
<td>Learning</td>
<td>.158</td>
<td>31</td>
</tr>
<tr>
<td>Result</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Lilliefors Significance Correction

Based on the results of the Shapiro-Wilk normality test using SPSS, it was found that with the value of sig = 0.066 > 0.05, it can be concluded that the student data are typically distributed. After the data is normally distributed, the hypothesis can be tested using SPSS. The results of the one-sample t-test using SPSS can be seen in Table 5.

Table 5. Test Results One-Sample t-Test

<table>
<thead>
<tr>
<th>One-Sample Test</th>
<th>Test Value = 80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Difference</td>
<td>95% Confidence Interval of the Difference</td>
</tr>
<tr>
<td>t</td>
<td>df</td>
</tr>
<tr>
<td>Learning(Result)</td>
<td>3.025</td>
</tr>
</tbody>
</table>

Student learning outcomes after using innovative e-modules based on non-metal chemistry KKNI on oxygen and sulfur materials developed can meet the minimum competency standards set or higher than the minimum competency standard values set, which is 80. The same is done by [16]. Based on the one sample t-test, the results are sig. = 0.005 < 0.05.

Student Response

Student responses to the questionnaire consisted of 5 aspects: presentation of material, appearance, language, graphics, and interest. The average value of student responses is listed in Picture 2.
Fig. 2. Average Student Response

Based on Pic 2, it is known that the presentation of the material is 86%, display 90.1%, language 90.9, graphic 87.9%, and interest 89.5%. All the indicators measured got an average percentage result of 89.04%, which is included in the perfect aspect. The high acquisition value of student responses is because the developed e-module can make it easier for students to learn the material. After all, it has been equipped with routine assignments, evaluation questions, summaries, learning videos, and animations that make it easier for students to explore the material, and students are straightforward and independent in gaining knowledge. Similarly, what was studied by [17] showed an attractive appearance of e-modules and ease of application for students when accessing e-modules. The use of multimedia is expected to overcome student boredom in learning and re-learn the material being studied. So innovative teaching materials based on KKNI are very appropriate to be used for inorganic chemistry learning [18].

4 Conclusion

The data obtained from the results study could draw many conclusions, including whether the increment in understudy learning outcomes reaches the high N-gain criteria of 0.74 (high category) [19]. Through the one-sample t-test, the data obtained sig. = 0.005 < 0.05 so that Ha is accepted, it can be said that student learning outcomes have finished using the innovative KKNI-based e-module that was developed to meet the minimum competency standards set, and Understudy reactions to the use of innovative e-modules based on the KKNI for oxygen and sulfur are very good with an average percentage of answers of 89.04% [20]. So, could it says e-module innovative based on KKNI can be used as a source alternative in learning, and learning media facilitates the learning process that supports students' cognitive aspects in chemistry [21].

This study has weaknesses and limitations that cannot be avoided, including the absence of an instrument for student learning motivation for e-module innovative based on the KKNI for
oxygen and sulfur material, data collection is carried out using only one class, and the use of the internet is not good in the learning process.

Acknowledgments. The author would like to thank the Master of Chemistry Education Study Program, chemical education students of the Faculty of Mathematics and Natural Sciences, Medan State University, chemistry lecturers, and all those who have helped complete the research and preparation of this article.

References


Development Student Worksheets (LKPD) Based on Contextual Class VII Private Junior High Schools Tiara Deli Serdang

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Abstract. This research aims to know (1) Student Worksheet Development (LKPD) of Contextual based social studies learning that is linked is suitable for use in grade VII students of SMP Swasta Tiara, (2) To find out the Student Worksheet Development (LKPD) contextual based social studies learning that is linked is effective for grade VII SMP Swasta Tiara. This research was conducted at Junior High School (SMP) Swasta Tiara at Deli Serdang. Research on the development model used is the Dick and Carey model. For sample research trials of individuals as much as 3 students, small groups of trials as much as 9 students and a sample test as many as 32 students. Trial results are obtained from the learning design expert 2 people, 2 people, media expert and 2 expert material. The results showed (1) teaching materials of Student Worksheet Development (LKPD) Contextual based social science learning is appropriate for use in social science subjects, (2) The use of teaching materials used in the learning process of social science with a count of tcount = ttable > 4.56 = 4.42, (3) Social Science Learning outcomes of class VII students with economic material using Student Worksheet Development (LKPD) teaching materials are higher than student learning outcomes using Ordinary Learning.

Keywords: Contextual-Based Student Worksheet (LKPD), Ordinary LKPD

1 Introduction

The Indonesian nation is a nation that upholds education, where education is used as a tool to educate the nation. The government fully supports the improvement of the quality of education for the Indonesian people, especially for elementary, junior high, and high school equivalents, as evidenced by the existence of four pillars of education, one of which reads "Compulsory Learning for 9 Years". Education is a system consisting of input, process, and output. Input is students who will carry out learning activities, the process is an activity of teaching and learning while the output is the result of the process to be implemented. The success of education is highly dependent on the human element and the most important and most decisive element is the teacher, because the teacher must be able to generate interest and
deliver more interesting materials. This is an implication of learning that demands maximum creativity and teacher effort.

Learning is the basis of knowledge and cognitive growth, according to Vygotsky (1978)\(^1\), and it is created by internalization, acquisition of meaning, creation of new information, and modification (transformation) of existing knowledge. Students learn when they do things that are unfamiliar but are still in the zone of closest development (ZPD), which is easy to understand. Together, students build on their knowledge by progressively developing competencies through interaction with professionals in their industry (teachers or tutors), using scaffolding such as offering instructions, guidelines, diagrams or drawings, processes, or feedback. These tasks are then completed according to student directions, resulting in modification or learning development.

Social Studies is a discipline of social sciences that covers a variety of activities in it that have been planned or organized and presented scientifically for educational purposes. The description above says that Social Studies is a social science that is deliberately planned by presenting material and various kinds of activities that foster high social character among human beings by not prioritizing personal interests and prioritizing groups. Social studies are certainly educating the human soul so that they can have good relations and should be in accordance with the norms and values in society.

Contextual Approach to Contextual Teaching and Learning (CTL), according to Trianto (2008)\(^2\), is a learning concept that helps teachers relate the information taught to students' real world conditions and encourages students to connect their knowledge with its application in learning. Learning outcomes are more significant for children with this idea. Instead of knowledge being transferred from teacher to student, learning occurs organically through student effort and experience.

Development in the context of instructional technology refers to the process of putting a design specification into a tangible form or other representation. It also refers to the process of creating learning materials. For example, educational resources used in the classroom. Technology and the growth of science, which have transformed almost every area of human existence and made it possible to solve various problems, provide the basis for the development of learning.

According to observations and conversations with social studies teachers at Tiara Private Junior High School, some students may find it difficult to understand the subjects taught in class. (1) Learning materials are challenging to understand and use in real-world situations. (2) LKPD material does not provide adequate examples and explanations to students. and (3) LKPD is not interesting so that it makes students reluctant to learn. (4) The number of LKPD used is not sufficient to guarantee that the material will be successfully studied and applied in daily life.

In class VII, the researcher hopes to create a contextual-based LKPD IPS. Its implementation in social studies includes connecting the teacher's lessons with the actual situation of students, applying the knowledge and applications of students that day, and increasing student learning activities. Existence is created through everyday life. In addition, LKPD is expected to improve learning outcomes, cultivate process skills in students, and increase activity levels.

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Improving the quality of education is considered to be greatly helped by the existence of the teacher LKPD. For intermediate level, teaching materials should be improved with student participation. The creation of creative worksheets that encourage students' interest in learning, increase student involvement, and increase students' understanding of the content offered. The creation of worksheets produces useful and effective resources to assist the teaching and learning process. The author is interested in conducting research with the title "Development of Social Studies Student Worksheets (LKPD) for Class VII Tiara Private Junior High School Contextually Based" based on the explanation of the context of the problems in this study.

2 Research Methods

This development study was conducted on seventh grade students of Tiara Private Junior High School in the Even Semester of the 2021–2022 Academic Year. The research was carried out after a thorough evaluation of the research location was carried out to determine the right number of courses and class VII students at Tiara Private Junior High School. the subject of this research. Grade VII students of Tiara Private Junior High School became research participants for a contextual-based LKPD development study. Three classes of class VII students were used as research subjects.

The development model used refers to the development model of Borg and Gall (2003) is a process used to develop and ratify educational products. The research steps are as follows: (1) the initial stage of research and information gathering, (2) the planning stage, (3) the initial stage of product development, (4) the initial trial stage, (5) the product revision stage, (6) the field test stage, (7) the field test product revision stage, (8) the operational test stage, (9) the final product revision stage, and (10) product implementation and dissemination. The research developed is the type of research and development Borg and Gall (1983). figure [1] 10 steps of research development.

![Figure 1: Steps of Research Development](image-url)
The research steps are as follows: (1) the initial stage of research and information gathering, (2) the planning stage, (3) the initial stage of product development, (4) the initial trial stage, (5) the product revision stage, (6) the field test stage, (7) the field test product revision stage, (8) the operational test stage, (9) the final product revision stage, and (10) product implementation and dissemination. This research was conducted at Tiara Deli Serdang Private Junior High School. The sample used is one class, namely class VII. The number of students in the individual trial was 3 people, the small group trial was 9 people, the large group trial was 32 people.

In this study, the necessary data were obtained by using a questionnaire, interview techniques, observation and identification. The data to be processed is data in the form of comments, suggestions and product improvements as well as a summary of the results of observation questionnaires from respondents and a team of experts. Questionnaires and interviews conducted in this study aimed to find preliminary data information about the analysis of student needs in social studies learning. This data and information is used as a reference for researchers in the development of social studies. Meanwhile, small group validation trials and expert teams were used to review or evaluate the prototype of the student worksheets that had been designed.

**LKPD Development Procedures**

The instrument for collecting data from research and development results is (1) a material expert validation questionnaire to obtain student worksheets (LKPD) feasibility score data in terms of material feasibility, (2) design expert questionnaires to obtain Worksheet feasibility score data Students (LKPD) in terms of design feasibility, (3) Material expert questionnaire to obtain data on the feasibility score of Student Worksheets (LKPD) in terms of media feasibility, (4) Student questionnaire sheet to obtain LKPD feasibility score data from the user perspective, namely students as users. The instrument must be validated (Sugiyono, 2013)\(^4\). Learning outcomes test is used to see the effectiveness of LKPD users in the learning process after using contextual-based IPS Worksheets. The assessment of the feasibility of the Worksheets by material experts, design experts, material experts, and students is presented in tables, tables 1, table 2, table 3, and table 4 as follows:

**Table 1. Eligibility Assessment Criteria Worksheets By Material Expert**

<table>
<thead>
<tr>
<th>No</th>
<th>Level of Achievement</th>
<th>Qualification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85% - 100%</td>
<td>Very Good</td>
<td>No Need to Revise</td>
</tr>
<tr>
<td>2</td>
<td>75% - 84%</td>
<td>Good</td>
<td>Needs to be Revised</td>
</tr>
<tr>
<td>3</td>
<td>65% - 74%</td>
<td>Sufficiently</td>
<td>Revised</td>
</tr>
<tr>
<td>4</td>
<td>55% - 64%</td>
<td>Less</td>
<td>Revised</td>
</tr>
<tr>
<td>5</td>
<td>0% - 54%</td>
<td>Very Less</td>
<td>Revised</td>
</tr>
</tbody>
</table>
Table 2. Feasibility Assessment Criteria Worksheets By Design Expert

<table>
<thead>
<tr>
<th>No</th>
<th>Level of Achievement</th>
<th>Qualification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85% - 100%</td>
<td>Very Good</td>
<td>No Need to Revise</td>
</tr>
<tr>
<td>2</td>
<td>75% - 84%</td>
<td>Good</td>
<td>Needs to be Revised</td>
</tr>
<tr>
<td>3</td>
<td>65% - 74%</td>
<td>Sufficiently</td>
<td>Revised</td>
</tr>
<tr>
<td>4</td>
<td>55% - 64%</td>
<td>Less</td>
<td>Revised</td>
</tr>
<tr>
<td>5</td>
<td>0% - 54%</td>
<td>Very Less</td>
<td>Revised</td>
</tr>
</tbody>
</table>

Table 3. Feasibility Assessment Criteria Worksheets By Media expert

<table>
<thead>
<tr>
<th>No</th>
<th>Level of Achievement</th>
<th>Qualification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85% - 100%</td>
<td>Very Good</td>
<td>No Need to Revise</td>
</tr>
<tr>
<td>2</td>
<td>75% - 84%</td>
<td>Good</td>
<td>Needs to be Revised</td>
</tr>
<tr>
<td>3</td>
<td>65% - 74%</td>
<td>Sufficiently</td>
<td>Revised</td>
</tr>
<tr>
<td>4</td>
<td>55% - 64%</td>
<td>Less</td>
<td>Revised</td>
</tr>
<tr>
<td>5</td>
<td>0% - 54%</td>
<td>Very Less</td>
<td>Revised</td>
</tr>
</tbody>
</table>

Table 4. Eligibility Assessment Criteria Worksheets By students

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Good</td>
<td>81% ≤ X ≤ 100%</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>61% ≤ X ≤ 80%</td>
</tr>
<tr>
<td>3</td>
<td>Sufficiently</td>
<td>41% ≤ X ≤ 60%</td>
</tr>
<tr>
<td>4</td>
<td>Less</td>
<td>21% ≤ X ≤ 40%</td>
</tr>
<tr>
<td>5</td>
<td>Very Less</td>
<td>0% ≤ X ≤ 20%</td>
</tr>
</tbody>
</table>
Analysis of the effectiveness of using Worksheets is done by comparing the average value of learning outcomes before using Worksheets and after using contextual-based LKPD, then the learning outcomes are processed using descriptive analysis. Inferential statistical analysis with normality test, homogeneity test and t test.

3 Results And Discussion

Product Development Research Results

a. Preliminary Product Design Process

Implementation of the development study first includes a preliminary study of students doing special studies in Class VII. In other words, the stages of identifying learning needs have been carried out, determining student body ability standards, conducting lesson analysis, identifying student characteristics as the first fulfillment, and writing. Capacity includes basic indicators, development of reference tests, development of learning strategies, and development of learning materials. Based on the findings of the preliminary analysis of objectives, it can be concluded that Class VII students will need teaching materials in the form of student schedules in order to successfully learn the relevant subjects. Based on the findings from the questionnaire that has been provided, all students and all teachers agree that they need contextual-oriented worksheets to be used as teaching materials so that the learning process becomes more efficient and interesting.

After the initial product of teaching materials is compiled, the next step is to validate the teaching materials to design experts, instructional materials experts, and media experts to produce products that are suitable for use. Furthermore, the product of teaching materials is carried out in a trial phase which is carried out as follows: (1) individual trials, (2) analysis of the results of individual trials, (3) second revision, (4) small group trials, (5) analysis of small group trial results, (6) third revision, (7) field trial, (8) analysis of field test results, (9) fourth revision, (10) final product.

b. Data Description of Expert Validation and Trial Results Product.

Validation seeks to ensure the views of material experts, learning design experts, and media experts about the correctness of content, learning elements, and the correctness of content, media, and learning design.

1) Learning Material Expert Validation Results Data

The purpose of product verification is to support the assessment of experts regarding the suitability of the content, its presentation, and the quality of its language. The evaluation was carried out to collect information that would be used to improve the standard of teaching resources for Worksheets IPS Class VII SMP Private Tiara. The results of the validation are presented in Table 5 below as a ranking of the assessment components of the feasibility of the content of the context-based LKPD material.
Table 5. Score of Worksheets Assessment Based Contextually on the eye Social Studies lessons by Material Experts on Aspects of Feasibility of Content, Presentation, Language

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Assessment</th>
<th>Total Score</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feasibility of Content</td>
<td>9</td>
<td>92.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation</td>
<td>9</td>
<td>92.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Linguistics</td>
<td>9</td>
<td>92.5%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>9</strong></td>
<td><strong>92.5%</strong></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>

Based on the table, it is clear that the Contextual-Based Worksheets received a “Very Good” rating from material experts, with an average score of 92.5 percent. It is also clear that the Contextual-Based IPS Worksheets content has received a “Appropriate Use” rating from the same material expert.

2) Worksheets Design Expert Validation Result Data

The Quality of Contextual-Based Teaching Material Design in Social Studies Subjects is reviewed from all fields contained in the Worksheets based on the assessment instrument that has been submitted to the Worksheets design expert. The following table 6 shows the results of the validation of the Worksheets design experts:

Table 6. Contextual-Based Worksheets Assessment Scores on Social Studies subjects by Design Experts on Content Feasibility Aspects, Content Design

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Assessment</th>
<th>Expert 1</th>
<th>Expert 2</th>
<th>Total Score</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content feasibility aspect</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>80%</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Display</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>Content design</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>90%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>9</strong></td>
<td></td>
<td><strong>90%</strong></td>
<td></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>

Based on Table 6 it can be concluded that the Contextual-Based Worksheets assessment by design experts is stated with the criteria of "Very Good" and an average score of 90% for the Social Studies topic "Proper to use".

3) Worksheets Media Expert Validation Result Data

The quality of the Contextual-Based worksheets on social studies subjects is evaluated from all fields contained in the worksheets based on the assessment instrument that has been submitted to the LKPD media expert. The following table 7 shows the results of the expert validation of worksheets Media:
Table 7. Contextual-Based LKPD Assessment Scores on Social Studies Subjects by Media Experts

<table>
<thead>
<tr>
<th>No</th>
<th>Items of Expert Assessment</th>
<th>Expert</th>
<th>Total Score</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Quality of learning materials</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>Learning delivery system</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>90%</td>
</tr>
<tr>
<td>3</td>
<td>Quality practice questions in LKPD</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>80%</td>
</tr>
<tr>
<td>4</td>
<td>LKPD quality on student learning activities</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>90%</td>
</tr>
<tr>
<td>5</td>
<td>Quality of display</td>
<td>4</td>
<td>5</td>
<td>9</td>
<td>90%</td>
</tr>
</tbody>
</table>

Based on Table 7 it can be concluded that the assessment of Media Experts Contextual-Based worksheets on the material indicated by the criteria of "Very Good" with an average score of 90%. It can also be concluded that the material is “Appropriate to Use” for social studies lessons.

4) Individual Trial Results Data

Assessment of worksheets context-based individual trials based on presentation features is offered on a "Very Good" basis with an average score of 86 percent, according to Table 8:

Table 8. Average Percentage of Assessment of Contextual-Based LKPD in Individual Trials

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect Assessment</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content Feasibility</td>
<td>94%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation</td>
<td>85%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Average 89.5% Very Good

94 percent of seventh grade students of Tiara Private Junior High School 3 who took part in the individual trial on the feasibility of the contextual-based worksheets content in social studies subjects were included in the Very Good category.

5) Small group test result data

Contextual-Based worksheets Assessment from small group trials based on display elements is indicated by the "Very Good" criteria with an average score of 88.5 percent, according to Table 9:
Table 9. Average Percentage of Assessment of Contextual-Based LKPD in Small Group Trials

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect Assessment</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content Feasibility</td>
<td>87%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation</td>
<td>90%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>88.5%</strong></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>

87% Grade VII students of Tiara Private Junior High School 9 who took part in the individual trial on the topic of the feasibility of contextual-based worksheets content in social studies subjects were rated Very Good, and 90 percent of them were rated Very Good.

6) Field Test Result Data

In the seventh grade of Tiara Private Junior High School, a field test was conducted. A total of 32 grade VII students of the Tiara private SMP took part in the field trial. Field testing produces data that will later be used to assess the efficacy of the educational material items made and determine how the product benefits. in table 10 below:

Table 10. Average Percentage of Assessment of Contextual-Based LKPD in Field Trials

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect Assessment</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content Feasibility</td>
<td>83%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation</td>
<td>83%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>83%</strong></td>
<td><strong>Very Good</strong></td>
</tr>
</tbody>
</table>

Individual trial to 32 grade VII junior high school students Private Tiara on the aspect of the feasibility of the Contextual-Based worksheets content in social studies subjects, 83% included in the Very Good category, in the aspect of presenting Contextual-Based LKPD learning materials in social science subjects. Contextual-Based worksheets on social studies topics was evaluated by 32 students in a field trial, and the findings revealed that the resulting product could be used.
Data Analysis

The average score in each field determines the research findings of material experts, worksheets design experts, and media experts on the overall assessment aspect. The viability of the Contextual-Based worksheets on social studies subjects was then evaluated using the results of the assessment. The following is a description of the average percentage of findings from the assessments of material experts, learning design experts, and media experts:

Product Effectiveness Test Results

Description of Research Data

The pretest learning outcomes of students who were taught using Contextual-Based worksheets obtained the lowest score of 11, the highest score of 22, the average value of 16.93 and the standard deviation of 2.93. The frequency distribution of students' pretest learning outcomes taught using Contextual-Based worksheets can be seen in Table 11 as follows:

Table 11 Frequency Distribution of Students' Pretest Learning Outcomes Learned by Using Contextual-Based LKPD

<table>
<thead>
<tr>
<th>No</th>
<th>Class Interval</th>
<th>Fi</th>
<th>relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11 – 12</td>
<td>3</td>
<td>9.38</td>
</tr>
<tr>
<td>2</td>
<td>13 – 14</td>
<td>4</td>
<td>12.50</td>
</tr>
<tr>
<td>3</td>
<td>15 – 16</td>
<td>5</td>
<td>15.63</td>
</tr>
<tr>
<td>4</td>
<td>17 – 18</td>
<td>11</td>
<td>34.38</td>
</tr>
<tr>
<td>5</td>
<td>19 – 20</td>
<td>5</td>
<td>15.63</td>
</tr>
<tr>
<td>6</td>
<td>21 – 22</td>
<td>4</td>
<td>12.50</td>
</tr>
<tr>
<td>Amount</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td>16.93</td>
</tr>
</tbody>
</table>

The results of the calculation of the test scores for learning outcomes before using the Contextual-based worksheets (pretest) showed that 3 students were in the 11-12 grade range with a frequency of 9.38%, 4 students were in the 13-14 and 21-22 ranges with a frequency of 12, 50%, 5 students are in the range 15-16 and 19-20 with a frequency of 15.63%, 11 students are in the range 17-18 with a frequency of 34.38%.

In addition, students who were taught using context-based teaching materials had the lowest posttest score of 11, the highest posttest score of 28, average score of 21.84, and standard deviation of 3.83. Table 12 shows the frequency distribution of posttest learning outcomes of students who were taught using contextual-based worksheets as follows:
Table 12 Frequency Distribution of Student Posttest Learning Outcomes Learned by Using Contextual-Based LKPD

<table>
<thead>
<tr>
<th>No</th>
<th>Class Interval</th>
<th>Fi</th>
<th>Relative frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11 – 13</td>
<td>1</td>
<td>3.13</td>
</tr>
<tr>
<td>2</td>
<td>14 – 16</td>
<td>2</td>
<td>6.25</td>
</tr>
<tr>
<td>3</td>
<td>17 – 19</td>
<td>4</td>
<td>12.50</td>
</tr>
<tr>
<td>4</td>
<td>20 – 22</td>
<td>11</td>
<td>34.38</td>
</tr>
<tr>
<td>5</td>
<td>23 – 25</td>
<td>8</td>
<td>25.00</td>
</tr>
<tr>
<td>6</td>
<td>26 – 28</td>
<td>6</td>
<td>18.75</td>
</tr>
<tr>
<td></td>
<td><strong>Amount</strong></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td>21.84</td>
<td></td>
</tr>
</tbody>
</table>

The results of the calculation of learning outcomes test scores before using Contextual-based worksheets (Postes) showed that 1 student was in the 11-13 grade range with a frequency of 3.13%, 2 students were in the 14-16 range with a frequency of 6.25%, 4 people are in the range 17-19 with a frequency of 12.50%, 11 students are in the range 20-22 with a frequency of 34.38%, 8 people are in the range 23-25 with a frequency of 25.00%, 6 people are in the range 26-28 with a frequency of 18.75%.

Fisher's exact test was used meanwhile to test the homogeneity of the research data. The results of the homogeneity analysis showed that the learning outcomes of students in the two groups—who received learning using contextual-based teaching materials and those who did not—are homogeneous. This can be seen from the magnitude of \( F_{count} < F_{table} \) at the 5% significance level (1.07 < 1.87).

The findings of hypothesis testing provide empirical support for the statement that the learning outcomes of social studies class students in class VII Junior High School Swasta Tiara are greater when contextual-based worksheets are used than when they are not used. Contextual-Based worksheets is useful in teaching social studies subjects in the following way:

\[
\bar{X} = \frac{\text{total score obtained}}{\text{ideal score}} \times 100\% \\
\bar{X} = \frac{699}{32} \times 100\% = 21.84\% 
\]

This effectiveness value is more greater than the following effectiveness values, which do not use contextual-based teaching materials:

\[
\bar{X} = \frac{\text{total score obtained}}{\text{ideal score}} \times 100\% \\
\bar{X} = \frac{535}{30} \times 100\% = 17.83\% 
\]

Discussion of Research Results

The product development process includes the analysis and testing of this context-based worksheets data, as well as elements that are changed and improved in response to feedback from material experts, learning design experts, learning media experts, and student users. The average score for the LKPD component is Very Good. The worksheets criteria considered are the suitability of language, presentation, and content. Students assess the results of subsequent
revisions on their own, in small groups, and in limited field experiments. With the help of this research, worksheets is expected to be more user-friendly and more in line with students' needs. This is in accordance with the statement of Borg and Gall (1983: 772)\(^5\) in Education Research An Introduction that development research is focused on the creation and validation of educational items.

Learning media, according to Sudjana and Rivai (2001:2)\(^6\), must improve the learning experience in the classroom and the learning outcomes obtained by students. Teaching materials are very helpful because (1) make the class entertaining and motivate students, and (2) make the meaning of the material clear and easy to understand.

Students will hear additional actions, such as understanding, in addition to the teacher's explanation. (3) Broader assessment techniques and (4) learning activities use more reflection to solve existing and existing problems.

Based on the explanation above, it can be concluded that the Contextual-Based worksheets in social studies learning class VII Private Tiara proved feasible to use because it had passed the material, media, worksheets design, individual, small group and field test tests and the results were declared "Very Good".

**Discussion of Product Effectiveness Research Results**

\(T\) count = 4.56 and \(T\) table = 4.02 are the calculated findings. From the results of \(T\) count = 4.56 and \(T\) table = 402, it can be concluded that students who use contextual-based worksheets in social studies class in class VII high junior school Swasta Tiara get better learning outcomes than students who do not.

After achieving the goals set with satisfactory results, the media is said to be very good. To evaluate the efficacy of the worksheets in this regard, product trials were conducted during the learning process. Student learning outcomes are a significant indicator of worksheets performance. The learning outcomes of 32 students who were taught using context-based worksheets were assessed for their learning outcomes, and these findings were compared with student learning outcomes in subjects that were not. Based on the analysis, students who received learning using contextual-based worksheets on average had better performance than students who received learning without using contextual-based worksheets.

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**4 Conclusion**

The following are conclusions that can be drawn from the formulation, objectives, findings, and discussion of the research on the creation of Contextual-Based LKPD in Social Studies Learning.
The total average is classified as “very good/very qualified” in the context of the LKPD learning IPS validation findings from material experts, learning design experts, and media experts. That's clear. The substance can thus be used for subsequent experiments with some modifications. Only media developed to offer validation results, which are limited to individual exams, small groups, and field tests, are eligible for use as student worksheets (LKPD). In social studies learning, contextual-based worksheets produce better student learning outcomes than non-context-based worksheets.

**Implications**

Compared to the LKPD used by teachers and students in the learning process, the conclusions and research findings of this LKPD are very significant.

The effect of the problem is:

This LKPD will make a useful contribution, especially for teachers in the learning process, where this LKPD provides convenience in the implementation of the teaching and learning process so that it has an impact on learning success and improving student learning outcomes. On the one hand, the creation of this LKPD offers relevant learning for students of Tiara Deli Serdang Private Junior High School and creates a fun learning environment because students are given sufficient space to study alone and speak in groups to answer questions.

The use of context-based learning worksheets, which require students to be ready to complete study assignments independently to get the highest possible score. In an effort to examine the content and learning questions presented, students are given the opportunity to develop their potential and creativity.

**References**

Development of Learning Media Based on Visualization of Computation Chemical Calculation Results

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Abstract. This study aims to determine the feasibility of learning media for electrolyte and non-electrolyte solutions based on visualization of computational chemical calculations. This type of research is development research that refers to the ADDIE model. This study uses a modified BSNP validation sheet which is validated by four validators: two chemistry teachers, material experts, and two media expert lecturers. The results of the needs analysis are the results of validating the feasibility of learning media based on visualization of computational chemistry calculations on electrolyte and non-electrolyte solution materials found on BSNP obtained an average percentage of content eligibility is 95%, language feasibility is 96%, and presentation feasibility is 94%. From the average percentage value of the three aspects, it is obtained 95%, meaning that the media is very feasible to use. The percentage of student responses to learning media is 87.97%.

Keywords: learning media, visualization, computing

1 Introduction

In the 2013 curriculum, improving the quality of learning cannot be separated from the learning process. The learning process is one element of the standard procedure that changes to achieve learning success and the formation of student competencies [1]. The method of learning chemistry in schools is still a problem that needs to be solved. Most chemistry teachers still use conventional and less innovative ways of teaching chemistry so that students feel uninterested in studying chemistry and even think that chemistry lessons are complex [2]. Teachers must be able to provide or apply appropriate learning media in chemistry learning [3]. Chemistry learning media dramatically affects student learning outcomes [4]. Learning media will make it easier for teachers to explain difficult-level material to be easier to understand [5]. With media application in chemistry learning, learning is made interesting with animation, sound, and images [6]. The use of interactive media is very influential on
student learning outcomes [7]. Utilizing technological developments in teaching and learning activities with computers has an excellent opportunity for students and teachers to combine active learning with computer technology [8]. The use of computer-based media has a different way to help students' problems in learning chemistry than media without computers [9].

Currently, developments that are by knowledge in the field of information and communication technology are the optimal use of computers in learning activities. Good learning media is also needed to improve the quality of learning. One of the media that can be used is PowerPoint, which is equipped with chemical structures and animations. The system and vibrancy of the chemical structure were developed using computational chemical calculations. The media produced is the application of computational chemistry calculations in the field of teaching chemistry [10].

Computational chemistry methods are very flexible. Almost all practical chemistry materials, both simple and high difficulty levels, can be well modeled using computational chemistry in software, including NWChem, Hyperchem, and Chemsketch [11]. The use of computational chemistry modeling has the advantage that it is inexpensive, has a high level of accuracy, shortens practice time, is not dangerous, and helps improve understanding of chemistry optimally [12]. Many applications of computational chemistry can be used to enhance students' experience of chemical structures and bonds. An ab initio computational chemistry software package that provides multiple methods for calculating the properties of molecular and periodic systems using standard quantum mechanical descriptions of the electronic wave function or density [13].

Visualization programs in computational chemistry can use Jmol, Chemdraw, and Avogadro software. In these applications, chemical bonding materials can be visualized in real terms. Avogadro is software that can be used to create 3-dimensional molecular shapes. Visualization using Avogadro software can explain understanding abstract concepts to be more concrete, easily captured by students, and fun to follow [14]. Avogadro software can bring students closer to molecules, reveal microscopic details, and help them understand chemical properties, chemical reactions, and other chemical phenomena [15].

Computational chemistry calculation methods can determine the energy and intermolecular distances in organic solution materials. The compound with the lowest power is the most stable compared to the mix with the highest point [16]. The benefits of computational chemistry calculations from the visualization results using Jmol software can produce thermodynamic data of compounds and the structure of interactions between compounds [17]. Computational chemical analyses and visualization using Jmol and Avogadro can determine the structure and stability of polymer complexes, the distance between ions, bond lengths, and the energy of complex formation with ligands [18].

2 Method

This research is research and development (Research and Development). The development research method applied in this research is the ADDIE development model starting from Analysis (Analysis), Design (Design), and Development (Development).
The analysis phase is carried out to analyze the needs needed to help students overcome learning difficulties in electrolyte and non-electrolyte solutions related to chemical structures. The data obtained are used to determine the need for the media developed in this study in the form of learning media for electrolyte and non-electrolyte solutions based on visualization of computational chemical calculations.

In the design phase, the researcher prepares the initial product or product design. At this stage, the activities carried out are designing learning media, determining compounds, developing research instruments consisting of the development stage carried out (1) making the structure of the compound with NWChem, namely the structure of the compound NaCl, HCl, NaOH, HF, H₂S, NH₃, H₂O, CH₃OH, C₂H₅OH, and C₆H₁₂O₆; (2) visualization and animation of compounds with Avogadro and Jmol; (3) media creation on PowerPoint; (4) validation of learning media to two media expert lecturers and teaching materials to two chemistry teachers; (5) improvement of learning media and teaching materials; (7) the final product of learning media. The expert validation assessment sheet criteria are based on the BSNP, which has been modified using a Likert scale.

3 Results and Discussion

The results of the calculations using the NWChem version 6.6 software to obtain the calculated data using the Unrestricted Hartree-Fock (UHF) method with a base set of 3-21G. The results of the calculation of NaCl, HCl, and NaOH compounds which are vital electrolytes using NWChem software, are then visualized using Jmol software in 3 Dimensional (3D) form as presented in the Figure below:

![Figure 1. The structure of the visualization NaCl](image1)

Figure 1. The structure of the visualization NaCl

![Figure 2. The structure of the visualization HCl](image2)

Figure 2. The structure of the visualization HCl

![Figure 3. The structure of the visualization NaOH](image3)

Figure 3. The structure of the visualization NaOH
The calculation results of HF, H$_2$S, NH$_3$, and H$_2$O compounds, weak electrolyte solutions using NWChem software, are then visualized using Jmol software in the form of 3 Dimensions (3D) presented in the Figure below.

**Figure 4.** The structure of the visualization HF

**Figure 5.** The structure of the visualization H$_2$S

**Figure 6.** The structure of the visualization NH$_3$

**Figure 7.** The structure of the visualization H$_2$O

The result of compound calculation CH$_3$OH, C$_2$H$_5$OH, and C$_6$H$_{12}$O$_6$ which is a non-electrolyte solution using NWChem software, then visualized using Jmol software in the form of 3 Dimensions (3D) which can be seen in the Figure below.

**Figure 8.** The structure of the visualization CH$_3$OH
The process of making learning media into products in the form of 3D visualization media and animations on electrolyte and non-electrolyte solution materials in the form of powerpoints. The following is an example display of the learning media products that have been made.

The initial media display includes indicators, objectives, materials, summaries, and evaluations.

Indicators are things to be achieved in the learning process on this media.
Learning objectives contain the goals to be achieved in this media.

The material in this media about electrolyte and non-electrolyte solutions is equipped with visualization of computational calculations and animations of their compounds.

The summary contains the core of the material described in bullet points to make it easier for students to understand the concept of the material.

The evaluation, which consists of five description questions, aims to test the extent to which students can understand the concept of the material.
Learning media based on visualization of computational chemistry results has been validated using the modified National Education Standards Agency (BSNP) eligibility standards. The developed media is assessed based on three eligibility standards according to BSNP, namely content feasibility, language feasibility, and presentation feasibility with material expert validators, namely two chemistry teachers and media expert validators, namely two chemistry lecturers.

The feasibility level of the electrolyte and non-electrolyte solution learning media developed based on the BSNP, which includes the feasibility of content, language feasibility, and presentation feasibility, is shown in Figure 17.

From the picture above, the media analysis results developed based on the BSNP questionnaire obtained an average percentage value of 95% content eligibility, 96% language eligibility, and 94% presentation feasibility, meaning that the media is very feasible and does not need to be revised. From the value of these three aspects, 95% is obtained, meaning that the press is possible to use.

Learning media based on 3D visualization and animation is very feasible/valid to be used for chemistry learning [19]. The results of media validation based on computational chemistry methods obtained an average value of 91% of content eligibility, 88% of language eligibility, and 75% presentation feasibility [10]. The results of the validity of learning media using computational methods obtained a percentage of media eligibility of 90.8% [20]. Compared with the visualization-based media validation results of computational chemistry calculations that have been carried out, it can be said that the percentage of media feasibility is greater than the percentage of media feasibility [10] and [20]. This is due to the different validators, the different chemicals developed, and the use of different animations.

Providing student response questionnaires obtained a percentage of student responses to the media of 87.97%. This means that the learning media for electrolyte and non-electrolyte solutions based on the visualization of computational chemistry results is very feasible to use. Student response to computational-based hydrocarbon media is 92.6% [20]. Student response to the molecular form media based on computational chemistry is 79% [10]. Student response to the media developed based on weblogs was 74.5% [21]. When compared with previous studies, the results of the percentage of student responses to electrolyte and non-electrolyte learning media based on 3D visualization and animation are very feasible/valid to be used for chemistry learning.

**Figure 17.** Graph of Media Feasibility Analysis Results Based on Visualization of Computational Chemistry Calculation Results on Electrolyte and Non-Electrolyte Solution Materials.
solution media based on visualization of computational chemistry calculations are lower than in previous studies, and this is due to differences in student samples, differences in response questionnaires, and differences in the material applied to the media.

4 Conclusion

Based on the research conducted, it can be concluded that the results of the validation of the feasibility of learning media based on visualization of computational chemistry calculations on electrolyte and non-electrolyte solution materials based on BSNP obtained an average percentage of 95% content eligibility, 96% language eligibility, and 94% presentation feasibility. From the value of the three aspects obtained, 94% means that the media is very feasible to use. The percentage value of student responses to learning media is 87.97%, which is possible to use.

References

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The Development of Web-Based Learning Media in Class VIII English Subjects at SMP Muhammadiyah-16 Lubuk Pakam

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**Abstract.** This study aims to: a) determine the feasibility of developing web-based learning media in English subjects; b) knowing the effectiveness of web-based learning media in English subjects. This research uses a development research approach (Research and Development) with the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The results of this study show that: a) the feasibility of web-based learning media in English subjects obtained by media expert validation with an average mean score of 4.45 with a percentage of 89\% very feasible interpretation; design expert validation with an average mean score of 4.6 with a percentage of 92\% interpretation is very feasible; expert validation of the material with an average mean score of 4.5 with a percentage of 90\% of interpretation is very feasible; trials of individual students with an average score of 4.3 with a percentage of 86\% very high acceptance interpretation; student group trials with an average score mean of 4.5 with a percentage of 90\% of interpretation of very high acceptance. b) the effectiveness of web-based learning media in English subjects shows a significant difference between student learning outcomes in experimental classes, namely students who are taught using web-based learning media in English subjects and student learning outcomes in control classes, namely students who are taught without using web-based learning media in English subjects at a significance level of 0.05 or 5\%. The result of the t-test showed that the posttest of the experimental and control group showed that $t_{\text{count}} > t_{\text{table}}$ was 3.225 > 1.6772. The results of the average score of the posttest experimental group were higher 88\% than the control group 64\%. Thus, it can be concluded that the web-based learning media developed is feasible and effective to be used to improve student learning outcomes.

**Keywords:** Research and Development, Learning Media, Web, English.

1 Introduction

Education is one of the determining factors for the progress of the nation, because through education it can create quality human beings. The quality of education can be seen in the
indicators of success in learning, namely by achieving learning objectives. One of them is by increasing students' understanding of the material presented which can be seen through the learning outcomes of students. According to Dimyati and Mudjiono (2009: 256) states that learning outcomes are the level of success obtained by each student after participating in learning activities marked by grades.¹

The development of communication and information technology has a very large influence on changing the learning process. Learning media can also help students to improve understanding, present data by dancing and trusting, facilitate data interpretation, and condense information (Arsyad, 2014).²

English is one of the most important subjects because language is a means of communication to meet the needs of life and as a cultural identity. There are four objectives of teaching English in Junior High School, namely students must have the skills of listening, speaking, reading, and writing in English.

Appropriate and useful solutions are needed so that English language learning can achieve the desired goals and competencies. Efforts to provide access to adequate learning resources can be made through web-based learning media. E-learning is generally a website where users can interact with each other. Learning processes that can be done such as delivering teaching materials, as well as evaluating learning for students.

Web-based learning is one of the solutions to the limitations when teachers and students are in learning activities at school, especially now that Indonesia is experiencing an outbreak of Coronavirus Disease (Covid-19). Covid-19 currently has an impact on all Indonesian people, one of which is in the field of education (Dewi, 2020).³ Learning activities are carried out online / remotely or learning from home (Circular Letter of the Minister of Education and Culture, No. 4 of 2020).

Edmodo is an educational site based on social networking in which there is a variety of content for education. Teachers can add learning materials, share links and videos, project assignments, and student grade notifications directly.

From the initial observations at the Muhammadiyah Private Junior High School (SMP) 16 Lubuk Pakam, it already has learning facilities that can be said to be quite adequate. Facilities that support the learning process include the existence of a projector, the existence of computer laboratory facilities, and also the availability of a Wi-Fi network to help both teachers and students find knowledge that is in accordance with the subject matter and current technological developments. However, in reality the existing facilities have not fully supported learning activities to get the expected learning outcomes, this can be evidenced by the low acquisition of learning outcomes.

Based on the description above, researchers will use teaching materials as a learning resource for students that can be used to improve thinking skills by presenting real problems in everyday life, both in the school environment so that it is expected to improve student learning outcomes in English subjects.

The formulation of the problems contained in this study, namely: (a) Is the web-based learning media in English subjects developed suitable for use in class VIII students at SMP Muhammadiyah-16 Lubuk Pakam?; (b) Is the web-based learning media in English subjects developed effectively used for class VIII SMP Muhammadiyah-16 Lubuk Pakam?
Based on the formulation of the problem that has been described, the objectives of this study are: (a) To determine the feasibility of developing web learning media in English subjects for class VIII students at SMP Muhammadiyah-16 Lubuk Pakam; (b) To find out the effectiveness of web learning media on English subjects for class VIII students at Muhammadiyah-16 Middle School Lubuk Pakam.

2 Theoretical Description

Learning theory is a theory in which there are procedures for applying teaching and learning activities between teachers and students, as well as designing learning methods that will be carried out in the classroom and outside the classroom. According to Hamid (2014: 6) learning theory focuses on the relationship between variables that determine learning outcomes. According to Law No. 20 of 2003 concerning the National Education System article 1 paragraph 20 states "learning is the process of interaction between students, teachers and learning resources in a learning environment".

The Association for Education, Communication and Technology (AECT) describes the media as the delivery of the process of conveying information. According to Mayer (2014: 1) explains that multimedia learning includes words and images and includes learning through textbooks containing text and illustrations, basic computer learning that contains animations and narratives and slides of face-to-face presentations containing graphics and spoken words. According to Riyana (2007) learning videos are audio-visual media that contain good learning messages to help make it easier for students to understand the subject matter. Learning videos have a very high appeal, this is inseparable from the presentation which displays videos in the form of images accompanied by sound, so that the senses of sight and hearing are also aroused.

According to Miars (2004: 550) four references contained in learning (learning outcomes) (1) the existence of new abilities or changes; (2) the change or new establishment does not last a moment, but rather settles and can be kept; (3) the change and the new capability occurred due to effort; (4) the change or new ability does not arise only due to growth factors.

According to Efendi (2013: 48) English is a very important lesson in high school. English is directed to develop speaking, writing, listening, and reading skills.

Reading can be defined as the ability to obtain the message conveyed by the author through the medium of words. According to Samo, R. (2018) "reading is primarily reflected as a dynamic meaning-focused interaction in which students are required to build comprehension of a text in a non-linear way", Reading is also a simultaneous process of information in the text and previous reader knowledge developed to establish meaning before, during, and after reading (Kimberly, 2014).

Rusman (2012: 335) stated that website-based learning popularly known as Web-Based-Education (WBE) or sometimes called e-learning (electronic learning) can be defined as the application of website technology in the world of learning for an educational process. According to Januarisman and Ghurton (2016: 169) This concept, known as e-learning or website-based learning media, has an influence on the process of transforming learning towards digital forms, both in content and system.
Edmodo is a platform pioneered by Nicolas Brogdan Jeff O'Hara in late 2008 that allows interaction between users who play the role of teachers and students. According to Angraini, Muharini and Lestari (2018) Edmodo allows students to access learning content uploaded (learning materials, links, learning videos, assignments, and grade notifications) by teachers and makes it easier for teachers and students to communicate in an online classroom environment.13

3 Method

This type of research uses research and development methods. This research will use the research and development model from ADDIE model developed by Branch (2009).14 The development procedure in this study is divided into 5 (five) stages, namely: 1) Analysis, aimed at designing English learning media; 2) Design, including designing the appearance of e-learning and collecting materials needed for product development; 3) Development, is the assembly of media / merging all materials such as subject matter, images, animations, text, and learning videos; 4) The implementation is the application of e-learning using the Edmodo Learning Management System (LMS) that has been developed; 5) The evaluation is carried out an assessment of the data that has been collected at the implementation stage.

Descriptive analysis is used to analyze and describe the data that has been collected. Quantitative data obtained from questionnaires given to material experts, media experts, design experts as well as students are presented in the form of tables and in descriptive narrative exposure. The results of descriptive statistical analysis are used to determine the feasibility of the developed media. The interpretation of multimedia feasibility of learning is carried out through descriptive statistical calculations. Answer scores in the range of 1 – 5 are tabulated and calculated average score", and can be seen in the following table (Sriadhi, 2018)15:

<table>
<thead>
<tr>
<th>No</th>
<th>Interval Mean Score</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,00 – 2,49</td>
<td>Not Worth It</td>
</tr>
<tr>
<td>2</td>
<td>2,50 – 3,32</td>
<td>Less Viable</td>
</tr>
<tr>
<td>3</td>
<td>3,33 – 4,16</td>
<td>Proper</td>
</tr>
<tr>
<td>4</td>
<td>4,16 – 5,00</td>
<td>Very Viable</td>
</tr>
</tbody>
</table>

The interpretation of multimedia feasibility on acceptability (the level of acceptance by the user/ user) is carried out through a descriptive statistical calculation. Answer scores in the range of 1 – 5 tabulated and calculated average scores can be seen below (Sriadhi, 2018) 15:

<table>
<thead>
<tr>
<th>No</th>
<th>Interval Mean Score</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,00 – 2,49</td>
<td>Low Acceptance</td>
</tr>
<tr>
<td>2</td>
<td>2,50 – 3,32</td>
<td>Sufficient Acceptability</td>
</tr>
<tr>
<td>3</td>
<td>3,33 – 4,16</td>
<td>High Acceptance</td>
</tr>
<tr>
<td>4</td>
<td>4,17 – 5,00</td>
<td>Very High Acceptability</td>
</tr>
</tbody>
</table>

The product effectiveness test aims to determine the extent to which the learning media developed can improve student learning outcomes in English subjects. The data analyzed in
this effectiveness test are student scores obtained from the experimental student group and the control student group. The average scores of the two groups of students were tested using the t-test. For hypothesis testing, a one-tailed test formula is used.

4 Results and Discussion

Based on product validation through a series of trials and revisions that have been made, web-based learning media has a valid status. The experiment was carried out in 4 stages, namely: (1) evaluation of learning media experts, learning design experts, and learning materials experts; (2) individual trials, (3) student group trials, and (4) summative evaluation.

Product Eligibility

Learning Media Expert Validation Results

Validation of learning media is carried out by media experts on web-based learning media. Learning media experts validate products on aspects of display, content feasibility, presentation and graphic.

<table>
<thead>
<tr>
<th>No</th>
<th>Interval</th>
<th>Mean Score</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Guidelines and Information</td>
<td>4,6</td>
<td>92%</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Programming</td>
<td>4.2</td>
<td>84%</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Systematics</td>
<td>4</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Aesthetic</td>
<td>4.7</td>
<td>94%</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Narration and Audio Quality</td>
<td>4.7</td>
<td>94%</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Video Quality/ Animation</td>
<td>4.5</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td></td>
<td>4.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td></td>
<td>Very Worthy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the validation results of learning media experts in the table above, it can be seen that web-based learning media in English subjects at obtaining an average assessment in each aspect, there is a mean total score of 4.45 with percentage 89% the interpretation of "very feasible".

Learning Design Expert Validation Results

Validation of learning designs is carried out by design experts on web-based learning media. Learning design experts carry out product validation on aspects of content feasibility and graphics in accordance with the process and stages of instructional development.

<table>
<thead>
<tr>
<th>No</th>
<th>Interval</th>
<th>Mean Score</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Information Design</td>
<td>4.6</td>
<td>92%</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Learning Design</td>
<td>4.6</td>
<td>92%</td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td></td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td></td>
<td>Very Worthy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the validation results of learning design experts in the table above, it can be seen that web-based learning media in English subjects at obtaining an average assessment in each aspect, there is a mean total score of 4.6 with percentage 92% a "very feasible" interpretation.

**Expert Validation Results of Learning Materials**

Validation of learning materials is carried out by material experts on web-based learning media. Learning material experts validate products on aspects of the material, learning process, and language.

<table>
<thead>
<tr>
<th>No</th>
<th>Interval Mean Score</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Guidelines and Information</td>
<td>4.7</td>
<td>94%</td>
</tr>
<tr>
<td>2.</td>
<td>Multimedia Materials</td>
<td>4.4</td>
<td>88%</td>
</tr>
<tr>
<td>3.</td>
<td>Evaluation</td>
<td>4.5</td>
<td>90%</td>
</tr>
</tbody>
</table>

**Table 5. Average Score web-based Media Assessment by Learning Materials Expert.**

Based on the results of expert validation of learning materials in the table above, it can be seen that web-based learning media in English subjects at obtaining an average assessment in each aspect, there is a mean total score of 4.5 with percentage 90% a "very feasible" interpretation.

**Student Individual Trial Results**

Based on the results of the acceptance of learning media by students in individual trials, it can be seen that web-based learning media in English subjects have a mean score of 4.3 with percentage 86% a "very feasible" interpretation.

**Student Group Trial Results**

Based on the results of the acceptance of learning media by students in student group trials, it can be seen that web-based learning media in English subjects have a mean score of 4.5 with percentage 90% a "very feasible" interpretation.

**Product Effectiveness Test**

The data normality test was carried out to find the normality of the sample under study. Normality test using The Lilliefors Technique. After calculations were carried out, in the experimental class, the value of \( L_{\text{count}} = 0.108 \) and \( L_{\text{table}} \) at a significance level of 5% was obtained with \( n = 25 \) is 0.173. This shows the value of \( L_{\text{count}} < L_{\text{table}} \) which means that the sample comes from a normally distributed population.

The results of the calculation of the data normality test in the control class were obtained \( L_{\text{count}} = 0.123 \) and \( L_{\text{table}} \) at a significance level of 5% with \( n = 25 \) is 0.173. This shows the value of \( L_{\text{count}} < L_{\text{table}} \) which means that the sample comes from a normally distributed population.

**Table 6. Summary of Data Normality Test Results.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Data</th>
<th>Class</th>
<th>( L_{\text{count}} )</th>
<th>( L_{\text{table}} )</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Post-test</td>
<td>Experiment</td>
<td>0.108</td>
<td>0.173</td>
<td>Normal</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Control</td>
<td>0.123</td>
<td>0.173</td>
<td>Normal</td>
</tr>
</tbody>
</table>
Homogeneity testing is carried out to find out about population variations, namely whether the research data used have the same or different population variants. The data homogeneity test in this study was carried out with the F test and obtained a calculated F value of 0.78, while the $F_{table}$ value at a significance level of 5% is 1.96.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data</th>
<th>Class</th>
<th>$t_{count}$</th>
<th>$t_{table}$</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Post-test</td>
<td>Experiment</td>
<td>0.78</td>
<td>1.96</td>
<td>Homogen</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis testing in this development research uses a one-tailed test formula. From the calculation results obtained $t_{count} = 3.225$ and the $t_{table}$ value at a significance level of 5% of 1.6772 which means that the calculation $t_{count} > t_{table}$ ($3.225 > 1.6772$) which means $H_0$ was rejected and $H_1$ was accepted. Thus, the research hypothesis that states that students' English learning outcomes using web-based learning media are higher than students who learn conventionally (without using web-based learning media) are tested for truth.

The results of this study are in line with research conducted by Thesalonika (2019) which states that the web-based learning developed is feasible to use. This is reinforced by the results of validation carried out to media experts, design experts and material experts. From the results of the development of web-based learning media feasibility tests that have gone through the feasibility test stage from experts, the results show that web-based learning media are very feasible to use, where the average percentage of web-based learning media feasibility test results is 90% and the percentage of student trials is 88%. Based on the results of validation and trials that have been carried out, the development of web-based learning media is suitable for use in class VIII English subjects at SMP Muhammadiyah-16 Lubuk Pakam.

The results of this study are in line with research conducted by Joko and Wulandari (2018) in their research showing that the media developed using Edmodo has been effective for use. This is reinforced by the difference in the learning outcomes of students who use Edmodo-based learning media and those who do not use Edmodo-based learning media. So it can be concluded that the web-based learning media that has been developed is effective in improving learning outcomes in class VIII English subjects at SMP Muhammadiyah-16 Lubuk Pakam.

5 Conclusion

Based on the results and discussion of the development of web-based learning media in English subjects, it can be concluded as follows:

Products in the form of web-based learning media in class VIII English subjects at SMP Muhammadiyah-16 Lubuk Pakam have the results that are worthy of being the final product that can be disseminated and implemented to users. This is supported by several stages, namely validation to learning media experts (4.45) with percentage 89%, learning design experts (4.6) with percentage 92%, learning material experts (4.5) with percentage 90%, individual student trials (4.3) with percentage 86%, and student group trials (4.5) with percentage 90%. All assessment results obtained at the media, design, and material validation stages obtained an average mean score of 4.5 with percentage 90% including in the
interpretation of "Very Feasible" and individual trials and groups of students obtained an average mean score of 4.4 with percentage 88% including in the interpretation of "Very High Acceptability".

Based on the results of data processing, the average value of student learning outcomes using web-based learning media developed has been effective. This is shown by the calculation results is $t_{\text{count}} > t_{\text{table}}$ (3.225 > 1.6772) for a $\alpha$ significance level of 0.05. The effectiveness value of learning media using web-based learning media is higher at 88% than the conventional learning effectiveness value of 64%.

**References**

Development of an Innovative E-book Integrated Learning Video to Improve Learning outcomes and Learning Motivation of Chemistry Education Student on Metabolic Biochemistry Topic

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Abstract. Education is very important role in the formation of quality human resource, because that educator must be creative and innovative. Innovation in learning can be in the form of developing teaching material using technology. The study aims to produce a ebook assisted by Kvisoft Flipbook Maker as a learning media and learning resource in metabolic biochemistry learning so as to increase student motivation and learning outcomes, this research with the ADDIE models the data collection instrument used was validation questionnaire based on the National Education Standard Agency (BSNP). The data were analyzed by descriptive statistical analysis. The result showed the feasibility of innovative an e-book of Biochemistry metabolism integrated with learning videos, with an average score of 3.45 and include in the valid, limited trial use e-books show effectived result in improve learning outcomes with an N-gain score 0.74 and motivation with an average score of 85%

Keywords: e-book biochemistry metabolism, learning outcomes, learning motivation

1 Introduction

Education is very important role in the formation of quality human resources, to produce quality human resources, educator must be able to develop and innovative. Development of technology is curently very rapid where technology is very important role in all fiels, especially education. During teh Covi-19 pandemic, the governent required to force all levels of society to carry out learning and working online and this affects in the world of education continue to carry out learning process by using technological sophistication. The consequences of this pandemic require educator to innovative in creating learning resources or learning media using technology so that learning outcomes can be achieved even though learning is done online. Innovative in education is development of teaching materials using technology so that the material contained in it becomes more interesting with the addition of video, animation and sound content.
The chemistry has an important role in influencing the development and progress of science and innovation[3,4,5]. So, the teacher must try to innovative in chemistry learning, especially courses by designing a biochemistry metabolism book by using electronic media[6] with help of Kvisoft Flipbook Maker application which able to convert PDF documents into computerized book publishing page that make books more interesting so that the learning process becomes efficient[7,8]. E-books function as teaching materials designed by teacher and then used by students.

Based on these problems, it can be concluded that current learning requires innovative teaching materials, in the form of e-books which were developed with the help of Kvisoft Flipbook Maker application which assist in the learning process by adding content in the form of learning videos, which are expected to assist teacher in delivering learning materials so that students can understand the teaching material independently. Learning by using Kvisoft Flipbook Maker has an important effect on learning outcomes, learning motivation and understanding of student thinking in learning and gets positive reaction from students after using e-books developed using Kvisoft Flipbook Maker application[9,10,11,12].

2 Method

The method in this research is research and development. Development in research will produce an electronic book (e-book). E-book development using Kvisoft Flipbook Maker software with research and development steps, namely analyze, design, development, implementation and evaluation. Thr overall research steps can be seen drawn as shown in figure

![Fig 1. Steps of development book](image)

The research was conducted at the faculty of Mathematics and Natural Sciences Universitas Negeri Medan, North Sumatera. The study was conducted from March to June 2022.

The population in this research was all students of chemistry education. The samples were students PSPK B 2019 with 27 students using random sampling data collection technique.
Research instrument are in e-book feasibility assessment based on BSNP, valid and reliable objective test and questionnaires of students motivations. The data analysis technique used one-group pretest-posttest design.

3 Result and Discussion

In this research begins at stage of analyzing the needs of teaching materials Biochemistry Metabolism. After the data is collected, the next stage is designing teaching material into e-book Biochemistry Metabolism using Kvisoft Flipbook Maker applications. The next stage is teaching material that have been designed into e-book Biochemistry Metabolism are validated by expert validators using a questionnaire of eligibility indicators according to BSNP agency.

Based on the validation results, the e-book feasibility value is 3,45 with valid category.

![Fig. 2. Graph of Feasibility Analysis Result of E-book Biochemistry Metabolism.](image)

After e-book Biochemistry Metabolism is declared valid and suitable for use, the next step is to try out (implementation) e-book Biochemistry Metabolism to students. Before learning begins, students are first given pretest. After that, the students are given an e-book Biochemistry Metabolism in learning process and before the learning ends, students are given posttest to find out the improve in student learning outcomes. Improvement in learning outcomes can be seen in table 1.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Average</th>
<th>N-gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Posttest</td>
<td>40,56</td>
<td>83,70</td>
</tr>
</tbody>
</table>
The increase in students learning outcomes is measured by the value of N-gain with value 0.74 which includes the criteria for high N-Gain.

In this study, in addition to measuring the increase in learning outcomes, it also assesses student learning motivation after using e-book Biochemistry Metabolism. Based on data obtained using motivation questionnaire, the value of students learning motivation after using e-book Biochemistry metabolism is 85%. Data on the percentage of student motivation can be seen figure 3.

![Figure 3. Percentage Learning Motivation](image)

### 4 Conclusion

The result showed that e-book Biochemistry metabolism develop using Kvisoft Flipbook Maker software was valid according to BSNP standard with value of 3.45 and the e-book could be used in the learning process in an effort to improve learning outcomes and motivate student to study independent.

The result of increasing student learning after using an e-book Biochemistry Metabolism developed using the Kvisoft Flipbook Maker software reached 0.74 with a high category.

The result of motivation learning students is measured after using e-book Biochemistry Metabolism reaced a value of 85% in the high motivation category.

**Acknowledgment.** We would like to thanks to the Rector of Unimed Dr. Syamsul Gultom, M,Kes. and the Head of the Research Institute of Unimed Prof. Dr. Baharuddin, for carrying out this research through the Fundamental Research allocation Unimed PNBP 2022 Research Grant and to all parties who helped carry out this research and research outputs.
References


The Implementation Of the Prototype Curriculum in UPTD SMP Negeri 1 Datuk Lima Puluh Batubara Regency

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Abstract. This study's objective is to assess how the prototype curriculum is being applied in the UPTD SMP Negeri 1 Datuk Lima Puluh Batubara Regency. The context, input, process, and output (CIPP) model was applied to 205 students and 21 teachers as the sample. Based on the curriculum's indications, a questionnaire was created, and descriptive statistics were utilized to assess the results. In this study, it was discovered that 96.40% of the participants rated the infrastructure and book acquisition aspects as very good. Then, less than 45% of respondents said that they still had just a minimal comprehension of the curriculum in terms of parental involvement, teacher coaching, and the learning and assessment processes. One of the curricular offerings, the Profil Pelajar Pancasil a, was rated as being in the good category by nearly 70% of respondents. In other words, the context, input, and process aspects of the prototype curriculum's implementation need to be improved.

Keywords: Prototype Curriculum, CIPP, School Movers

1 Introduction

Education is a means or bridge for humans to develop their potential through the learning process they get. As we know, it is stated in the 1945 Constitution Article 31 Paragraph 1 stating "every citizen has the right to education". Thus, it is clear that education is the right of every individual to get it. With education, it is hoped that it can give birth to the next generation of the nation with intelligent and quality individuals, which means a generation that is able to take advantage of existing progress as well as possible [1], [2], [3].

In the last 10 years the budget for education has been allocated 20 percent of the APBN. In 2020, the education budget increased from IDR 549.5 trillion to IDR 550 trillion in 2021. However, various indicators of student learning achievement have not shown satisfying results. The 2018 PISA results ranked Indonesia at the bottom of the OECD countries. According to the study's findings, Indonesia's PISA ranking in 2018 dropped in comparison to the PISA results from 2015 [4], [5], [6]. Every three years, 600,000 15-year-old children from 79 different nations were evaluated for this 2018 survey. Each child's performance in arithmetic, reading, and science is compared in this study. [7], [8], [9]. The gap in the quality of education based on the region and the socio-economic conditions of students still overshadows the portrait of education in Indonesia. Research reveals that the low quality of education is one of the reasons for the overcrowded curriculum that burdens students. Curriculum content that is too difficult for students is one of the reasons for the lagging quality of education in developing countries, while teachers only focus on efforts to pursue curriculum completeness. [10], [11].

In recent years, Indonesia has continued to strive to improve student learning outcomes. However, during the pandemic, various changes in education have resulted in a decline in student learning
outcomes. In these difficult times, the main goal of education is not only curriculum completion, but also to maintain the health and safety of all elements of education [12], [13], [14]. The COVID-19 pandemic causes various negative impacts that lead to learning loss [15], [16]. During the Covid-19 pandemic, children were less active because they stay at home. Feelings of getting bored quickly, watching TV more often and playing on electronic devices that have an impact on health get worse without doing activities outside the home [17]. Students lost the opportunity to learn as they should, and in this case their right to learn could not be fulfilled optimally. According to data from the Indonesian Survey Institute in early September 2021, most students are considered to have started to get tired of undergoing long distance learning. This could be seen from their enthusiasm for participating in learning [18], [19], [20]. Then, 23.8% of teachers assessed that students did not have the motivation to learn. This data is one proof of the decline in the quality of education, where students have no interest in learning, including participating in learning and understanding the material [21], [22], [23].

In addition, a study revealed that when comparing IFLS data in 2014 with 2000, it was found that children's numeracy skills in 2000 were relatively higher than children at the same level 14 years later. From Figure 1, it can be seen that the achievement of children at each level in 2014 was consistently below the achievement in 2000. This applies to both the group of children who are in school, and children of that age who are not in school. This means that, at least during the years 2000 to 2014, the educational attainment of children in Indonesia actually decreased [24], [25].

Tackling the learning crisis in Indonesia requires a holistic and integrated handling effort. As one of these efforts, particularly in dealing with an overcrowded curriculum. According to the Decree of the Minister of Education and Research and Technology Number 162/M/2021 about Schools Mover, the Ministry of Education, Culture, Research and Technology is creating a new curriculum dubbed the Prototype Curriculum. The development of this curriculum begins with the implementation of an emergency curriculum during a pandemic, namely through simplification of the curriculum that directs students to focus on essential competencies. The evaluation results show that the use of an emergency curriculum can significantly reduce indications of learning loss during the pandemic, both for literacy and numeracy achievements [26]. Students who used the curriculum of emergency, regardless of their socioeconomic status, had better learning results than students who used the 2013 curriculum, according to research on how the program was implemented during the COVID-19 Pandemic [27]. The prototype curriculum also emphasizes the attainment of contextual learning that adjusts to students' requirements and developmental stages in the following development. The
prototype curriculum is a competency-based curriculum that uses project-based learning (PBL) to enhance the character development of students in line with the Pancasila Student Profile. The last resort for instructional units that can restore learning is this curriculum [28]. Currently, this curriculum has been implemented in 2,500 driving schools spread across 111 districts/cities and 34 provinces in Indonesia. Project-based learning is directly tied to the curriculum's prototype. A teaching strategy known as project-based learning (PBL) involves having students actively participate in projects that are both personally and practically relevant [29] but another theory suggests the organization and administration of project-based learning can take time to solve complex problems [30]. The empirical gap, the phenomenon of educational attainment, and the theoretical gap lead researchers to examine the implementation of the model curriculum in one of the education units at the junior high school level in Batubara Regency. With the expectation that the evaluation findings from this study can meaningfully contribute to the implementation of the prototype curriculum in the future, this study intends to assess the use of the prototype curriculum at the junior high school level.

2 Literature Review

2.1 On Prototype Curriculum

Policies regarding education in Indonesia have changed from one period to another and one of the policies that have changed is the curriculum [31]. A group of subjects with lesson plans that will be taught to pupils make up the curriculum. The Indonesian curriculum is always being updated and improved, such as when the 2013 curriculum was replaced with the 2022 curriculum [32]. The pandemic situation which also has an impact on the world of education has indeed made the learning process more hampered. For instance, when the pandemic first occurred, the government in this case the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) had presented an emergency curriculum. The emergency curriculum itself is one option that can be taken by education implementers or in this case schools that implement Distance Learning (PJJ) both for levels ranging from PAUD to SMA/SMK by simplifying basic competencies. At the same time, despite participating in implementing PJJ during the pandemic, in fact there are still schools that use the 2013 curriculum. As a result, Kemendikbudristek saw that schools that used the emergency curriculum were four to five months ahead in terms of quality and learning time compared to schools that were still using the full 2013 curriculum. Seeing these situations, with a target to restore learning nationally, the Ministry of Education and Research and Technology finally presents a new curriculum, namely the Prototype Curriculum [33]. Several key elements of the prototype curriculum facilitate learning recall such as (1) project-based learning to develop soft skills and character (faith and virtuous character, mutual cooperation, global diversity, independence, critical thinking, creativity); (2) focus on essential materials to allow sufficient time for in-depth study of basic skills such as reading, writing and mathematics; (3) Flexibility for teachers to conduct learning according to the student's ability (teaching at the appropriate level).

2.2 Prototype Curriculum and Contextual Participatory Learning

The COVID-19 pandemic opens up opportunities to bring innovation in learning. The Ministry of Education and Culture has compiled a Prototype Curriculum as part of the national curriculum to encourage the recovery of learning during the Covid-19 pandemic [34, 35].

One endeavor to reform education in Indonesia is the prototype curriculum. The development of the prototype curriculum is going in a manner that supports attempts to support learning. The Ministry of Education and Culture-Research and Technology will introduce a prototype curriculum in the 2022–2023 academic year with the excellent goal of promoting more active and adaptive learning by giving teachers the freedom to carry out a learning process focused on learning projects. In order to create a better and more advanced Indonesian education, the assistance and diligence of numerous parties are required [36]. The 2022 Prototype curricula place a greater emphasis on fundamental
subjects in accordance with each phase’s learning objectives. As a result, it is anticipated that the prototype curriculum will be able to resolve the issue of the difficulty of completing the 2013 curriculum’s subject matter during the COVID-19 epidemic [37].

The idea of a prototype curriculum begins by providing flexibility to teachers and principals to carry out learning that favors students. For this reason, educational units are allowed to reformulate the curriculum based on the needs and characteristics of students through the preparation of the Educational Unit Operational Curriculum (KOS). In preparing KOS, the education unit is expected to be able to collect structured information (assessment) to formulate the characteristics of the education unit. After that, the education unit is flexible to reformulate the vision, mission, and educational goals to be achieved based on the results of the characteristic assessment. The education unit can also determine the most appropriate learning organization and carry out professional development so that teachers can develop lesson plans in the classroom.

In general, KOS consists of five main components, namely: (i) characteristics of the education unit; (ii) the vision, mission, and objectives of the education unit; (iii) learning organization; (iv) mentoring, evaluation, and professional development; and (v) lesson plans. In providing educational services, the education unit will refer to the KOS document. This document will serve as a reference for reflection so that educational units can adapt to the dynamics of change and student needs.

During the adaptation period at School Movers, most (79.92%) education units have completed KOS documents, both those that have been determined and those that have not been determined by the education office (Figure 2). A total of 19.76% of education units are still in the process of preparing KOS, and the rest (0.31%) have not compiled KOS at all. The data was generated from an evaluation study on the implementation of the School Movers Program in November 2021 with principals as respondents.

2.3 Character and Characteristic Development and Application of the Prototype Curriculum in Junior High School

The 2013 curriculum has emphasized character development but has not been given a special portion in its curriculum structure. In the prototype curriculum structure, 20 – 30 percent of lesson hours are used for character development of the Pancasila Student Profile through project-based learning. Project-based learning is important for character development because:

1. Provide opportunities to learn through experience (experiential learning).
2. Integrating essential competencies learned by students from various disciplines.
3. Flexible learning structure.
While the characteristics and application of the prototype curriculum in Junior High Schools are listed below:

1. Adjustment to the development of digital technology, Informatics subjects become compulsory subjects.
2. A guide for Informatics teachers is prepared to help novice teachers, so that subject teachers do not have to have an informatics education background.
3. Project-based learning to raise awareness of Pancasila students is carried out at least 3 times in one academic year.

2.4 The Learning Outcomes of Prototype Curriculum (CP)

Learning Outcomes are learning competencies set by the government. This learning achievement, if compared, has the same role as KI and KD in K13 [38]. The learning outcomes are arranged systematically and adjusted based on the phases. This phase is educational and has been divided into six parts. There is phase A which includes first and second-grade elementary school students. Then phase B consisted of third and fourth-grade elementary school students, and phase C was for the fifth and the sixth-grade elementary school students. Especially for phase D, this directly covers the junior high school level from grades seven to nine. There is a special portion in phase E for tenth-grade high school, and finally phase F for eleventh and twelfth grades.

2.5 Relevant Research

Research conducted by [39] was evaluation research using a literature review methodology. The purpose of this study is to contribute in a corrective way to the prototype curriculum's policy coherence. The information is derived from government regulations that are validated by professional evaluations of curriculum designers. Data analysis is logical and deductive. According to the findings of this study, the prototype curriculum places a strong emphasis on the development of non-technical skills and character traits within the context of Pancasila ideals, the simplicity of instructional materials, and the improvement of reading and numeracy abilities. This curriculum offers the chance to lessen the administrative burden of teaching and make learning more adaptable so that learning quality can be raised. The difficulty lies in teacher preparedness (attitude, knowledge, and behavior). Based on the Ministry of National Education's recommendation, which makes reference to the 2020 UKG findings, it is said that the KKG and MGMP functions have not yet been fully utilized, IT capabilities need to be improved, and instructors' quality and competency need to be raised.

Another research by [40] Using a poll of principals and teachers from various schools, it was found that principals and teachers claimed they were prepared if the official prototype curriculum was used as the most recent curriculum because the curriculum must be changed and revised on a regular basis in the education unit. according to the requirements of development conditions and technical advancements. Because education must continually be developing in order to provide the most recent advancements in learning, the curriculum is a crucial component of the guidelines for educational goals that must be owned by every educational unit.

Meanwhile, research by [41] aimed to analyze the condition of education with changes in curriculum policies in improving the quality of education in Indonesia. This study uses qualitative research methods with the type of literature review. Based on the sources studied, the facts of events that have been written in the statements are revealed. The results of this study are changes that occur because of new curriculum policies that affect the role of teachers as well as educational challenges that require teachers to instill some self-competence in developing learning with this new curriculum.
Research by [42] intended to talk about flexibility in using the prototype curriculum. This study employs a descriptive methodology and makes use of library research or literature study. This kind of research is done in order to be able to give a summary of the results of literature reviews that are based on articles, journals, websites, or books that are relevant to the subject being studied. One of the alternatives for recovery in the implementation of learning is the prototype curriculum, which is an educational program. The teaching and learning process included in this curricular structure makes reference to achievement. The prototype curriculum that the Ministry of Education and Culture will introduce in the 2022–2023 academic year has some excellent objectives, and it specifically calls for development that is more dynamic and diverse by enabling instructors to carry out cycles of learning that are realized through projects.

In addition, research by [43] noted that the implementation of the 2013 curriculum, which will be replaced by the 2022 curriculum as a result of the COVID-19 epidemic, will be discussed, along with its effects on the educational system. This article was written using a quantitative approach as the writing strategy. Data collecting is the method employed in this investigation. Briefly gathering data in the form of tables and graphs can be done using quantitative data collection approaches. The study's findings suggest that there is a new curriculum, often referred to as a prototype curriculum, which, when put into practice, can improve the effectiveness and efficiency of Indonesian education.

The poll results, which show that the majority of respondents believe the prototype curriculum will be implemented successfully, serve as evidence for this. This must be matched, though, with the accessibility and fair distribution of infrastructure and educational resources, particularly in the area of technology.

3 Method

In April 2022, this study was done at UPTD SMP Negeri 1 Datuk Lima Puluh Batubara Regency with 205 students and 21 teachers serving as respondents. While Stufflebeam's CIPP (Context, Input, Process, Output) evaluation model is employed as shown in Figure 3.

The CIPP evaluation model in its implementation is frequently used by evaluators [44], this is due to the fact that this evaluation methodology is more thorough than other evaluation methods [45]. CIPP stands for context evaluation, also known as context assessment, input assessment, process assessment, and product assessment, also known as results assessment. The four abbreviations of CIPP are the evaluation components.

![Fig. 3. CIPP Model](image)

A questionnaire that was delivered to teachers and students served as the study's instrument. This questionnaire was compiled based on the CIPP aspect and then formulated several questions referring to several indicators as listed in Table 1 below.
Table 1. Aspects and Indicators

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Facilities and Infrastructure</td>
</tr>
<tr>
<td></td>
<td>Students' and teachers' knowledge</td>
</tr>
<tr>
<td></td>
<td>Parents involvement</td>
</tr>
<tr>
<td>Input</td>
<td>Book procurement</td>
</tr>
<tr>
<td></td>
<td>Coaching for teachers</td>
</tr>
<tr>
<td>Process</td>
<td>Learning process</td>
</tr>
<tr>
<td>Product</td>
<td>Pancasila Students Profile Project</td>
</tr>
</tbody>
</table>

By measuring the percentage of respondents who answered the questions, simple descriptive statistics were used to assess the data received from the respondents.

Table 2. Description of Research Percentage Result

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage (%)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76-100</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>51-75</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>26-50</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>1-25</td>
<td>Poor</td>
</tr>
</tbody>
</table>

The results of this percentage are then categorized into descriptions of Very Good, Good, Satisfactory, and Poor as listed in Table 2 above.

4 Results and Discussion

Table 3 contains the findings of the investigation into the evaluation of the Prototype Curriculum's implementation at UPTD SMP Negeri 1 Datuk Lima Puluh, North Sumatra Province. The research findings are shown in this table as percentages of the indicators for evaluation in context, input, process, and product (CIPP).

Table 3. Research Result

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Indicators</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Facilities and Infrastructure</td>
<td>74,01%</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Students' and teachers' knowledge</td>
<td>46,31%</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>Parents involvement</td>
<td>43,44%</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Input</td>
<td>Book procurement</td>
<td>96,40%</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td>Coaching for teachers</td>
<td>42,86%</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Process</td>
<td>Learning process</td>
<td>48,45%</td>
<td>Satisfactory</td>
</tr>
<tr>
<td></td>
<td>Assessment process</td>
<td>45,82%</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Product</td>
<td>Pancasila Students Profile Project</td>
<td>69,37%</td>
<td>Good</td>
</tr>
</tbody>
</table>

From Table 3, according to the evaluation of the context factor, 74.01% of teachers and students at UPTD SMP Negeri 1 Datuk Lima Puluh thought the school's facilities and infrastructure were good. Parents' involvement and teacher and student knowledge fall into the low group, with a percentage of less than 47%. The procurement of books in line with the prototype curriculum is also usually done on time, which shows that the respondents, who made up the respondents, gave the procurement of books a very high rating (96.40%). Less than 43% of respondents, however, believe that coaching provided to teachers falls into the category of poor.

The results of data analysis on the process aspect consist of two indicators, namely the learning process and the assessment process. Less than 49% of respondents provided unsatisfactory responses for both indicators. The product aspect, where as many as 69.37% of respondents provided a good
category response, is the final element to be examined. The results of the research on the Pancasila Student Profile product are in line with research that states that the product of the prototype curriculum includes strengthening the Pancasila Student Profile [46].

The creation of the prototype curriculum is headed in a way that supports initiatives for learning recovery. The Ministry of Education and Culture-Research and Technology's prototype curriculum has a very admirable objective, namely to promote more active and flexible learning by giving teachers the freedom to adopt a project-oriented learning process. To actualize a better and more modern Indonesian education, it will take the cooperation and diligence of many parties [47]. This, of course, contradicts the results of research conducted on the input aspect where coaching conducted for teachers tends to be short and conducted online, which results in coaching participants having to allocate most of their time to this activity.

To ensure that graduates in Indonesia have a transforming and adaptable soul to the times, the prototype curriculum is being applied. Planning the new curriculum is anticipated to be able to improve education in Indonesia while continuing to cultivate students' potential to be open-minded and create a soul that is prepared to meet problems in the future [48]. It's just that the evaluation results from the process aspect found that the learning process and the assessment process were still not optimal because the standard standards had not yet been determined so teachers were still trying hard to find these standards to determine learning outcomes (CP) in accordance with the phases listed in the prototype curriculum. In addition, the involvement of parents in the context aspect which is considered unfavorable by the respondents needs special attention when planning the initial implementation of the prototype curriculum.

5 Conclusion

The implementation of the prototype curriculum at UPTD SMP Negeri 1 Datuk Lima Puluh was in the very good category in terms of input aspects of the book procurement indicators and good responses to input aspects, namely facilities and infrastructure as well as product aspects in the Pancasila Student Profile. While the knowledge and understanding of teachers and students, parental involvement (context aspect), assessment and learning process (process aspect) are in the poor category. Therefore, the preparation and quality of instructors, schools, and other factors must be taken into consideration when implementing the prototype curriculum. The prototype curriculum also replaces grade levels (like grades VII, VIII, and IX) with "phases". Overcome the unfavorable response to the input process aspect, it can be done by bringing expert trainers directly to the school and the emphasis on improving the process aspect can be done by making clear roles or roles in terms of policies.
References


Effectiveness of Developing Self-Discovery and Exploration (SDE) Integrated Low Level Organism Taxonomy Module to Improve Collaboration Skill

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Sumatera Utara1,2,3,4

Abstract. Collaborative skills are skills to actively participate in building positive relationships with others. These skills are important to have to demonstrate high productivity, full responsibility and respect for others to support skills in the 21st century. However, according to observations, the research results show that students of the Department of Biology, Faculty of Natural Sciences, State University of Medan still have low 21st century skills with a percentage of 61.22%. Therefore, this study aims to test the effectiveness of developing an integrated Self-Discovery and Exploration (SDE) Taxonomy of Organisms module to improve students' collaboration skills. This module is a modification of the Discovery Learning concept based on assignments from the Indonesian National Qualifications Framework. This study uses the Research and Development (R&D) method which specifically measures the effectiveness of the developed module. Data collection techniques through observation. The research instrument used a precision sheet for the achievement of students' collaboration skills. The results of the study were analyzed through t-test and the percentage of students' collaboration skills was calculated. The results showed that there was a significant difference between the learning outcomes of students' collaboration skills in the experimental class and the control class with a tcount of 73.724 and a ttable of 1,697 (tcount > ttable). The average value of the collaboration skills of the experimental class students is 74.36% and the control class is 4.28%. Thus, it can be concluded that the development of the integrated Self-Discovery and Exploration (SDE) module on the Taxonomy of Low-Level Organisms (SDE) has proven to be effective in improving students' collaboration skills.

Keywords: Collaboration Skills; Module; Self-Discovery and Exploration (SDE).

1. Introduction

Collaborative skills are a form of collaboration skills that are able to compensate for differences in views, knowledge, and mindsets that play a role in discussions to listen, give advice, and support each other in order to achieve common goals. Collaborative skills are closely related to
social skills, where students can show an attitude of working together and respecting each other effectively to achieve one goal in learning. Students flexibly actively act as whole individuals who help and compromise in broad thinking and are able to work productively with others in a high sense of responsibility and contribution to work [24][26][8]. Important collaboration skills are needed in the 21st century to increase productivity, patterns of positive interaction with others, and knowledge that is important to be mastered by a global society. This has implications for the development of metacognition and factual knowledge needed in dealing with the world of work and producing various technologies that characterize the 21st century holistically [12][27][4].

One way that can be done to improve collaboration skills is to implement modules as teaching materials that can construct a learning environment that is full of learning contexts, study group support, assignments, and interaction processes within the framework [17]. The framework that can optimize these skills is a Self-Discovery and Exploration (SDE)-based framework which is a combination of the Discovery Learning model and assignments oriented to the Indonesian National Qualifications Framework (KKNI) [30][22]. Discovery Learning is a part of constructivism learning that can train students’ independence in finding and constructing the knowledge and concepts being studied. The learning activities include problem identification, data collection, data processing, verification and conclusion drawing as a solution to problem solving [10][1][15]. Meanwhile, the implementation of the KKNI at the State University of Medan involves six kinds of assignments that must be completed by students when following the course unit. The mandatory tasks are Routine Tasks, Critical Journal Reviews, Critical Book Reports, Mini Research, Projects, and Idea Engineering [19][16][5].

However, according to a specific review of the Low-Level Organism Taxonomy course at the Department of Biology, Faculty of Natural Sciences, State University of Medan, it is known that students still have low collaboration skills, which is 61.22%. The student admitted that there is a need for the development of teaching materials in the Lower Level Taxonomy of Organisms course that can improve collaboration skills based on learning models that are oriented towards finding facts, concepts, and information as well as the assignment of the IQF. Therefore, this study aims to analyze the effectiveness of developing the Self-Discovery and Exploration (SDE) module to improve student collaboration skills. This research is expected to be an alternative solution to improve the quality of teaching materials in the Taxonomy of Low-Level Organisms courses that are capable of improving student collaboration skills as one of the skills needed in the 21st century.

2. Method

This research is descriptive which systematically describes the phenomenon and provides solutions to the problem solving of the phenomenon [28]. The study population was all students of the Department of Biology, Faculty of Natural Sciences, State University of Medan which consisted of 268 students. The research sample consisted of 67 students who were divided into experimental and control classes.

The data collection technique used observation of student collaboration skills learning outcomes. The research instrument used an observation sheet for the acquisition of student collaboration skills during learning with the indicators measured as follows.
Table 1. Collaborative Skills Indicators Measured in Research

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Measured Aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective</td>
<td>1. Effectiveness in working together</td>
</tr>
<tr>
<td>Open Minded</td>
<td>2. The attitude of accepting other people's opinions</td>
</tr>
<tr>
<td>Responsibility</td>
<td>3. Collaborative responsibility</td>
</tr>
<tr>
<td>Appreciation</td>
<td>4. Respect for others</td>
</tr>
</tbody>
</table>

(Sources: [20][23][21])

Data analysis was carried out in two ways, namely t-test and accuracy of student collaboration skills. The t-test aims to determine whether there is a significant difference in the collaboration skills of the experimental and control class students. The t-test analysis was calculated with the help of SPSS 2022. Meanwhile, the accuracy of the achievement of student collaboration skills was carried out by calculating the average percentage of student skill acquisition. Furthermore, the percentage results are interpreted according to the following criteria.

Table 2. Interpretation of Student Collaboration Skills Percentage

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-100</td>
<td>Very high</td>
</tr>
<tr>
<td>51-75</td>
<td>High</td>
</tr>
<tr>
<td>26-50</td>
<td>Low</td>
</tr>
<tr>
<td>0-25</td>
<td>Very low</td>
</tr>
</tbody>
</table>

(Source: [11])

3. Results And Discussion

Before calculating the t-test, first, normality and homogeneity tests were carried out on the student collaboration skills scores as a condition for conducting the t-test. The results of the normality test can be seen in Table 3.

Table 3. Normality Test of Collaboration Skill Scores Based on Collaboration Skills Indicators

<table>
<thead>
<tr>
<th>Classes</th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro Wilk</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>0.340</td>
<td>0.257</td>
<td>Normal</td>
</tr>
<tr>
<td>Control</td>
<td>0.473</td>
<td>0.370</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Based on Table 3, above it can be understood that the acquisition of the Normality test of Collaboration Skill scores based on indicators of collaboration skills in the experimental and control classes > 0.05. According to Putra, et al (2019) if the result is > 0.05, then the data used is normally distributed. Based on this, the students’ collaboration skills scores were normally distributed [18].

The results of the homogeneity test of the Collaboration Skill value obtained the Sig value. (P-Value) of 0.870 which indicates the value is > 0.05. According to Ghozali (2020) if the result is > 0.05, then the data used is homogeneous [6]. This means that the acquisition of Collaboration Skill scores is homogeneous. Furthermore, according to the calculation of the t-test between the average score of the Experimental and control Collaboration Skills, the tcount value is 73,724 and ttable is 1,697 with Sig. (2-Tailed) of 0.000 which indicates the value of tcount > ttable and the value of Sig. the <0.05. According to Suyono (2018) if the results of tcount > t table and Sig. (2-tailed) SPSS≤0.05, indicating there is a significant difference between the two variables.
being compared [25]. This indicates that there is a significant difference between the average control and experimental class Collaboration Skill scores. The results of the accuracy of student collaboration skills can be seen in Table 4.

<table>
<thead>
<tr>
<th>Classes</th>
<th>Percentage of Achievement</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>74.36%</td>
<td>High</td>
</tr>
<tr>
<td>Control</td>
<td>4.28%</td>
<td>Very Low</td>
</tr>
</tbody>
</table>

Based on Table 4 above, the results show that the average Collaboration Skill of experimental class students who are taught using the developed module is in the high category. Meanwhile, the average collaboration skills of control class students who were taught using the textbooks available in the Lower Level Organism Taxonomy course were in the very low category. In this study, it was found that the application of Discovery Learning combined with the exploration of the IQF assignment which was integrated in the concept of Self-Discovery and Exploration could significantly improve students' collaboration skills. This is obtained because Discovery Learning is a constructivist learning model that can emphasize an active learning style followed by specific instructions that must be done collaboratively. This is as proposed by Bruner that the practice of independent instructional learning in a collaborative environment is more effective in increasing mastery of material in groups. The same thing was also emphasized by Huang (2020) & Tang, et al (2020) that Discovery Learning is effectively able to improve students' collaboration skills because students are invited to find, process, and investigate a fact of learning information by actively contributing, being flexible, in compromising and appreciating the arguments given, so as to generalize a concept of discovery in learning [9][26]. Furthermore, Andrews & Forsyth (2020) also reported that collaboration-based assignments given in learning were able to have a positive impact on the level of social awareness of students [3]. Xie, et al (2018) explained that structured tasks moderated in group discussions can train patterns of social interaction that involve the collaborative role of students [29]. Basically, the learning that is applied is active, where students are not considered as empty containers to be filled. However, students can explore their skills through the lessons presented. This is in line with McComas (2014) which states that Discovery Learning as initiated by Jerome Bruner does not view students as empty containers filled passively. However, students are considered as learning subjects who can actively participate in interacting socially and their environment to develop their potential [32]. The same thing is also emphasized by Bau, et al (2017) that learning Discovery Learning brings many benefits for the development of collaboration skills of students including the attention of students more focused on learning together, the resulting discovery ideas are more varied to be completed, there is a positive response to each other. find solutions to problem solving and students can give each other constructive feedback [33].

The assignments given in learning also support the development of students' collaboration skills. This is because assignments based on the Indonesian national qualification framework given help students master the material by collaborating with each other. This is reinforced by Liu, et al (2020) that additional tasks in learning can be a preference for improving student learning outcomes. This is because students are trained to optimize each other's skills in a flexible, effective, and consistent interaction pattern [34]. In line with this, Zhang, et al (2022) also reported that meaningful learning combined in discovery learning-based assignments can
associate understanding in building information through assignment instructions completed in groups. Learners can also access new information to produce better retention together. Ideas that are difficult to solve can also be solved well and reduce misconceptions in learning. This is what triggers the emergence of a great motivation for students to think openly and be flexible in giving appreciation for each contribution made [35].

Discovery Learning can improve collaboration skills because in its application each student has the opportunity to build their own knowledge through dialogue in groups. Each student communicates with each other to share the information that has been found. The experimental class is also trained to solve problems contained in the KKNI-based assignments that are given collaboratively, so that each individual has a sense of responsibility to achieve shared learning goals. This is in line with Makoolati, et al (2021) that there is a principle to interact with each other in the application of Discovery Learning. Each student has a role and a task that must be completed. Every idea and thought that he got was then disclosed to other friends [13]. Thus, each student is required to show respect to be able to work together in concluding every idea expressed. Gorgulla, et al (2022) also emphasized that Discovery Learning combined with the assignment principle emphasizes the activeness of students in learning (student-centered learning). Students collaboratively interact with each other in identifying problems, providing solutions to problems presented through hypothesis design, collecting data through experiments, processing finding data, and verifying and generalizing the data found [7].

Meanwhile, control class students tend to have low collaboration skills because students are passive in accepting learning. Students only receive material from the lecturer and are followed by a question and answer session at the end of the lesson. In practice, the learning process does not show any pattern of interaction between students. Conditions like this can weaken the attitude of social care in learning because students do not work together to achieve learning goals. The same thing was also explained by Müller & Mildenberger (2021) and Aliramezani, et al (2022) that conventional learning only focuses students on receiving learning in one direction, so that students lack the opportunity to develop their knowledge collaboratively [14][2]. Yousuf, et al (2022) also reported that in the application of conventional learning there is no interaction pattern between students, because every concept, material, and information taught only comes from the teacher or lecturer. Students are less able to explore their potential in depth through interrelation in their groups [30].

4. Conclusion
The Integrated Low Level Organism Taxonomy Module Self-Discovery and Exploration (SDE) is proven to be effective in improving students’ collaboration skills with tcount of 73,724 and ttable of 1,697 on Sig. (2-Tailed) of 0.000 which indicates there is a significant difference between the learning outcomes of students’ collaboration skills in the experimental and control classes. The accuracy of the achievement of collaboration skills of experimental class students is 74.36% in the high category and the control class students are 4.28% in the very low category.

References


Development of Student Worksheets (LKPD) Fiction Text Based On Higher Order Thinking Skill (HOTS) In Class VII Students Of Santa Lusia Private Junior High School Sei Rotan

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Abstract. This study aims to develop a Student Worksheet (LKPD) fiction text based on higher order thinking skills (HOTS) of Indonesian language and literature for class VII SMP Private Santa Lusia Sei Rotan and to find out the students' higher order thinking skills. The sample used in this study is the questions contained in the LKPD for Indonesian class VII subjects. The research method used is research and development using the 4-D method, namely (1) the definition stage; (2) the design stage (design); (3) the development stage (develop); and (4) the dissemination stage. The results of the research are HOTS-based fiction worksheets. The results of the assessment from colleagues obtained 85.25% in the good category. The results of the validation of the LKPD design by design experts are 92.5% with very good criteria. The results of the validation of learning materials by material experts are 93.33% with very good criteria. This is evidenced in the effectiveness test of HOTS-based fiction worksheets for class VII SMP Private Santa Lusia Sei Rotan obtaining an average pretest score of 68.7 with the lowest score of 59 and the highest score of 84. While the posttest average score of 81 with the lowest score 69 and the highest score is 94. Based on these data, it can be concluded that the HOTS-based fiction student worksheets can improve student learning outcomes, especially in fiction text material.

Keywords: Fiction Text, HOTS Based, LKPD

1 Introduction

LKPD is a series of materials that are arranged systematically and in writing so as to create a learning atmosphere that is in accordance with the presence of students (Daryanto and Dwicahyono, 2014: 171). LKPD is divided into 2 types, namely print LKPD and online LKPD. Printed LKPD is a series of teaching materials in the form of sheets of paper containing material, summaries and instructions for implementing learning tasks that must be done by students. While online LKPD teaching materials are in the form of audio, such as cassettes, radio, LPs, and audio compact discs. Audiovisual LKPD such as, CAI (Computer Assisted Instruction), and can be categorized as web-based learning materials (web-based learning materials) Lestari, (2013: 5).
Students' learning interest is also one of the determinants in learning activities because without interest in learning students are usually difficult to communicate with and result in students having difficulty mastering the material taught by the teacher (Tarigan, 2013: 135). So that to support the learning interest of students, teachers must be able to provide LKPD in accordance with the existence of students.

Higher order thinking skills for students can increase or improve if training is carried out and is faced with a problem that has been faced before in early learning. Improving the quality of higher-order thinking is analyzed through the Minimum Competency Assessment (AKM) which includes literacy, numeracy, and student character. The AKM is programmed by the government to improve the quality of education in Indonesia, which is still far behind from other countries (Mendikbud, 2021). Curriculum improvement designed to increase students' ability to think critically and creatively is part of higher order thinking skills (HOTS). However, in reality, students are still unable to master higher order thinking skills. Higher order thinking skills (HOTS) are needed by students in facing the demands of education in the present and future digital era. HOTS is a thinking ability that not only requires the ability to remember, but also requires higher abilities, such as the ability to think creatively and critically (Brookhart, 2010:13). HOTS trains students to make changes and requires them to be active learners.

LKPD as a teaching material that aims to help and facilitate the learning activities will help the ability to solve problems that will affect the HOTS of students. This makes students more challenged in learning activities. The activity of solving LKPD problems will later have an impact on improving their way of thinking, including critical thinking (Astill, 2018: 120). The development of HOTS-based worksheets is quite helpful in efforts to improve students' thinking skills in mastering concepts, especially in HOTS. The LKPD that will be developed contains exercises that must be done by students, where the exercises in the LKPD are in the form of HOTS questions.

It can be proven by the following example of HOTS questions, “A sunny morning, Laras is a teenager who is looking for an angkot, because his village is only passed by one angkot (1). His stomping footsteps prove the flames of his enthusiasm for learning (2). Laras cooks here to give to her friends (3). Laras became one of the model students, and he always won class (4). The sentences that are not coherent in the paragraph above are numbered sentences... a. 1, b. 2, c. 3, d. 4. The most appropriate answer is c, after the researcher conducted the post-test the students obtained results that were not maximal, meaning that they still achieved the KKM score, so that creativity from the teacher was needed to develop the learning tools. So to improve the ability of students to identify and retell fable texts, teaching materials are needed outside of textbooks and LKPD provided by schools in the form of HOTS-based LKPD.

Based on Permendikbud Number 37 of 2018 it is stated that KD 3.11 “Identifies information about local fables/legends that are read and heard”, KD 4.11 “Retelling the contents of local fables/legends”, KD 3.12 “Examining the structure and language of local fables/legends what is read and heard”, KD 4.12 “Acting the contents of local fables/legends that are read and heard. Epistemologically, fable comes from the Latin fabulat. Fables are stories about the lives of animals that behave like humans. Fables are a type of fictional story, not stories about real life (Kosasih, 2017: 194). Fable text is an interesting fairy tale for students to learn, especially in seventh grade of junior high school, but it turns out that at Santa Lusia Sei Rotan Junior High School, many seventh grade students still don't know about fable texts, what types of fables are
and so on. For this reason, teachers need to be shrewd in determining the teaching materials used both in the learning process and evaluating students to see the extent to which students understand the material being taught.

2 Literature Study

Some of the relevant research that the author uses as a source of literature is the first research conducted by Ubaidillah (2016), entitled Development of Problem Solving-Based Physics LKPD to Improve Science Process Skills and Higher-Level Thinking Skills. This study shows that the use of Problem Solving-based Physics worksheets will increase students’ HOTS. The next research by Yenni Ernawati entitled Development of Student Worksheets (LKPD) on Scientific-Based Fable Text Materials for Class VIII Junior High School Students. The purpose of this study was to describe the needs of students and teachers for learning to write scientific-based fable texts, produce Student Worksheets (LKPD) teaching materials on scientific-based Fable Texts, and describe the results of expert validation of the developed LKPD.

3 Methodology

This research is a development research using a modified 4-D development model. The subjects of this study were class VIII students and Indonesian teachers. Based on the results of expert validation, the LKPD on the developed fable text material is categorized as good or feasible to be used as a companion teaching material for textbooks. As well as the latest research conducted by Yuniati, et al, entitled Development of Student Activity Sheets for Indonesian Language Subjects with Mind Mapping Concepts in SMA. This research on the development of student activity sheets (LKPD) aims to improve the quality of student learning, use the maximum concept of mind mapping, be able to create an active and fun learning process in learning Indonesian at SMA Al Azhar class XII.

4. Result and Discussion

The validation results from the material experts stated that the LKPD was feasible to use with a percentage of 76.36%, while from the learning media design experts the level of achievement of feasibility was 84.44%. The peer-to-peer eligibility test reached 83.63% and the trial on class XII students of SMA Al Azhar obtained the level of achievement of eligibility of 93.9%.

Data analysis used descriptive analysis in accordance with the results of the analysis from experts/experts in accordance with (Sugiyono, 2016: 135).

Feasibility was carried out using a questionnaire, with criteria 1 = irrelevant/not appropriate, 2 = less relevant/less feasible, 3 = relevant/feasible, 4 = very relevant/very feasible.
2.1 Equations, formulas and code

The effectiveness of the LKPD used in the learning process in schools gets a score of 2063 with an ideal score of 3000, then the score is as follows:

\[
\text{Effectiveness} = \frac{\text{Totalscore}}{\text{idealscore}} \times 100
\]

\[
= \frac{2063}{3000} \times 100 = 68.7\%
\]

While the effectiveness of the HOTS-Based LKPD with the developed one obtained a score of 2063 with an ideal score of 3000, then the acquisition score, then the acquisition score is as follows:

\[
\text{Effectiveness} = \frac{\text{totalscore}}{\text{scoreideal}} \times 100
\]

\[
= \frac{2430}{3000} \times 100 = 81\%
\]

Code. The difference between the pretest and posttest percentages is 12% with the posttest score better than the pretest. So, the effectiveness contribution from using HOTS-based worksheets with fiction text material is 12%. So it can be concluded that the HOTS-Based LKPD developed was more effective by 81% in the good category and the effectiveness of the student lecture method by 68.7% in the sufficient category. So the HOTS-based worksheets are declared to be effective as additional teaching materials for students in fiction text material.

4 Conclusion

Based on the description of the research results, conclusions can be drawn relating to the development of HOTS-based fiction worksheets for seventh grade students of Santa Lusia Sei Rotan Private Junior High School, conclusions obtained based on the formulation of the problem, research objectives, results, and discussion, can be described as follows: The results of the analysis of the needs of teachers and students need HOTS-based LKPD in the fiction text learning process, designing LKPD in fiction text learning, and finally the assessment of design experts with an average score of 85% and material experts with an average score of 86.5%. The feasibility of the LKPD material got an average score of 81.5% with "good" criteria and 88% with "good" criteria in developing HOTS-based LKPD in Fiction Text Learning. The effectiveness of the student learning outcomes test got an average score of 81% with the criteria
of "good" before using the HOTS-based worksheets in learning to write fiction texts got an average score of 68.7% with the criteria of "enough". Based on the conclusions in the research on the development of HOTS-based LKPD in learning to write fiction texts, the ones that have been tested have implications for teachers, students, and the education office in the learning process. The implications in question are as follows: The HOTS-based LKPD that was developed will make a practical contribution, especially in the implementation of the learning process for teachers, this HOTS-based LKPD is as additional learning to provide convenience in delivering the material being taught which can be taught independently or classically. For students, it can improve the quality of learning, especially in writing fiction texts in HOTS-based LKPD learning.

References

The Development Of Short Story Text Materials In E-Modules Sigil For High School Class XI Students Muhammadiyah 1 Medan

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Abstract. This study aims to determine the results of the development of short story text material in e-modul sigil for high school class XI Students Muhammadiyah 1 Medan. This type of research is development research based on the Brog and Gall development model. The test subjects consisted of class XI students of Senior High School Muhammadiyah 1 Medan. The results showed that: (1) material expert validation included content eligibility 94.31% on very good criteria, 92.71% presentation feasibility on very good criteria, and language eligibility 88.88% on very good criteria, (2) validation design experts with an average of 97.91% on very good criteria, (3) individual group trials of 86.80% on very good criteria, (4) small group trials of 90.04% on very good criteria, (5) The field group test was limited to 92.12% on very good criteria, (6) The effectiveness of the module in improving student learning outcomes. Student learning outcomes based on the pretest and posttest showed the difference from pretest to posttest the value obtained was 28.59% with an average pretest of 58.75% and an average posttest of 87.34%. Based on the results of the study, it was concluded that the short story text material in the sigil-assisted e-module that was developed was feasible and effective to be used by class XI students of Senior High School Muhammadiyah 1 Medan in short story text learning. The implication of this research is to provide convenience for teachers in delivering material by using e-modules assisted by sigils as learning resources in schools and for students to improve student learning outcomes in writing short stories.

Keywords: short story text, e-module, sigil.

1 Introduction

Learning is one element that cannot be separated in improving students' abilities. The ability of students will be seen from the learning outcomes that have been carried out by the teacher in teaching and learning activities. One of the elements that support this activity is learning tools, especially learning media. The current learning process from home cannot be called an ideal learning condition, but an emergency condition that must be implemented. There are still various obstacles so that all learning can be optimal. Teachers work closely with parents of students to oversee online learning during the COVID-19 pandemic. [1]
Learning using modules will allow a student to have better and faster abilities in one or more Basic Competencies (KD). The explains that "Basically on the module, a teaching material is made systematically using language that is easy to understand and adapted to the age level and knowledge of students. In addition, the module can measure students' ability to master the material." The 2013 curriculum in Indonesian language learning has many changes both in terms of content, method of presentation and evaluation used. The 2013 curriculum presents material based on the text that is used as a model in studying the material. Based on the text given, students are asked to be able to understand the concepts and rules that apply in a text. One of them that must be understood by students is the short story text. [2]

Learning is one element that cannot be separated in improving students' abilities. The ability of students will be seen from the learning outcomes that have been carried out by the teacher in teaching and learning activities. One of the elements that support this activity is learning tools, especially learning media.

The basic competence in the 2013 curriculum which emphasizes the ability to write on short story text material for class IX, namely KD 3.9 Analyzing the elements of short story text building in a collection of short stories and KD 4.9 Constructing a short story text by paying attention to the elements of short story text building.

Based on data from the Center for Assessment and Education (PUSPENDIK) in 2018, it was stated that the mastery of the national exam material on the indicators tested, namely determining the mandate contained in short stories/novel quotes, was only 50.79% of 943,708. [3] Meanwhile, the Center for Assessment and Education (PUSPENDIK) in 2019 stated that the mastery of the national exam material on the indicators tested, namely determining certain background evidence in literary text quotations 54.76% of 973,249. [4]

Based on research conducted it states that e-modules are given the right to access to students with the aim of obtaining materials that are packaged attractively using multimedia elements and assessments such as exercises. Students can study independently anytime & anywhere. Teachers can also help students in real learning activities. [5]

The combination of modules with multimedia can be chosen to foster students' interests and abilities in the learning process. The selection of the right application is used to make teaching materials in the form of electronic modules, namely the sigil application. This application already supports text, images, sound, video, and questions and is supported by many devices, such as computers and android. Sigil-based e-modules make learning more efficient and effective. Save costs because you don't have to print according to the number of students, overcome space and time, the material that students get is much more creative so it's not monotonous, interesting and easy to understand.

2 Theoretical Basis

2.1 E-Modules

The electronic module is a presentation of teaching materials that are arranged according to the rules in the form of digital form for learning purposes to be achieved in accordance with expectations. Electronic modules are one way of presenting self-study material. These materials
are arranged systematically in smaller learning units in order to obtain a learning objective and presentation in an electronic format.[6]

Electronic modules are modules that are used with digital media. Display in the form of images, text, videos, and animations from electronic devices such as computers. Technological developments have also made it possible to display modules with smartphones. Another advantage of this module is that it can reduce the use of paper in the learning process. [7]

2.2 Short Stories

States that short stories are stories with short physical structures that are read in approximately half an hour using a number of terms of approximately 500-5,000 terms.[8] From this statement, it can be concluded that short stories are stories that give a single impression, consisting of less than 10,000. A short story text is a totality, a short story text has interrelated elements. To be able to make a good short story, an author must pay attention to crucial elements, namely intrinsic elements and extrinsic elements.

Electronic modules are non-printed modules that use special devices, computer-assisted development, and provide multimedia elements to make them more interactive and interesting. The difference between a printed module and an electronic module is that a module is printed using paper, but an electronic module is an electronic module that is developed and implemented using technology-based information. [9]

2.3 Sigil

Sigil is an editing application for epub. The application is free of charge and can be accessed by many individuals. Sigil is an editing application for e-books that is open. Sigil is a tool for editing, applied for free Sigil is a tool for opening epub [10]

The digital book template from Sigil makes it easy to load digital books. The development of the framework design allows finding solutions in making digital books quickly and easily, because they only need to complete the contents according to the available arrangement. [11]

a. Epub

The epub form is a very popular form of e-book now, because various functions can be used in epub to modify the appearance of the e-book. For example, in addition to images and text, commands to insert audio and video files can also be used to further enhance the appearance of the book. [10]
The appearance of the sigil Version 0.9.4 of the image shows that it has three panels on the top, middle, and right. The table of contents on the right is used to list the contents of the file to be made in the form of an electronic book. The middle part of the sigil version 0.9.4 is used to bring up e-books that can be converted into e-books. The right side of the book browser can be used to host various epub files, such as text, images, fonts, audio, video, etc. The Directorate of High School Development explained that the right panel is the ePub document that is being processed, the middle panel is the editor, and the left panel is the file in the browser from the files contained in the ePub.

1. Digital Sigil Module Development
   a) Download the application according to the existing address
   b) Data used as e-book: The prepared file is saved as HTML in Microsoft Word format (web page), images in online format. Then prepare the book cover in the form (Jpeg);
   c) While the software is being implemented, it loads several menus: enter data, HTML, insert cover pages, insert videos, import songs and create catalogs
   d) Save what you have created in Epub format;
   e) Apply reader app to open data.

2. Digital Sigil Module Manufacturing
   1) Inserting HTML pages
      This stage is to click on the html file that has been created into sigil, from sigil -> document -> open, then select the HTML document that has been created.
   2) Inserting an HTML page
      The first thing to do is open the html file on sigil, from sigil > document > open, then select the existing HTML document.

Fig. 2. Open HTML file

b. Colophon

A colophon is a note by the author, usually at the end of an issue or publication, and contains information about the copy of the manuscript, time, and location. Colophones in e-books and metadata have something in common. Metadata is a description that describes the file. In ePub, metadata is the identity of a book: author name, book title, language, year of publication, publisher, ISBN, description, category, etc.
In the process of logging in to the metadata window, go to Sigil > Tools > Metadata editor or click the F8 key. Next, type the title, author and add other attributes like year of publication, publisher, etc., press the Add Base button and then change the values.

3) Cover page

Cover page (cover image) is an e-book cover, the cover is usually shown on the main screen of the e-book reader software along with other information such as author and title.

E-book reader library in making cover pages, preparations you have to do by providing image files for cover images. If it appears that the image used as the cover already exists in the HTML document, you can specify it as the cover image as follows:

a) Image > Select Image > Right Click > Add Semantics > Cover Page
When the image doesn't exist, you can add the image file as follows: right click the image > add existing file > select image. The image used will be added to the image file and can now be used for the cover page with the steps shown earlier.

b) Tools >> Add cover >>

![Image](image.png)

**Fig. 6.** Tools Section

On the add cover menu, the image that has been displayed will enter, when the existing document is selected, immediately click the ok button. The menu in the add cover pop up window selects the last image, then selects it as the cover in the add existing files pop up window, then clicks open.

*Cover* will appear in the inserted image. When the file you selected is available, then click the "OK" button. Finally, the pop-up window for adding a cover shows the image you specified as the cover in a pop-up to add an existing file, then select Open.

![Image](image.png)

**Fig. 7.** Determination of Cover Image

1. **Indent**

Indentation is an element in the paragraph that is closer to the paragraph line and is used to create a table of contents to show the data you want to see. the trick is to put the cursor on the topic sentence / subtopic> select the title
3. Multimedia file insertion in Epub

1) Right select > Insert file > Other files > Select the desired audio/video. Then the video/audio playback screen will appear in the editor window.

Fig. 9. Image Placement

2) Then the video/audio playback screen will appear in the editor window. Select document -> save again to archive your data for e-books.

3) Select the image menu next will display the page.

Fig. 10. Audio Insert Window Tampilan

4) Select Insert then click another document and select the selected video
Fig. 11. Add Existing File Window Display
Displaying according to the image, adjust your audio-video add as expected.

Fig. 12. Audio Placement Result Display

4. Advanced Development for Exercise, Evaluation and Self-Assessment
   1) Exercise and Evaluation

Fig. 13. Display Practice Questions

Fig. 14. Evaluation Results Display
2) Self-assessment

Fig. 15. Self Appraisal Display

3 Research Methods

The development model chosen is the educational development of Brog and Gall. I Made Tegeh, I nyoman Jampel, and Ketut Pundjawa in developing, researchers adapted based on the Brog and Gall model on the grounds that the development design was used to develop a product. The Brog and Gall development procedure, which has been developed collection technique in this development research used a questionnaire (questionnaire), namely an expert validation questionnaire and a teacher response questionnaire. [13]

The collection technique in this development research using a questionnaire (questionnaire), namely an expert validation questionnaire and teacher response questionnaire. The data analysis technique used is descriptive analysis, which describes the data that has been collected as it is. The data were obtained through expert validation, teacher responses, and student trials. The data is presented in the form of a Likert scale that has been given a score. Then the data were analyzed descriptively quantitatively, namely calculating the percentage of indicators for each category in the developed learning media, with the formula:

\[
\text{score percentage} = \frac{\text{Number of indicators per category}}{\text{Number of category total indicators}} \times 100\%
\]

4 Results and Discussion

4.1 The Process of Developing Short Story Text Material In E-Modul Sigil For High School Class XI Students Muhammadiyah 1 Medan

The product development process in the form of short story text material in a sigil-assisted e-module is applied through three stages, namely analyzing the need to develop a product, and testing the development product which will then produce a product in the form of short story text material learning media in a sigil-assisted e-module. 1) The first stage is to analyze the needs of teachers and students. Based on these stages, it was obtained data that students needed product development in the form of short story text material in sigil-assisted e-modules. 2) The second stage is applied by designing the product to be developed. 3) Next to the last stage, namely conducting product trials.
4.2 The Validity of Short Story Text Material in E-Modul Assisted Sigil

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Expert Validation Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content eligibility</td>
<td>94.31%</td>
</tr>
<tr>
<td>Serving eligibility</td>
<td>92.71%</td>
</tr>
<tr>
<td>Language eligibility</td>
<td>88.88%</td>
</tr>
</tbody>
</table>

Table 2. The Validity of Design Expert

<table>
<thead>
<tr>
<th>Component</th>
<th>Design Expert Validation Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design eligibility</td>
<td>97.91%</td>
</tr>
</tbody>
</table>

4.3 Effectiveness of Short Story Text Material in E-Modul Assisted Sigil

The product used is short story text material in an e-module assisted by sigil which was developed more effectively than using textbooks used by students at school. Based on this statement, it can be proven by an increase in student learning outcomes, namely before using the media and a pre-test was carried out with an average percentage of 58.75 in the "not good" category, while after using the media and post-testing the average percentage was 87.34 with the category "very good". Based on these results, it is known that the increase in student learning outcomes by using the media and not using the media with a significant comparison is 28.59. It was concluded that the effectiveness of the short story text material product in the sigil-assisted e-module to improve students' understanding and ability in writing short stories.

The product development process in the form of short story text material in the e-module assisted by sigil is applied through three stages, namely the analysis of the need to develop the product, and testing the product development which will then produce a product in the form of learning media for short story text material in the e-module assisted by sigil.

The results of the validation state that the product has met the requirements and is suitable for use in class XI Senior High School Muhammadiyah 1 Medan. Validation of material experts in developing short story text material in sigil-assisted e-modules for students shows that (1) the feasibility of the material content is 94.31% with the criteria of "very good" the average percentage of the feasibility of the material content, (2) 92.71% with the criteria of "very good" the average percentage of the feasibility of the material content, (2) 92.71% with the criteria of "very good" the average percentage of the feasibility of the presentation, and (3) 88.88% with the criteria of "very good" the average percentage of the eligibility of the language. Design expert validation has a percentage of 97.91% with the "very good" criteria. The results of the teacher's responses showed an average percentage of 93.33% with the criteria of "very good".

The effectiveness of the short story text material in the sigil-assisted e-module after using the sigil-assisted e-module learning media is in the "very good" category with an average value of 87.34.
5 Conclusion

The development of short story text material in sigil-assisted e-modules in order to make it easier for students to understand short story text material is to present material by analyzing in depth the material from easy to difficult. Teachers can design products that will be developed further which will produce material learning media. The making of learning media must be adjusted to the basic competencies and achievement indicators on the student activity sheets. Things that must be considered in compiling media are structured, using language that is easy to understand, does not have ambiguous meanings, and has good coherence and cohesion. The effectiveness of the short story text material product in the sigil-assisted e-module to improve students’ understanding and ability in writing short stories.

References

Abstract. Study this aim for knowing design and results validity from e-module design work and energy based problem solving. Study this is e-module design effort and energy validated by 1 media expert for evaluate appearance and suitability of e-modules, as well as 1 expert Theory for evaluate depth the contents of the designed e-module which is lecturer at Medan State University. Instruments used in study this is questionnaire validation media expert and questionnaire validation expert material. Results obtained from aspect designed validity from input media expert obtained average score 88.3% in category very worth and for evaluation expert Theory average score 90.5% in category very worth. Based on results study concluded that e-module work and energy based designed problem solving is valid.

Keywords: Design, e-module effort and energy, problem solving

1. Introduction

In the era of the industrial revolution 4.0, there was rapid development in the field of technology in various countries including Indonesia itself. Time has pushed everything to change. Now everything has changed, including the world of education. The development of an all-digital world has made the world of education immersed in digitalization. One thing that cannot be denied from the world of Indonesian education is that the mastery of the material by Indonesian students is still low. It can be seen from the results of PISA that the skills and abilities of students in Indonesia are still relatively average [2]. From the results of the scientific capability assessment conducted by the PISA team in 2018, Indonesia is ranked 71 out of 79 participating countries [3]. In other words, learning is needed that is able to improve problem solving skills, one of which is problem solving learning. To support problem solving learning carried out in the era of industrial technology 4.0 and in this pandemic era, teaching materials are needed.

One of the teaching materials that is often used in applying the problem solving model is the module. Several studies have shown that problem solving-based modules are practical and
effective in teaching physics such as static fluids [4]. Teaching materials in the form of modules are still available in printed form so that they can be developed into e-modules (electronic modules).

Module is prepared teaching materials themselves by educators whose purpose is for make it easy participant educate learn Theory lesson by independent. In the world of education, there are 2 types the developed modules, namely module electronics and modules print. Use module electronics and print based on analysis problems and needs students. Well module electronic nor module print very needed as innovation learning for student. Especially needs module electronic based computerized for answer needs generation millennials [5]. E-modules can contain information in the form of videos, animations, diagrams, and texts so that students can understand more deeply the material being studied [6]. The advantages of applying these teaching materials are that they can be accessed easily, costs are more affordable, study times are flexible, and have broad insights. Then students need to be allowed to improve their understanding of the material by working by formulating procedures, analyzing results, and making decisions independently. Due to current conditions, the COVID-19 pandemic has affected the education sector. The government decided that the implementation of learning in schools was shifted to online learning.

This online learning will remain effective even though educators and students are in different places [7]. Online learning is defined as a knowledge transfer experience using video, audio, images, text communication, software [8], so it takes an electronic-based teaching materials such as electronic modules (e-modules). One of the subject matter in the 2013 curriculum that effectively uses e-module in the learning is work and energy.

Work and energy are materials that are quite difficult to understand [9]. This is in line with the research that has been done previously, that in 68 students, the results obtained the average value of students is 50.65 with the minimum value is 35.56 and the maximum is 57.78. The value of students who are still below 75 can be said to be classified as low [9]. In this material, students are required to be able to understand and analyze the concepts in the work and energy material. Based on the results of interviews with teachers obtained by researchers that in learning physics, teachers tend to only use worksheets and powerpoints which have not been able to facilitate students to think at a higher level. Students also think that physics is a boring lesson because teachers only use unattractive worksheets so there is a lack of skills and interaction between teachers and students [10]. So we need an electronic-based teaching materials that are integrated with student learning models, especially on business and energy materials. Therefore, to support problem solving-based learning, especially on business and energy materials as well as the use of technological advances and support online learning, the researchers proposed an idea in this study with the research title "Design of Business and Energy-Based E-Module Problem solving."

2. Method

Study this implemented in April 2022 until with May 2022, while at the stage composing report carried out in May 2022. Making e-module product work and energy, based on problem solving, combine all existing material. Has made start from design, material, animation, drawing support, simulation videos and follow stages science process skills and mastery Theory students.
Product will be validated by 1 media expert for evaluate appearance and suitability of e-modules, as well as 1 expert Theory for evaluate depth the contents of the designed e-module which is lecturer at Medan State University. Questionnaire for media expert and expert Theory used as guidelines in repair and refinement product. Validation result expert then customized with criteria validation in Table 1 [11].

**Table 1. Validation Test Percentage**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>76% - 100%</td>
<td>Very Valid</td>
</tr>
<tr>
<td>3</td>
<td>51% - 75%</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>26% - 50%</td>
<td>Less Valid</td>
</tr>
<tr>
<td>1</td>
<td>0% - 25%</td>
<td>Invalid</td>
</tr>
</tbody>
</table>

3. Results and Discussion

3.1. E-Module Design
The initial design of teaching materials in the form of e-modules was compiled using module elements according to the Ministry of National Education, so that an initial design was produced, namely cover, preface, table of contents, list of pictures, list of tables, learning instructions for teachers and students, competencies to be achieved, content of materials, work instructions/procedures, worksheets, exercises, and evaluation sheets. The resulting initial design is as follows:

**Figure 4.1. Cover Design**

**Figure 4.2. Design Stage Formulate**
3.2. Media Expert Validation Result Data

Validation media expert on E-module design work and energy based problem solving carried out by 1 media expert. Evaluation product meant for get information that will used for upgrade E-module work and energy based problem solving.

Average percentage results evaluation learning media expert on the E-Module who has designed could seen in Table 2.

**Table 2. Average Percentage of Media Expert Assessment Results**

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aspects of Content Quality and Purpose</td>
<td>90%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Instructional Quality Aspects</td>
<td>83.3%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Technical Quality Aspect</td>
<td>91.6%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>88.3%</td>
<td>Highly Valid</td>
</tr>
</tbody>
</table>

Assessment results learning media expert to e-module experiment physics on matter Hooke's law and elasticity have the average percentage is 88.3%. It means the average percentage indicator evaluation including category “Highly Valid” and can used in the learning process as well as worthy for trial _ field based on response learning media expert.

3.2. Material Expert Validation Results Data

After the validation test media experts, planning is also done with validation expert Theory to e-module design work and energy based problem solving. Validation expert Theory done by 1
expert material. Average percentage yield evaluation expert Theory to the E-Module which has been designed could be seen in Table 3 below this.

Table 3. Average Percentage of Material Expert Assessment Results

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator Evaluation</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aspect language</td>
<td>90%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Aspect Appropriateness Presentation</td>
<td>91.67%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Aspect Completeness of Understanding Process Student</td>
<td>90%</td>
<td>Highly Valid</td>
</tr>
</tbody>
</table>

Average 90.5% Highly Valid From result evaluation expert Theory of the work and energy E-Module designed in Table 3 above the average percentage evaluation respectively, 90.00% eligibility aspect language, 91.67% aspects presentation, and 90.00% aspects completeness of the scientific process. By whole, third aspect the including in category “Highly Valid” with number the average percentage is 90.50% which means e-module work and energy based problem solving can fulfill demands needs learning and worth used.

4. Conclusion

Aspect e-module validity work and energy based problem solving design input media expert obtained an average score of 88.30% with category very valid and for evaluation expert experiment average score 90.50% with category very valid.

References

Design of PhET Simulation Assisted Experimental E-Module on Elastic Materials and Hooke Law in High School Students

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Abstract. This research is aimed to determine the design by the results of the validity of the design PhET simulation-assisted physics experimental e-module. This research is an experimental e-Module design that was validated by 1 media expert to assess the appearance and suitability of the e-module, as well as 1 material expert to assess the depth of the content of the designed e-module who was a lecturer at Medan State University. The instruments used in the study were media expert validation questionnaires and experimental expert validation questionnaires. The results obtained from the validity aspect which was designed from input by media experts, an average score of 92.05% was obtained in the very feasible category and for the expert assessment of the perimeter, the average score was 94.46% in the very feasible category. Based on the results of the study, it was concluded that the designed PhET simulation-assisted physics experiment e-module was valid.

Keywords: Design, physics experiment e-module, PhET simulation

1. Introduction

The Ministry of Education and Culture of the Government of Indonesia has implemented a policy, namely changing the Education Unit Level Curriculum to the 2013 Curriculum which began to be practiced in the 2013/2014 academic year. The 2013 curriculum is an improvement of the Education Unit Level Curriculum which does not play a role in the development of Indonesian education. The 2013 curriculum is implemented to train process skills that can be seen in learning activities. The process skills implemented are observing, questioning, collecting data, associating as well as communicating what is called a scientific approach [1]. One form of teaching material is modules. Modules are teaching material compiled by educators themselves whose purpose is to make it easier for students to learn the subject matter independently. In the world of education, there are 2 types of modules developed, namely
electronic modules and printed modules. The use of electronic and printed modules is based on the analysis of problems and needs of students. Both electronic modules and print modules are needed as learning innovations for students. Especially the need for electronic modules based on computerization to answer the needs of the millennial generation [2].

The birth of the millennial generation is one of the reasons to change the vision of education, thus leading to a new learning process [3]. Teachers must be able to design and implement learning in the classroom by the needs of students and technological developments. Technological advances have resulted in online-based learning resources and media with e-learning and attractive blended applications. E-learning provides purely e-learning through the internet, intranet, or multimedia networks [4].

Students in carrying out practicum activities have not referred to problem-solving problems but are only invited to prove the concepts presented by educators when learning. Learning refers more to the teacher's explanation without allowing students to solve problems, find facts, concepts, and theories that are the result of their findings. This condition must be considered, one of which is through increasing learning activities by applying the science process skills approach [5]. One of the student's processes skills can be measured using experimental methods. This method can present a certain process that the student then follows or tries to do. Students can experience and discover physics concepts for themselves by conducting an experiment or experiment so that students' understanding and memory are higher. Students' interest in learning motivates students, improving abstract ideas in learning activities [6]. It's good when the school has facilitated the needs of the process of teaching and learning activities so that teachers can take advantage of existing facilities to prepare students to face industrial revolution 4.0. Teachers must be able to make an innovation in learning by developing learning media that is packaged in such a way that learning is more interesting, interactive, effective, and efficient in its use. [7][8]

Along with the development of technology, practicum activities can be carried out in a simulated manner using a virtual lab operated using a computer. One virtual lab that can be used is PhET. PhET is an interactive physics simulation software available on the site that can be downloaded for free and can be run online or offline [9]. Computer-aided simulations and interactive learning activities can encourage collaboration between digital skills and student process abilities [10]. The existence of virtual lab simulations is beneficial because the combination of online learning media is effective and can improve student learning outcomes. The software can be run by students to do a practicum simulation before experimenting but students need an E-Module as a guide for experimental practicum in the implementation of physics practicum, so an experimental e-module assisted by PhET simulation is needed to support student learning in class [11].

Research using PhET in learning can train science process skills effectively. Student learning outcomes increased due to the existence of PhET simulation media in physics subjects based on the 2013 curriculum [12-14]. The existence of an experimental e-module with steps for approaching science process skills can be used as a guide that leads students to apply the scientific method in understanding, developing, and discovering science so that it is expected to contribute to improving students' science process skills and improving students' mastery of the material, especially of the material elasticity and Hooke's law.

This research is an experimental e-Module design that was validated by 1 media expert to assess the appearance and suitability of the e-module, as well as 1 material expert to assess the depth of the content of the developed e-module who was a lecturer at Medan State University.
2. Methods

This research was carried out from May 2022 to July 2022, while the stage of preparing the report was carried out in July 2022. The creation of e-module products uses PhET simulations, Flip PDF, and PowerPoint software, combining all the materials that have been made ranging from designs, materials, animations, supporting images, and video simulations following the stages of science process skills and mastery of student materials.

The product will be validated by 1 media expert to assess the appearance and suitability of the e-module, as well as 1 material expert to assess the depth of the content of the designed e-module who was a lecturer at Medan State University.

Questionnaires for media experts and material experts are used as guidelines for product improvement. The results of the expert validation are then adjusted to the validation criteria in Table 1 [15].

<table>
<thead>
<tr>
<th>No.</th>
<th>Validation Percentage</th>
<th>Validation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>85.01% - 100.00%</td>
<td>Highly Valid (can be used without revision)</td>
</tr>
<tr>
<td>2.</td>
<td>70.01% - 85.00%</td>
<td>Valid (can be used with minor revisions)</td>
</tr>
<tr>
<td>3.</td>
<td>50.01% - 70.00%</td>
<td>Less Valid (can be used with major revisions)</td>
</tr>
</tbody>
</table>

3. Result and Discussion

3.1. Design E-Module

The design of the content of teaching materials in the form of e-modules uses the approach of students' science process skills, determines the subject matter to be developed, namely elasticity material and Hooke's law studied in class XI SMA, determines KI, KD, indicators of competency achievement and learning objectives. The delivery of the material is displayed in 3 learning activities and each activity is arranged by applying stages using the student's science process skills approach.

The initial design of teaching materials in the form of e-modules is prepared using module elements according to the Ministry of National Education so that an initial design is produced, namely covers, prefaces, table of contents, list of images, table of tables, learning instructions for teachers and students, competencies to be achieved, material content, instructions/work procedures, worksheets, exercises, and evaluation sheets. The resulting initial design was as follows:
KEGIATAN PEMBELAJARAN 1:
ELASTISitas

1. INDUKTOR

3.2.1. Pembaris dapat menganalisis karakteristik bentuk elastis dan bentuk tidak elasit.
3.2.2. Pembaris dapat menganalisis nilai tegangan, tegangan, dan modulus elastisitas.
3.2.3. Pembaris dapat menganalisis konstanta pengujian pengujian dalam simulasi PhET dengan benar.

II. URAIAN MATERI
ELASTISitas

Indikator Keterampilan Penyelesaian Masalah:

- Pembaris dapat melakukan pengujian tes elektronik

Pada saat Anda bekerja, tutup yang telah diproduksi dengan baik akan digunakan di jalanan yang telah ditentukan. Indikator gencangan tersebut berguna untuk mengetahui kapan saat mula-mula konduktor yang stabil kembali. Pada konduktor seperti ini merupakan banyak proses dari elastisitas dan gerak bebas

Gambar 2. Memperoleh motor dengan sistem motor

Figure 1. Cover Design

Figure 2. Design Of The Observing Stage

Figure 3. Design Stage of Taking Measurements Using PhET
3.2. Media Expert Validation Result Data
The validation of media experts on the design of the Physics experiment E-Module assisted by PhET simulation on Elasticity material and Hooke's law was carried out by 1 media expert. The assessment of the product is intended to obtain information that will be used to improve the feasibility of the E-Module of physics experiments on the material of Elasticity and Hooke's law.

The average percentage of the results of the assessment of learning media experts on the E-Module that has been designed can be seen in Table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Assessment Indicators</th>
<th>Average Percentage</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aspects of Content Quality and Purpose</td>
<td>85%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Instructional Quality Aspects</td>
<td>91.6%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Technical Quality Aspects</td>
<td>91.6%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>4.</td>
<td>Completeness of E-Module Instruments</td>
<td>100%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>92.05%</td>
<td>Highly Valid</td>
</tr>
</tbody>
</table>

The results of the assessment of learning media experts on the e-module of physics experiments on the material Elasticity and Hooke's law have an average percentage of 92.05%. This means that the average percentage of assessment indicators belongs to the category of "Highly Valid" and can be used in the learning process as well as being feasible for field trials based on the responses of learning media experts.

3.2. Material Expert Validation Result Data
After the validation test of media experts, it was also designed with the validation of experimental experts on the design of an e-module of physics experiments assisted by PhET simulations on elasticity materials and Hooke's law. The validation of experimental material experts was carried out by 1 media expert. The assessment of the experiment is intended to obtain information that will be used to improve the feasibility/accuracy of the material present in the PhET simulation-assisted physics experiment e-module on elasticity matter and Hooke's law.

The average percentage of the results of the experimental expert's assessment of the E-Module that has been designed can be seen in the following Table 3.

<table>
<thead>
<tr>
<th>No.</th>
<th>Assessment Indicators</th>
<th>Average Percentage</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Linguistic Aspects</td>
<td>95%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Aspects of Presentation Feasibility</td>
<td>91.6%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Aspects of Completeness of Science Processes</td>
<td>96.8%</td>
<td>Highly Valid</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>94.46%</td>
<td>Highly Valid</td>
</tr>
</tbody>
</table>
From the results of the experimental expert's assessment of the experimental E-Module designed in Table 3 above the average percentage of assessment, respectively, 95% of feasibility in the language aspect, 91.6% in the presentation aspect, and 96.8% in the completeness aspect of the science process. Overall, the three aspects belong to the "Very Valid" category with an average percentage figure of 94.46% which means e-module PhET simulation-assisted physics experiments on elasticity matter and Hooke's law can meet the demands of learning needs and are worth using.

4. Conclusion

The validity aspects of the PhET simulation-assisted physics experiment e-module on elasticity material and Hooke's law designed from input by media experts obtained an average score of 92.5% with a very valid category and for the assessment of experimental experts an average score of 94.46% with a very valid category.

References


Development Of Pisa-Based Questions For Fluid Materials In SMA

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Abstract. The research aims to develop a PISA-based test for high school students on fluid material that meets good qualifications (standard test) including validity, reliability, level of difficulty, discriminatory power and effectiveness of distractors. This type of research is development research, using the ADDIE model. The data analysis technique used is qualitative and quantitative. The results of the quantitative analysis of the quality of the PISA-based test are good. Analysis of 38 items in the small group test obtained 32 items were accepted and 6 items were rejected. In the large group test, 30 items were accepted and 2 items were rejected.

Keywords: PISA, Fluida

1. Introduction

The world is in the 21st century, the era of the industrial revolution 4.0. The era where information technology and robotics are the basis in every sphere of human life. One of the challenges in this era of industrial revolution 4.0 is to prepare human resources who have basic cross-disciplinary skills to be able to compete globally [1]. In the era of the industrial revolution 4.0, mastery of literacy and thinking skills is needed. The development of this industry causes a tremendous impact on the job opportunities that can be obtained by school and college graduates. The world of education must also change the education system to survive in the future [2]. Based on this, education has an important role in producing quality human resources. Through the learning process, personal learners can always experience developments and changes towards more advanced in science, social, moral, and other sciences.

Changes in this era cannot be avoided by anyone so adequate preparation of human resources is needed to be ready to adapt and be able to compete on a global scale. Improving the quality of human resources through educational channels ranging from primary and secondary education to higher education is the key to being able to follow the development of the industrial revolution 4.0 [3].
Scientific literacy is perceived as a key competency and is defined in the form of an interactive ability to master information sources and technology so that a person can move himself to interact with the outside world and within a wider range of use [4]. According to the Organization for Economic Cooperation and Development (OECD) scientific literacy is a person's ability to solve problems using the scientific method [5]. The stages of problem-solving start from identifying problems, solving problems based on sequential evidence, understanding and making decisions. The decisions taken will affect nature and changes in human activities. Measurement of scientific literacy is important to determine the extent of students' literacy of the science concepts they have learned [6].

The results of the Program for International Students Assessment (PISA) research in 2018 with the focus of the theme being scientific literacy competence show that scientific literacy skills in Indonesia are still relatively low, ranking 9th from the bottom, namely 71 out of 79 countries [7]. Indonesia's ranking in PISA has always been in a lower position, and this constant result since the first time PISA was conducted, namely in 2000 until now the PISA assessment in 2018. Several assumptions place the PISA report as one of the strongest reasons for a country's education to change or make improvements to systems and programs as well as everything that exists in education. Indonesia uses the PISA assessment report as the basis for making improvements to the existing curriculum [7].

The low results of students' scientific literacy are most likely because they are not used to working on scientific literacy-type questions. The questions given by the teacher are usually in the form of problem-solving questions of the type of calculation. Students are used to only memorizing, equations (formulas) without understanding the meaning of the equations they use [8]. This is what teachers often use in learning carried out at school. Facts in the field also show that students are very good at memorizing, but less skilled in applying their knowledge. Evaluation instruments based on scientific literacy need to be developed [9]. Students who are familiar with problem solving based on scientific literacy, make scientific literacy embedded in students. This will make it easier for students to solve problems using the scientific method as desired in PISA.

Based on the description above, it is necessary to develop a PISA-based scientific literacy measurement tool to suit the conditions of education in Indonesia, so that our achievements will be the same as the average achievements of OECD countries considering the rapid development of science and technology. So in this study, the author wants to conduct a study with the title: Development of PISA-Based Objective Tests for Fluid Materials in SMA.

## 2. Methods

Research and development (R&D) is a basic research activity to obtain information on user needs (needs assessment), then continued development activities to produce products and assess the effectiveness of these products [10]. Based on the opinions of several experts, development research is research on products that will be developed based on these findings by conducting field trials according to the background where the product will be used and revising the results obtained from field trials. This model consists of 5 main phases or stages, namely: -Analyze, -Design, -Development, -Implementation, -Evaluate [11].

The ADDIE concept is applied to form performance-based learning. Branch [12] also posits that the ADDIE model is a fundamental process for creating effective learning resources.
ADDIE model has a design that makes it easy to be active, multi-functional lies in an inspirational approach to learning. The concept of ADDIE development is described in figure 1.

3. Result and Discussion

3.1 Analysis Stage
There are several activities carried out in the analysis stage, namely needs analysis, material analysis, and literature analysis.

3.2 Design Stage
The assessment design of the PISA-based objective test instrument that is carried out is in the form of multiple-choice questions. The relevance between test instruments and the theory is to link PISA-based test instruments and the theory of science literacy ability based on indicators developed from basic competencies in fluid matter.

3.3 Development Stage
The PISA-based test instruments that have been compiled are then validated by expert validators. Validators are asked to provide an assessment of the PISA-based objective test instrument that has been developed based on the items on the assessment sheet and provide criticism and suggestions. Valid instruments based on validators will be implemented in small groups and large groups.

3.4 Implementation Phase
Small Group Trials

Validity

Based on the results of the analysis of the 38 question items, it can be seen that the questions that fall into the valid category amount to 32 question items (84.21%), while the questions that fall into the invalid category amount to 6 items (15.78%). Can be seen on the graph Fig.2.
Reliability

The reliability of the questions of 0.898 means that the PISA test was used already.

Difficulty level

Based on data analysis, questions were obtained with a difficult category of 3 questions (7.89%), an easy category of 15 questions (39.47%), and a medium category of 20 questions (52.63%). Can be seen on the graph Fig. 3.

Differentiating Power

Based on the results of data analysis, 2 questions with very good categories were obtained, 26 questions (5.26%), questions with good categories totaling 22 questions (57.89%), questions with sufficient categories totaling 10 questions (26.31%), and questions with bad categories totaling 4 questions (10.52).

Effectiveness of Deception

The number of effective questions is 32 questions out of the 38 questions tested.
Large Group Trials

Validity

Based on the results of the analysis of the 32 question items, it can be seen that the questions that are in the valid category amount to 30 questions (93.75%), while the questions that are in the invalid category are 2 questions (6.25%). Can be seen on the graph Fig.4.

![Fig.4. Calculation Results of the Validity of Power Group Trial Questions](image)

Reliability

The reliability of the questions of 0.854 means that the PISA test used already has a reliability with a very high category.

Difficulty level

Based on data analysis, questions with difficult categories totaled 6 questions (25%), questions with medium categories totaled 15 questions (56.25%), and questions with easy categories totaled 11 questions (18.75%). Can be seen on the graph Fig.5.

![Fig.5. Calculation Results of Difficulty Level of Power Group Trial Questions](image)

Differentiating Power

Based on the results of the data analysis, 6 questions with very good categories were obtained (18.75%), questions with good categories totaled 22 questions (68.75%), questions with
sufficient categories totaled 4 questions (12.5%), and questions with bad categories totaled 0 questions.

**Effectiveness of Deception**

The number of effective questions is 30 questions out of the 32 questions tested.

**3.5 Evaluation Stage (Evaluation)**

**Evaluation of the Suitability of the Test Instrument to the Characteristics of the Question Item.**

The results of the small group trial obtained questions that were following the characteristics of the question items were as many as 22 questions from the 38 question items tested. The results of the analysis obtained have not all instruments met the criteria for a good test so revisions are needed for questions that are not good. The revised questions amounted to 10 questions. Furthermore, the revised questions were used in large group trials where the number of questions was reduced from 38 points to 32 questions.

Furthermore, large group trials were carried out, quantitative analysis of the results regarding validity, reliability, difficulty, differentiating power, and the effectiveness of deceivers. The results of the large group trial obtained questions that were by the characteristics of the question items were as many as 30 questions from the 32 question items tested. The results of the analysis obtained have not all instruments met the criteria for a good test so revisions are needed for questions that are not good. The revised questions amount to 2 questions. Furthermore, the revised questions are stored in the question bank of PISA-based test instruments on Fluid material in high school with a total of 30 questions.

**Evaluation of Factors of Inconsistency characteristics of the Question Item.**

The failure of the first question item lies in the difficulty of the question that is too easy or too difficult. The second cause of failure lies in the differentiating power of the question which means the inability of the question item to distinguish students who have mastered the subject matter from students who have not mastered the subject matter and the cause of the last failure lies in the validity and effectiveness of the deceiver in the question item.

**4. Conclusion**

Pisa-Based Test Instruments on Fluid material in high school are declared feasible and meet the criteria as valid and effective questions. The reliability of PISA-based test instruments on Fluid material in SMA has been categorized as having very high reliability. The differentiating power of PISA-Based Test Instruments on Fluid material in SMA is in a good category. The level of difficulty of PISA-Based Test Instruments on Fluid material in SMA is good and is in the moderate category. The effectiveness of the PISA-Based Test Instrument deceiver on Fluid material in high school has functioned well and can outwit students.
References


The use of Learning Media *Digital Scrapbook* Theory
Text Explanation Class VIII

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**Abstract.** This study was using research and development (R&D) model proposed by Borg and Gall which to know (1) developing process of teaching material in explanation text with digital scrapbook, (2) output of teaching material, (3) appropriateness of teaching material, (4) effectiveness of teaching materials. The result of research showed that (1) the developing teaching material with processing 10 stages and appropriating with model proposed by Borg and Gall., (2) the output of product was teaching materials of explanation text using digital scrapbook with the different style and content, (3) the validation of teaching materials was appropriated to be used based on experts' validation which consist of the value of content, presentation, and language appropriateness got score 91.16% with excellent level, expert of design which consist of graphic aspect successfully with score 86.00% with excellent level, and expert of media which got score 87.50% with excellent level. Meanwhile for individual assessment, the average score range is 86.98% with excellent level. Small group discussion's score was 87.11% with excellent level. Limited field training discussion's score was 88.04% with excellent level. Meanwhile for individual assessment, the average score range is 86.98% with excellent level. Small group discussion's score was 87.11% with excellent level. Limited field training discussion's score was 88.04% with excellent level, (4) effectiveness of teaching material of explanation text with paper clip or digital scrapbook revealed that there was improvement total score 17.04 from pretest assessment was 65.53 to be postes assessment was 82.57. Overall this study indicated that teaching material of explanation text was considered feasible and effective to be used in process learning and teaching. The implications of this study were (1) teaching material was developed could be used in learning and teaching process, (2) teaching material was developed could improve insight of teacher in increasing the quality and creating valuable learning, (3) teaching material was developed can be used as one of alternative teaching materials in learning of explanation text.

**Keywords:** Explanatory text, Scrapbook, learning media.

**1 Introduction**

Explanation originated from language England that is the *explanation* means explanation. *Explanation* comes from from base *explain* meaning _explain_. Based on the basic word, essence explanation is give explanation to happening a event. Explanation in a text make connection cause and effect or stages a event. Text explanation is text that aims to explain the process of creating something that occurs naturally, or the working process of natural and social phenomena. In explanatory text learning, students are required to could understand material. There are several basic competencies in explanatory texts, namely 3.9 Identifying information...
from explanatory texts in the form of exposure to events of a natural phenomenon that is heard or read, 3.10 Exploring explanatory texts in the form of exposure to events of a natural phenomenon that is heard or read, 4.9 Summarizing the contents of explanatory texts in the form of the process of occurrence of an event. phenomena from various sources that are heard and read, 4.10 Presenting information and data in the form of an explanatory text of the process of the occurrence of a phenomenon orally and in writing by paying attention to the structure, linguistic elements, or oral aspects of Bhineka Tunggal Ika.

According to Wiarto (2016: 3), learning media are tools used in delivering material to students for the purpose of facilitating students in learning. The right media to use as a module aid is a digital photo sheet (scrapbook). Digital scrapbooks are digital media in the form of image patches or other decorations made in 3-dimensional (3D) form. The advantages of scrapbooks help students in thinking creatively by involving knowledge in solving a problem. Therefore, the media is appropriate to be used as a learning module aid.

Scrapbook originated from two words i.e. scrap (goods remainder) and book (books) or sheet. Scrapbook is art and technique decorate photo album or personal, so that his appearance becomes more beautiful. Scrapbook not only just stick paper pictorial, but also pouring expression with harmony colors, motifs and shape. Art scrapbook invented in England in the 15th century which originated from the word scrap it means goods the rest, the beginning for complicated recipe cuisine, poetry and beautiful words. In development, media and materials scrapbook is handmade made from paper. Use of this medium effective because could give impression real and interesting for participant educate.

Scrapbook is a media in the form of image paste or decoration others applied above paper, as described in a site sprachforum, on year 2013 “Das wort Scrabooking Kommt wow english, Scrap”, welcomes Schnipsel, Stickchen bedeutet. In Scrapbook werden edited Schnipsel und papierstucke als stucke der Lebensgeschichte eingeklebt und gesammelt.” What is meant above statement that is origin say Scrapbooking from language English meaning bits and pieces paper collected and pasted for tell something.

The origin of the word scrap it means goods remainder. However make scrapbook not simply stick from ingredient remainder. Definition scrapbook is art stick photo on paper media, and decorate it becomes creative work. Scrapbook no only art must decorate too have story, and there journal in it.

Along time development function scrapbook no only as a medium for beautify photo album or image. However, now scrapbooks can be used as (a) Marriage dowry, now scrapbook can becomes possible choices used as dowry wedding because scrapbook is creative and innovative work that can made memories moment special moments, (b) Hobbies, scrapbooks is great work unique and interesting. So that, without realized will capable alluring some people for make or collect scrapbook as hobby new, (c) Gift, scrapbook could be one choice as present repeat year, anniversary, wedding, birth, and so on. Scrapbook can made by hand (made hand) so that could customized with desire the maker, (d) Learning media, now learning media development the more diverse. No all learning media obtained from the shop. However, learning media could made from easy things found in the environment around. Like case scrapbook that can be made from objects in the environment around, will could used as a learning medium if arranged with creative and interesting as well as be equipped picture nor material to be taught.
2 Theoretical Base

2.1 Characteristics of Scrapbook Media

[2] The characteristics of scrapbooks that can be used as learning media, namely, (a) in the form of books, (b) themes must be in accordance with learning objectives, (c) data entered in scrapbooks must focus on the subject matter or material being taught, (d) is not too much decoration, because the main purpose is as a medium of learning. From some of the characteristics of the scrapbook above, it is hoped that it can be an illustration or reference in making scrapbook media to suit the purpose of using media that is in accordance with learning objectives.

2.2 How to Make a Scrapbook

[3] Scrapbook media maker use two ways, i.e., manually and digitally. Making manually the materials used, namely: double tip, drawing, glue, scissors, cartridge, pencil, and ruler. Whereas making digitally i.e. make background design and images used.

A number of steps make scrapbook media:

1) Make design start, with determine theme or material used.
2) Make design contents sheet with add Images ornamental.
3) Scissors cardboard with the size that has been determined.
4) Scissors paper decoration with form desired decoration.
5) Determine appearance cover da nisi book with decorate with accessories scrapbook which contains Theory learning.
6) Look for variation picture at each sheet paper and contrast color for easy understood participant educate.
7) Enter or paste decorations and papers that have been cut out to cover of each sheet book.
8) Decorate book scrapbook as attractive possible so that interesting used and the material described delivered with good.

2.3 Example of Scrapbook Media

[4] According to John Poole in Hardiana (2015) scrapbooks, also known as scrapbooks, are a collection of memorabilia, photos, narrative stories, poetry, payment receipts, etc., which are assembled and arranged in an album or hand-made book. Scrapbook is one of the creative works, shaped like a book and gives an interesting and special visual impression because it contains a collection of photos and various decorations. The following are some forms of scrapbooks:

Fig.1. Example Shapes Scrapbook
2.4 Steps Scrapbook Media Usage

[4] In process learning use of scrapbook media as following

1. Teacher To do apperception by conveying _destination learning, and competence base_

2. Teacher explain all Theory chain food and nets food using scrapbook media, in delivery every Theory are on different sheets.

3. Teacher gives opportunity ask to students who haven't understand Theory.

4. Teacher divides student Becomes group, then the teacher gives question on each group.

5. Student order for discuss spell questions that have been given by the teacher, after done teacher’s discussion every group paste creation results discussion to scrapbook media.

6. After discussion finished, the teacher gives questions test by individual for evaluate results study.

2.5 Advantages and Disadvantages of Photo Sheet Media (Scrapbook)

Advantage Scrapbook

[5] There are several advantages of scrapbook media, including:

1) Interesting, scrapbooks are composed of various photos, pictures, important notes, and so on with some decorations. So it will look beautiful and attractive.

2) Realistic in showing the subject matter, with scrapbooks, we can present an object that looks real through pictures or photos. Because pictures or photos can provide details in the form of pictures as they are, thus we can more easily know and remember them better.

3) To overcome the limitations of time and space, scrapbook media can be a solution to the many events or objects that are difficult to present directly and difficult to repeat.

4) Easy to make, how to make a scrapbook is not difficult. We only need to arrange and mix and match between pictures, notes, and decorations in such a way. So that children and adults will be able to make their own scrapbook.

5) The materials used to make scrapbooks are easy to obtain. The materials needed in making scrapbooks are easy to obtain. Because we can use items that are not used or used goods. Even now, special materials are available for making scrapbooks.

6) Can be made or designed as desired, scrapbooks can be made or designed according to the wishes of the maker. For example, pictures, photos, notes, colors, text, and so on.

Weaknesses Scrapbook

[5] As for weakness scrapbooks, including:

a) The time used is relatively long to make a scrapbook, the time required to make a scrapbook is relatively long depending on the complexity of the preparation. The more complicated the design and preparation of scrapbook media, the longer it will take.

b) Complex images are less effective in learning activities, the use of images that are too complex and excessive will have an impact on the lack of concentration on the subject (material) so that learning activities will not take place effectively.
2.6 Explanatory Text

Explanatory text is purposeful text for explain the creation process something happened by nature, or the process of working phenomenon natural as well as social. Text explanation including to in type explanatory text connection logical from a number of event. On text explanation, a incident arise because there is incident other past and events the result in another event again afterward. Structure the text is statement general, order pedestal an logical.

In line with that Priyanti (in Klara 2016:8) explains text explanation is explanation about related processes with phenomena nature, social, science knowledge, culture and others called text explanation. Text explanation originated from question writer related to 'why' and 'how' of a phenomenon happen. Text explanation aim for explain process formation or related activities with phenomena nature, social, science knowledge, or culture.

According to Pardiyono (in Pestauli, 2007:155), "Text explanation is a explanatory text process happening something phenomenon natural or social." Furthermore, Hammond in pardiyono (2007:155) says, "Text explanation is type capable text answer question how and why phenomenon natural that happen." According to Dougherty in Wijaya (1999:16) says, "Text explanation is something process that shows events certain connected with events other through use by appropriate statements that are general".

4. Discussion

In process media learning scrapbook, researcher give instruction to student for use learning using scrapbook media they use mobile phone through classroom application. Student directed for open classroom later student open the link of the researcher's scrapbook media give student then click the link that the researcher give.

Shiva do 2 meetings to researcher so that researcher also can provide scrapbook media by direct to students the so that researcher understand to what just constrained in the given medium researcher that. Then researcher see one by one more formerly students who haven't understand against scarbook media that. Then researcher make 3 groups in one class so that they discuss together about Theory explanation with using learning media scarbook.

5. Conclusion

Learning text explanation using learning media scrapbook could fishing creativity student by maximum. Student could show ability in IT field and also could show compact and solid cooperation. With process students who see the existing link pictures and videos, no only could dig ability student in ability think, but also could make student show ability in get to know digital learning media through links. Process Scarbook media learning also could increase ability student in IT learning so that student no monotone with media lectures.
References


Development of Folklore Teaching Materials (Hikayat) Digital Form For Class X High School Students State 1 Stabat Langkat Regency

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Abstract. This study aims to determine the results of developing digital folklore teaching materials for class X students of SMA Negeri 1 Stabat, Langkat Regency. This type of research is development research based on the Brog and Gall development model. The test subjects consisted of class X students of SMA Negeri 1 Stabat, Langkat Regency. The results showed that the validation of the material experts included the feasibility of the content of 88%, the feasibility of presenting the learning material 88% in the good category, the aspect of language assessment 90%. Design expert validation includes initial design 91.14%, content design 86.14%, digital module typography 79.33, and illustration 87.6%. The limited trial obtained a score of 84.5%. The expanded trial obtained a score of 97.7%. The results of the effectiveness of folklore teaching materials (saga) in digital form were obtained from the results of research on product effectiveness tests based on pretest and posttest. The pretest results of students before using digital media in folklore (hikayat) with an average of 64.6% on the "enough" criteria and for students' scores after using digital media in folklore (hikayat) is 84.5% on the "good" criteria , and it can be concluded that learning using folklore teaching materials (saga) in digital form can improve student learning outcomes. This research has implications, namely that the product developed will make a practical contribution, especially in the implementation of the learning process for teachers as additional teaching materials to make it easier for the material being taught to be independent or classical. For students to improve the quality of learning, especially in folklore material activities (saga).

Keywords: teaching materials, folklore (saga), digital media (moodle)

1 Introduction

Teaching materials are one of the important aspects in the world of education, because teaching materials are a means to support the learning process. The teaching materials used in the learning process are developed according to the needs of teachers and students and are properly utilized to improve the quality of learning. Teaching materials are very important in the learning process, meaning that without teaching materials it will be difficult for teachers to improve learning effectiveness. Likewise, without teaching materials it will be difficult for students to follow the learning process in class. Therefore, teaching materials are considered as materials that can be utilized, both by teachers and students as an instrument to improve the quality of learning.
Today there are various kinds of teaching materials that innovate. Among them are teaching materials based on technology or better known as e-learning teaching materials. E-learning is very effective to increase understanding of knowledge and increase students' interest in learning. The important reason for using e-learning is to provide interactive learning alternatives in the millennial era by utilizing existing technology. Through e-learning media, it is possible for students to learn to be very effective and run well. Because students can access well-designed and appropriate web-based learning, it can make learning fun and cause students to remember more teaching materials. (Susilo & Suhardi, 2018). [1]

One of the competencies to be achieved by learning Indonesian in the 2013 curriculum for class X Senior High School (SMA) is that students are able to identify the values and content contained in folklore (saga) both orally and in writing. With basic competence 3.7 "Identifying the values and content contained in folklore (saga) both orally and in writing", Basic competence 4.7 "Retelling the contents of folk tales (saga) that are heard and read. Folklore is a story that comes from the past, which is often introduced to the next generation. Basic competence 3.8 “Comparing the values and language of folklore and short stories. Basic competence 4.8 “Developing folklore (saga) into short stories by paying attention to the content and values. This is a special characteristic for a country that has a diverse culture and history, such as that of Indonesia. The benefit is that students learn folklore (saga) from Langkat in order to add insight into the history of an area and by studying folklore (saga) students can learn about the culture, customs that exist in the story and the environment they live in.

One of the most widely used open source Learning Management System (LMS) tools is Moodle. Moodle is designed using pedagogical principles to help educators create effective e-learning systems. The use of learning media is very important to support the success of the learning process in the classroom, one of which is computer-based learning media (Prasetya, 2008). [2]

To create a learning model as described above, a teacher can take advantage of virtual classes as one of the solutions, namely by utilizing the Learning Management System. So based on the existing explanation, it can be concluded that a teacher and students can take advantage of technological developments such as computers, smart devices (smartphones), social networks, modern learning media, and others as supporting media in learning.

The purpose of implementing a Learning Management System (LMS) in learning web programming is to support active and independent learning of students as measured by interest in learning and student learning outcomes. In this study, the Learning Management System (LMS) acts as a medium for sharing, discussing, and learning together by utilizing various existing features and supporting facilities. With the application of this learning, it certainly involves the activity of both parties, both teachers and students, which are expected to increase students' interest in learning which then has a positive effect on their learning outcomes.

2 Theoretical Basis

2.1 Teaching Materials

Teaching materials are all materials (both information, tools, and texts) that are systematically arranged, which displays a complete figure of competencies that will be mastered by students
and used in the learning process with the aim of planning and studying the implementation of learning. For example, textbooks, modules, handouts, worksheets, models or mockups, audio teaching materials, interactive teaching materials, and so on. [3]

Teaching materials are all forms of materials used to assist teachers or instructors in carrying out the learning process in the classroom. The material in question can be in the form of written or unwritten material. The views of other experts say that teaching materials are a set of materials that are arranged systematically so as to create an environment or atmosphere that allows students to learn. [3]

Teaching materials are one of the important supporting factors in learning. The use of teaching materials can improve student learning outcomes (Effiong, Ekpo, & Charles, 2015). [4] Teaching materials are a set of materials and resources that help teachers and students in learning. [5]

Based on some of the above understandings from experts, it can be concluded that teaching materials are all forms of materials (both information, tools or text) that are systematically arranged that are used by teachers and students for the learning process in order to achieve a learning goal.

2.2 Folklore (Saga)

Folklore is an oral folklore genre that is told from generation to generation (Endraswara, S, 2013: 47). [7] There are many different categories of folklore. But basically, folklore can be divided into three major groups include: Myth (myth), legend (legend), and fairy tales (folktale) (Bascom, 1965, translation, Danandjaja, J, 1984: 50). [8]

Folklore can be interpreted as a cultural expression of a society through spoken language that is directly related to various aspects of culture such as religion and belief, the law on economic activities, the family system and the composition of the social values of the community (Isnain, 2007). [9] Meanwhile, according to the Big Indonesian Dictionary (KBBI), saga is an old Malay literary work in the form of prose that contains stories, fictitious genealogies, religious, historical, biographical or a combination of traits read for solace. Hikayat can be said to be similar to a historical story or in the form of a biography in which there are many things that do not make sense and are full of wonders.

Based on several understandings from experts, it can be concluded that folklore is a story that is passed down or passed down from generation to generation both orally and orally.
2.3 Digital Media (moodle)

Digital is a complex, flexible method that makes it a staple in human life. While Digital Theory is a concept of understanding the development of the Age of Technology and Science, from everything that is manual to automatic, and from all that is complicated to be concise (Rustam, 2016). [10]

Digital technology is a technology that no longer uses human or manual labor. But tends to an automatic operating system with a computerized system or a format that can be read by a computer.

The digital era was born with the emergence of digital, internet networks, especially computer information technology. The new media of the digital era has the characteristics of being able to be manipulated, network or internet. The mass media switch to new media or the internet because there is a cultural shift in the delivery of information. The ability of this digital era media makes it easier for people to receive information faster. With the internet, the mass media have moved in droves. The more sophisticated digital technology today makes big changes to the world, the birth of various kinds of increasingly advanced digital technology has emerged. Various groups have made it easier to access information through many ways, and can enjoy the facilities of digital technology freely and in control (Wawan, 2017). [11]

Learning Management System (LMS) is a software application that is widely used among educators both at the college level and at the high school level. Prawiradilaga (2004) explained that the Learning Management System (LMS) is a system that supports the implementation of electronic learning (e-learning) by providing learning materials, instructions for the learning process carried out by students, evaluation materials and the appearance of the results of the learning process. [12]

One of the most widely used open-source Learning Management System (LMS) tools is Moodle. Moodle is designed using pedagogical principles to help educators create effective e-learning systems. Moodle is a type of Learning Management System (LMS) software package developed to assist web and internet-based learning processes.

3 Research Methods

The research used is Research and Development or research and development methods, this method is used to produce certain products and test the effectiveness of these products. The research method according to Suharsimi Arikunto is the method used by researchers in collecting research data. This study refers to the modified Borg and Gall model from Sugiono, this model includes 1) Potential and problems, 2) Data collection, 3) Product design, 4) Design validation, 5) Design revision, 6) Product trial, 7) Product Revision, 8) Usage Trial, 9) Product Revision, 10) Mass Product. [13] The Brog and Gall Development Procedure, which has developed a collection research technique in this study, uses a questionnaire, namely the expert validation questionnaire and the teacher's response.
The collection technique in this development research uses a questionnaire (questionnaire), namely an expert validation questionnaire and teacher response questionnaire. The data analysis technique used is descriptive analysis, which describes the data that has been collected as it is. The data were obtained through expert validation, teacher responses, and student trials. The data is presented in the form of a Likert scale that has been given a score. Then the data were analyzed descriptively quantitatively, namely calculating the percentage of indicators for each category in the developed learning media, with the formula:

\[
\text{score percentage} = \frac{\text{Number of indicators per category}}{\text{Number of category total indicators}} \times 100\% 
\]

4 Results and Discussion

4.1 The Process of Developing Folklore Teaching Materials (Hikayat) in Digital Form for Class X Students of SMA Negeri 1 Stabat Langkat Regency

The product development process in the form of folklore teaching materials (saga) in digital form is applied through three stages, namely analyzing the need to develop a product, and testing product development which will then produce digital products. 1) The first stage is to analyze the needs of teachers and students. Based on these stages, data was obtained that students needed product development in the form of folklore material (saga) in digital form. 2) The second stage was applied by designing the product to be developed. 3) The last stage was conducting product trials.

4.2 Validity of Folklore Material (Hikayat) in Digital Form

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Expert Validation Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Eligibility</td>
<td>90%</td>
</tr>
<tr>
<td>Serving Eligibility</td>
<td>92%</td>
</tr>
<tr>
<td>Language Eligibility</td>
<td>88.5%</td>
</tr>
</tbody>
</table>

Table 2. The Validity of Design Expert

<table>
<thead>
<tr>
<th>Component</th>
<th>Design Expert Validation Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Eligibility</td>
<td>86%</td>
</tr>
</tbody>
</table>

4.3 The Effectiveness of Folklore Teaching Materials (saga) in Digital Form

After conducting the trial, the next step is to see the effectiveness of the product on student learning outcomes. Learning outcomes can be seen after conducting pre-test and post-test to 32 students of class X SMA Negeri 1 Stabat Langkat Regency. The pretest is given before using the developed product and the posttest is given after using the developed product (material).
The average value (mean) of student learning outcomes through the pretest is 64.6% and the posttest is 84.5%.

Based on these results, it can be seen that the average value of student learning outcomes after using the media increased by a difference of 20 increments. The table above also shows that student learning outcomes in folklore material (saga) through the pretest have the lowest score of 55 and the highest score of 80, while the results Student learning on folklore material (saga) through posttest has the lowest score of 70 and the highest score of 95.

Calculations obtained from the product effectiveness test show that the results of developing digital folklore teaching materials (saga) are more effective than learning folklore materials (saga) that do not use media. This is evidenced by the learning outcomes of students using digital media (moodle) with an effectiveness of 84.5%, while the effectiveness of learning that does not use developed products (materials) is 64.6%. Based on this explanation, it can be concluded that folklore teaching materials (saga) in digital form are effectively used and can improve student learning outcomes, especially in folklore materials (saga).

5 Conclusion

Feasibility Results The development of Digital-Based Folklore teaching materials was declared feasible because all assessment results were in the “very good” category. The results of the material expert's validation were declared "very good" with all aspects of the assessment getting an average value of 90%, and the validation results by the media design experts were declared "very good" with all aspects of the assessment getting an average score of 86% declared "very good". Then the results of the Indonesian language teacher's response with an average of 95.8% "very good" criteria. The results of individual trials were declared "very good" with an average percentage of 84.5. The results of the small group trial were declared "very good" with an average percentage of 90. And the results of the limited field trial were declared "very good" with an average percentage of 97.7. The results of student learning abilities in folklore material (saga) in digital form after using the developed learning media are in the "very good" category with an average value of 84.5 and the average value before using digital folklore learning media is 64, 6 which is included in the "good" category. With that, it can be concluded that folklore teaching materials (saga) using Moodle media can improve student learning outcomes, especially in folklore materials (saga).

References


The Marginalization of Women in the Novel

*Perempuan yang Menangis kepada Bulan Hitam* by Dian Purnomo: A Study of Feminism

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Abstract. This study aims to describe the form of women's marginalization in the novel *Perempuan yang Menangis kepada Bulan Hitam* by Dian Purnomo. The method used in this research is descriptive qualitative method of analysis. The results of this study indicate that there are 13 data on the marginalization of women. The source of the data obtained is in the novel *Perempuan yang Menangis kepada Bulan Hitam* by Dian Purnomo. The data of this research are in the form of dialogues of the characters, narration, behavior and thoughts of the characters in the novel that describe marginalization. The results of this study indicate that the marginalization of women in Dian Purnomo’s novel *Perempuan yang Menangis kepada Bulan Hitam* obtained 13 data in the form of (1) restrictions on women's actions, (2) accepting unilateral decisions, (3) control over women's sexuality, (4) demands on women's sexuality: the needs of men, (5) control the wealth and economic resources

Keywords: Marginalization, Women, Feminism

1 Introduction

The novel as a literary work was created by the author based on the reality captured by the author through his point of view, so that in the novel there is an expression of the reality of life. Therefore, the presence of the novel is part of the representation of people's lives that occurred during that period. In the novel *Perempuan yang Menangis kepada Bulan Hitam*, the author describes a portrait of the life of the Sumba people who still adhere to a patriarchal system with the impact of marginalization of women. This provides a positive value that can be absorbed and realized in the lives of readers, especially related to the issue of marginalization of women because they are bound to a culture. As the people of Indonesia who have a variety of tribes and cultures, it is an obligation to maintain the preservation of their respective traditions as self-identity and to maintain ancestral heritage. However, sometimes a tradition is no longer appropriate or not suitable to be carried out, so it may need to be adjusted without losing its essence. Dian Purnomo has succeeded in raising the tradition of marrying and capturing as a social issue, especially the issue of women, which may be new information for some people. Seeing the views of the local community and the general public in seeing this tradition.
novel *Perempuan yang Menangis kepada Bulan Hitam* by Dian Purnomo is the result of the author's residency in Waikabubak given by The National Book Committee and the Ministry of National Education to stay in Waikabubak for six weeks which brought up the true story of victims of marriage and arrest. The author interviewed women who were victims of marriage and arrest to deepen the research for the sake of this novel. Along with the times, not all Indonesian cultural heritage can be preserved for a long time. One of them is like capture marriage, which actually harms women a lot.

The problem in this research is the concept of Sumbanese women who are marginalized in the name of adat, so this research is carried out through a study of feminism literary criticism. The feminist goal is gender balance or interaction. Feminists are people who adhere to feminism. Feminism comes from the Latin word, namely femina which means having a feminine character. This research was conducted through the study of feminism literary criticism to analyze the forms of marginalization of women.

## 2 Theoretical Basis

### 2.1 Feminism Literary Criticism

According to Ratna (2007: 221), the word feminism comes from the word femme which means woman. Feminism is a movement that aims for equality between men and women. The problems raised by this movement are very diverse, ranging from patriarchy to political areas. According to Sugihastusi and Suharto (2019: 6), feminism was born in the West and began to flare up in the late 1960s, influenced by several factors. This movement affects many aspects of life and affects every aspect of a woman's life. Since the development of feminist criticism as part of the international women's movement in the late 1960s, this concept of exploring feminist literary criticism has become an attractive option.

The limitation of feminist literary criticism is stated by Culler (in Sugihastuti and Suharto 2019) that feminist literary criticism is reading as a woman. What is meant by reading as a woman is the reader's perception that the meaning of literary works has gender differences and important conflicts of meaning. In line with this, Djajanegara (Prasigit, 2020:11) found that feminism which is associated with literary works is closely related to feminist literary criticism, namely the study of feminist-based literary works, justice in contemplation of the existence of women. As a writer and in his literary works, critics are aware of the existence of gender, especially in literature, culture and life. Feminist literature believes that female readers and female critics bring different perceptions, understandings, and assumptions to the experience of reading literary works compared to men. Their insights were initiated by the pioneers and later developed in many ways.

Feminist literary criticism is gender analysis. In gender analysis, critics must be able to distinguish between the concepts of sex and gender. Fakih (2019:8) explains that gender is a characteristic of men and women who are socially and culturally constructed through a long process. Therefore, gender is basically a socio-cultural construction, which is a cultural interpretation of gender differences. For example, women are known to be gentle, beautiful, shy, loyal, often emotional and motherly. Men are considered strong, brave, aggressive, dishonest, masculine, often rational and powerful. In general, there are two genders, male and female. In terms of sex, the difference between men and women lies in the shape of their bodies. This can be explained by the fact that a man has a penis, while menjing and a man produces sperm. Women can give birth by means of reproduction such as the uterus. If a man is
considered stronger than a woman, then women are required to be weak, so women have many physical and mental limitations that make women lose their rights. Djajanegara (in Prasigit, 2020: 12) also stated that feminist literary criticism emerged from the feminist desire to examine the works of women writers in the past and present the image of women in the works of male writers by being suppressed in various ways and ignored by patriarchal traditions. Similarly, Sugihastuti (2010:136) states the same thing that feminist literary criticism aims to show the image of women in men's writings that present women as beings who are suppressed in various ways, misinterpreted, and underestimated by patriarchal traditions.

Furthermore, Wiyatmi (2010: 16) explains that feminist literary criticism is a variant of literary criticism (literary studies) which justifies the existence of women both in women as authors and in their literary works. Feminist literary criticism examines how women exist throughout society, as evidenced by society treating women with men. Endraswara (2008:149) argues that researchers need to read as women if they want to study using feminist literature. This is because awareness as a woman in dealing with women's problems will be different from reading women's problems as men.

2.2 Marginalization

Marginalization can be caused by various events, such as evictions, natural disasters, and exploitation processes. However, there is one form of impoverishment of one particular gender, in this case women, which is caused by gender. There are several differences in type and form, place and time as well as the mechanism of the process of marginalizing women because of these gender differences. In terms of sources, many come from government policies, beliefs, religious interpretations, traditional beliefs and customs or even scientific assumptions.

The Ministry of National Education (2008:716) reveals that marginalization is an effort to limit. Marginalization of women is an attempt to limit the movement of women. Murniati (Surjowati, 2014: 64) explains that marginalization means placement or movement to the periphery. Marginalization is the process of ignoring the rights that should be obtained by marginalized parties. However, these rights are abused for various reasons. According to Fakih (2019: 14), the process of alienation is the same as the process of poverty. Marginalized parties are not given the opportunity to develop.

Women are more disadvantaged than men in terms of this gender inequality. For example in terms of work. Women who work are considered to only provide additional income for the family, so the difference in salary also applies between women and men. The same thing was also expressed by Yuarsi (in Airlandha 2017: 23) who stated that the lowest position and wages would be experienced by women, even though in terms of education and abilities they were not inferior to men. This is because the owners of capital are of the view that men are more flexible in various ways and women are considered unproductive. If women need maternity leave, give birth, and are rarely able to work overtime due to the double burden of taking care of the family at home, this is not the case for men.

According to Fakih (2019: 15), women are not only treated unfairly in the workplace, but also in the form of discrimination against women by their own families. Women's families do not have the same rights as men in terms of family decisions. The father has absolute power over the lives of his wife and children and the position of his sons and daughters. Even if the position of the daughter precedes the position of the son, the son immediately replaces the father if the father dies. The position of men in obtaining higher education also affects women's low education. For example, if a family is in a financial crisis, fathers prioritize higher education for sons over daughters. Girls spend more time helping at home. This is due to the assumption that
in a patriarchal society, the son is the representative of the patriarchy (representative breadwinner) and the woman becomes a housewife when married. Murniati (Surjowati, 2014: 71) also explains that the process of alienation does not only occur outside of women, but alienation within itself affects women. This is due to the distrust of women, which causes them to withdraw from the competition. There is also the insistence of a patriarchal society with a soft and gentle personality, and it seems like women are armed against all these rules. According to Bhasin (1999: 5) in a patriarchal society there are several areas of women's lives that are dominated by men. These areas of life are:

**Limiting the Productive Power or Labor of Women**
According to Walby (Bhasin, 1999: 5) housewives are a position where women are made slaves for their husbands and those who live in the family. A female worker here is at risk of providing everything her husband and family need. She was not much different from a working woman. Bhasin (1999: 6) also states that women who work outside the home also do not have independence. The type of work they can do is determined by the men, which jobs are suitable for women and which are not. Here, women are excluded from high paying jobs.

**Control Over Female Reproduction**
Woman sometimes have no reproductive freedom and everything is controlled by a man. In fact, Bhasin (1999: 6) states that modern reproduction is determined by the state (dominated by men). As in India, the family planning system is mandated by the state to have only two children to curb population growth. Unlike Indonesia and India, Malaysia and Europe even encourage women to have many children. This is because Malaysia wants to boost its domestic economy, while Europe has a low population growth rate. This shows that there are restrictions and restrictions imposed on women regarding reproduction. Women are marginalized in making decisions and women's rights are ignored by the state and authorities.

**Control Over Female Sexuality**
Women's sexuality is controlled by men, in line with what Bhasin (1999: 8) says which states that women must provide sexual services to men according to the needs of men, not women. Men have the power for sexual desire. This means that women cannot deny men's desire for sexual intercourse and women cannot force men to have sexual desires. Current legislation also limits women over men. According to Bhasin (1999: 8), this is seen in patriarchal societies where women are forced to wear closed clothes rather than asking boys to bow their heads when meeting girls. This means that women are seen as the cause of crime (sexuality) denying the lack of self-control in men.

**Restricted Movement of Women**
Bhasin (1999: 9) states that there are clear boundaries in the women's movement in a patriarchal society. This is shown when there are many rules that restrict girls. This limit can be illustrated when a woman leaves the house. There are rules for dealing with the opposite sex and dealing with each other. Sometimes there is even a tradition of isolation for adolescent girls, which occurred during the period before Indonesia's independence.

**Property and Other Economic Resources Owned by Men**
According to Bhasin (1999: 10), most of the wealth and productive resources managed by men are passed on from one person to another. This is reflected in religious and social laws that give male heirs more than female heirs. Even if a woman inherits her father's property, if she has a husband, the wealth is managed directly by her husband, who acts as the head of the family managing her wealth. Bhasin (1999: 5) argues that the restrictions imposed on women are determined by a patriarchal society. Women don't even have independence in themselves. This is shown when reproduction, movement, and sexuality are still controlled by men. Women's independence is also reflected in the clear division of labor from men to women. Women are
only subject to various things to meet the needs of men. They are not given the opportunity to grow as they wish.

2.3 Novel
Nurgiyantoro (2015:11) reveals that the word novel comes from the novella language, which in German is called novelle and novel in English, and this is what later entered Indonesia. Novella literally means a small novelty, which is then interpreted as a short story in the form of prose. Nurgiyantoro's opinion seems to be different from Semi's opinion. Semi (in Susiati: 2016) suggests that the novel is a type of narrative literary work, which is characterized by actions and reactions between characters, especially between antagonists and protagonists. Antagonists and protagonists are always featured in novels. His presence raises various problems (conflicts) that arouse the reader's excitement and curiosity about the end of the story. The stories presented are always interrelated. Therefore, it is not an exaggeration to say that the novel is a work that requires great concentration in its creation.

Zaidan, et al (2005:136) reveal more detailed things as well, namely the novel is a type of prose that contains elements of character, plot, setting, fiction that unfolds human life on the basis of the author's point of view, and contains life values, processed with storytelling techniques and the form that forms the basis of the writing convention. Meanwhile, Aziez and Abdul Hakim (2010:7) reveal that the novel is a work that was created by involving all the imagination of the author.

3 Research Methods
This research is a qualitative research that examines the novel Perempuan yang Menangis kepada Bulan Hitam by Dian Purnomo. The source of the data used is the Novel Perempuan yang Menangis kepada Bulan Hitam by Dian Purnomo. The data of this research are in the form of dialogues of the characters, narration, behavior and thoughts of the characters in the novel that describe the marginalization of the male characters against the female characters. The data collection technique used in this research is the literature study method, which uses techniques by collecting data in the form of document archives, including books and journals containing opinions, theories, and those related to the research to be carried out.

The data analysis technique used is descriptive-qualitative analysis technique. The steps are as follows:

a) The first step taken by the researcher was to read and study carefully the novel Perempuan yang Menangis kepada Bulan Hitam by Dian Purnomo.

b) Furthermore, the categorization of data according to its type is based on the type of gender problem, namely marginalization.

c) After going through all the processes above, then the data obtained is interpreted by describing the forms of marginalization contained in the novel.

d) The final stage is drawing conclusions as answers to all the problems in the research. The validity of the data used used a transferability check technique by means of a detailed description. This research was carried out carefully and thoroughly to describe the context of the research carried out.
4 Results And Discussion
4.1 Research result

The form of marginalization of women in Dian Purnomo’s novel Perempuan yang Menangis kepada Bulan Hitam, obtained 13 data quotes in the form of limiting various women's actions, accepting unilateral decisions, controlling women's sexuality, demands for men's needs, and controlling assets and economic resources available. in the following table.

<table>
<thead>
<tr>
<th>No</th>
<th>Marginalization</th>
<th>Quote</th>
<th>Amount of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Limiting women's actions</td>
<td>Not only will she be married by kidnapping her, she will also become a second wife, if it turns out that Leba Ali is not officially divorced. (page 59)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The culture of taking women forcibly as if they were goods that could be carried here and there without being asked what they wanted. Not much has changed in his village and Magi feels like he's running alone (p. 88)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manu says their father will not send Manu to school. Manu could be the keeper of the cellphone counter or the only convenience store keeper in Waikabubak, the important thing is that once there is a mate, they will immediately marry off. (p. 196)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Accept unilateral decision</td>
<td>&quot;Sa as the representative of the Leba Ali family has come to deliver the happy news,&quot; said the one who looked the most senior. In the middle of his sentence he spat red saliva on the sidelines of the bamboo floor. &quot;Ama has a child, Miss, Magi Diela Talo, is in we have a house.&quot; Several voices mumbled to join Ama Bobo's house. &quot;We have a sister, Leba Ali, a bachelor of education, there is a desire to take my daughter as a wife.&quot; (page 18)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customary agreements have been made. Magi would be bought with 50 or 70 animals, Tara didn't know for sure. Dangu's head was getting dizzy. He has not slept well for two nights (p. 32)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working after the kidnapping was completely different. Now Magi is not allowed to bring his own motorbike, there is always someone else who takes him to the office, then picks him up home. Although embarrassed, on the one hand Magi felt safer. The paths he took sometimes still reminded him of that fateful day. One more thing that is different is his father's new habit of checking Magi's cell phone (p. 107)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ama Bobo doesn't want to send Manu more than high school because he doesn't want any more daughters to</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Marginalization
disappoint him. Children go to college, spend a lot of money on therapy, return home to be dissidents, fight otangrua, smear their father's face with dung, forget cloth and forget kebaya. So now let Manu stay in Waikabubak and work there while waiting for the man to propose to her. (p. 197)

<table>
<thead>
<tr>
<th>3</th>
<th>Control over female reproduction</th>
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<th>-</th>
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</thead>
</table>

It's official news that will circulate; Magi Diela was arrested to be married by Leba Ali. Yappa mawine". Dangu's blood boils. He knows this is not true. This is not the yappa mawine that it should be. There has never been an agreement between the Magi family and Leba Ali's family. All he knows is one thing: Leba Ali is famous for being a hooker. Even though he has never proven it himself but everyone knows who he is. (p. 19)

Leba Ali put Magi on top. Magi tried to attack with his right hand, but failed. Leba Ali immediately grabbed the hand and held it above Magi's head. Likewise with his left hand. Both of Magi's hands were easily held by Leba Ali's one. Their bodies pressed against each other, Magi could feel Leba Ali's body odor, including the nauseating smell of his mouth from the smell of cigarettes and alcohol. Leba Ali's head is to the right of Magi's head so every word he says goes straight to Magi's ears. "I want so I have a wife. There are no other bad intentions. So shut up and be a good wife for me." At that moment Magi felt nauseous. For a moment Magi was grateful that he was unconscious when Leba Ali raped him, because if he woke up, the intercourse would taste like being cooked alive in a big stove. Terrible and cursed! (pp. 53-54)

But there's no guarantee that a man will be good to me. Being a dong pu wife is the same as letting me have my body raped every day. "I feel like he just wants to make me like a trophy (page 186)

Leba Ali backed away releasing the stranglehold on Magi's neck, holding Magi's chest with his left hand while his right hand pulled Magi's culottes down and ripped her panties off. Magi struggled, but he knew this was futile. Leba Ali had already lowered his own underwear. Magi could feel something hard and disgusting on his two thighs which he pressed tightly together. (p. 291)

| 5 | Demands on the needs of men | He felt every beat that Leba Ali made while slapping his face and biting his breasts. I realize the devil woman! then he bit Magi's shoulder, "Wake up!" Leba Ali bit every part of Magi's body he could bite, trying his best to make Magi come to his senses. He felt every second, so vividly, as | 1 |
Leba Ali's genitals forced its way into him and created excruciating pain (p. 292).

<table>
<thead>
<tr>
<th>6</th>
<th>Mastering wealth and economic resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leba Alilah was the mastermind behind the kidnapping. Fear and anger raced to occupy Magi's mind, he was afraid because he knew the power of Leba Ali. The man's closeness to powerful people, his possessions, as well as his coquettishness. (page 44)</td>
<td></td>
</tr>
</tbody>
</table>

4.2 Discussion

The Ministry of National Education (2008:716) reveals that marginalization is an effort to limit. Marginalization of women is an attempt to limit the movement of women. The marginalization of women that appears in the novel Perempuan yang Menangis kepada Bulan Hitam is as follows.

"Sa as the representative of the Leba Ali family has come to deliver the happy news," said the one who looked the most senior. In the middle of his sentence he spat red saliva on the sidelines of the bamboo floor. "Ama has a child, Miss, Magi Diela Talo, is in we have a house." Several voices mumbled to join Ama Bobo's house. "We have a sister, Leba Ali, a bachelor of education, there is a desire to take my daughter as a wife." (page 18)

The quote above tells the truth about the alleged news that Magi Diela had been kidnapped to be married by Leba Ali, Magi, who reportedly had not returned home from morning until night and there was an allegation that Magi was kidnapped for marriage. This is feared because these cases are common in their village, and have become a custom that should not be rejected. Women are kidnapped and forced to marry, the rights that should be obtained by women to be able to choose their own life partner are ignored by adat. There was a unilateral decision and Magi was treated unfairly because Leba Ali wanted Magi to be his wife without Magi's consent, including a form of marginalization accepted by Magi Diela as a woman. In line with the opinion of Nimrah & Sakaria (2015:175) which states that men dominate women, and women are always seen as second only to women. male, then male who has the right to make decisions. Magi's rights as women to choose and make decisions have been marginalized and ignored by adat in a patriarchal society which considers women's decisions to be unimportant.

It's official news that will circulate, Magi Diela was arrested to be married by Leba Ali. Yappa mawine. Dangu's blood boils. He knows this is not true. This is not the yappa mawine that it should be. There has never been an agreement between the Magi family and Leba Ali's family. All he knows is one thing: Leba Ali is famous for being a hooker. Even though he has never proven it himself but everyone knows who he is. (p. 19)

This quote explains that Magi Diela was kidnapped, captured by Leba Ali for marriage. Leba Ali, who is well-known as a slave by all the people in the village, wants to marry Magi Diela just to satisfy Leba Ali's lust, including in the form of marginalization, namely control over women's sexuality. Women's sexuality is controlled by men, in line with what Bhasin (1999:8) said that women are required to provide sexual services to men according to the needs of men, not women. Men have power over their sexual desires. This means that women are not allowed to refuse men's desire to have sexual intercourse and women are not allowed to force their desire to have sexual relations on men. The applicable law also limits women more than men.

This made Dagu Toda's blood boil, he was angry because of the yappa mawine (marriage of capture) which should have happened if there was an agreement between the Magi family and the Leba Ali family. But the yappa mawine (capture marriage) that happens to Magi is only based on lust. The kidnapping marriage that should have taken place is one of the solutions if
the male family fails to reach a customary agreement with the female family. If this is the case, then the woman's family may not be aware of the plan beforehand. After the bride-to-be is kidnapped, then the woman's family surrenders and finally there is a customary agreement between the two families. This is included in forced marriage but is still accepted by Sumbanese customs, so it can be concluded that the quote above is included in the marginalization of the decision of one party, namely by the Leba Ali family.

*Customary agreements have been made. Magi would be bought with 50 or 70 animals, Tara didn't know for sure. Dangu's head was getting dizzy. He has not slept well for two nights (p. 32)*

The quote above tells that the customary agreement will be carried out, Magi will become Leba Ali's wife without Magi's prior approval, including the form of marginalization accepted by Magi Diela as a woman. Magi rights as women are marginalized in determining these decisions, Magi rights are ignored by adat in a patriarchal society which considers women's decisions to be unimportant. Because Ama Bobo is Magi's father, he has accepted the proposal and offer from a spokesman sent by the Leba Ali family. Even his own father did not seek approval from his son, this proves that Magi only accepted a one-sided decision. His father has absolute power over Magi's life.

The next quote explains that men control the wealth and economic resources contained in the following quote.

*Leba Alilah was the mastermind behind the kidnapping. Fear and anger raced to occupy Magi's mind, he was afraid because he knew the power of Leba Ali. The man's closeness to powerful people, his possessions, as well as his coquettishness. (page 44)*

The data above shows the marginalization of women that men are the rulers of economic resources. According to Bhasin (1999:10), most of the wealth and productive resources controlled by men are then passed on from men to other men. This can be seen in religious and social laws which give more shares to male heirs than female heirs. This makes Magi feel scared and angry because he can guess the mastermind behind the kidnapping, Magi is scared because he knows Leba Ali is the mastermind behind the kidnapping, Leba Ali has the power and strength of wealth with his coquettish nature. The man had a long list of the names of the girls and widows he had dated. The patriarchal system that is still entrenched in society causes women to continue to be used as second humans after men. Patriarchy is a social system that in practice places men in positions of power and oppresses women. Men have power and are free to do anything because men control the wealth and economic resources, while women who are treated unfairly cannot even choose their own way of life because everything is determined by men. In line with the opinion of Bhasin (1999: 5) that, the things mentioned above are the limitations given by patriarchal society for women. Women have no independence even in themselves.

After Magi was kidnapped, then Leba Ali who raped Magi with a sense of innocence just to satisfy male lust is included in the marginalization of demands for the needs of men contained in the following quote.

*Leba Ali put Magi on top. Magi tried to attack with his right hand, but failed. Leba Ali immediately grabbed the hand and held it above Magi's head. Likewise with his left hand. Both of Magi's hands were easily held by Leba Ali's one. Their bodies pressed against each other, Magi could feel Leba Ali's body odor, including the nauseating smell of his mouth from the smell of cigarettes and alcohol. Leba Ali's head is to the right of Magi's head so every word he says goes straight to Magi's ears. "I want so I have a wife. There are no other bad intentions. So shut up and be a good wife for me." At that moment Magi felt nauseous. For a moment Magi was...*
grateful that he was unconscious when Leba Ali raped him, because if he woke up, the intercourse would taste like being cooked alive in a big stove. Terrible and cursed! (pp. 53-54)

The quote above explains that Leba Ali raped Magi just to fulfill a man's lust, including the marginalization of control over women's sexuality. Women are required to provide sexual services to men according to the needs of men, not women. Men have power over their sexual desires. This means that women are not allowed to refuse men's desire to have sexual intercourse and women are not allowed to force their desire to have sexual relations on men. Leba Ali who convinced Magi to be a good wife by forcing her will to fulfill her own lust and not based on mutual desire.

The next quote that raises marginalization in the form of limiting the actions of women that Magi will become Leba Ali's second wife is as follows.

Not only will she be married by kidnapping her, she will also become a second wife, if it turns out that Leba Ali is not officially divorced. (page 59)

Magi is not only married by kidnapping but will also become a second wife, because Leba Ali is not yet officially divorced. Official words are quite difficult to describe in traditional Magi village life. There are many people who marry according to adat but do not register their marriage in the civil registry.

The culture of taking women forcibly as if they were goods that could be carried here and there without being asked what they wanted. Not much has changed in his village and Magi feels like he's running alone (p. 88)

This restriction on women's movement is applied in a patriarchal society. The goal is that women continue to be marginalized and do not surpass men who are destined to be rulers. The laws in adat are made to limit women's space and highlight the domination of men. The cultural rules take women forcibly as if they are goods that can be carried here and there without being asked what they want, making Magi not have the opportunity to make his own life choices, including in terms of choosing a life partner. By not making women independent, men can continue to make them slaves according to their wishes. This shows that cultural law is made to perpetuate male power which is included in the form of marginalization.

After the incident that traumatized Magi, Magi was no longer allowed to bring his own motorbike and there must be someone to pick him up, including in the marginalization of limiting various women's actions. Magi's father who began to be protective and always checked Magi's cellphone included the marginalization of unilateral decisions, as contained in the following quote.

Working after the kidnapping was completely different. Now Magi is not allowed to bring his own motorbike, there is always someone else who takes him to the office, then picks him up home. Although embarrassed, on the one hand Magi felt safer. The paths he took sometimes still reminded him of that fateful day. One more thing that is different is his father's new habit of checking Magi's cell phone (p. 107)

Knowing her father was spying openly made Magi very upset. Magi knew his father was trying to check who was communicating with Magi. Due to his father's new habit, now every day the magi is forced to delete all the messages he wants to keep secret from his father before he gets home from work. The treatment received by Magi is included in the form of marginalization of unilateral decisions. The deprivation of women's rights is also carried out by men in terms of women's freedom in general. That is, women have many limitations to do something. Women must have permission from men (who are considered more powerful) when going out of the house or making important decisions in their lives. Magi is forbidden to bring his own motorbike with the reason to keep it from things that will damage it outside.
The prohibitions that his father gave to Magi were made to keep Magi as he wished. Restricting a woman's movements meant that her father had limited Magi's opportunities to develop. Restrictions on movement for women are set in a patriarchal society. The goal is that women continue to be marginalized and do not surpass men who are destined to be rulers. The next quote also shows marginalization in the form of control over women's sexuality which is contained in the following quote.

_But there's no guarantee that a man will be good to me. Being a dönü mú wife is the same as letting me have my body raped every day. 'I feel like he just wants to make me like a trophy (p. 186)_

The quote above tells that Magi imagines being the wife of a man like Leba Ali is like allowing herself to be raped every day. According to Bhasin (1996:9) rape can be seen as an effective political tool and this action is carried out by the ruling class against members of the lower class. Women are the ones who are more disadvantaged and unable to fight back in reproduction and sexuality which should be their personal rights. In line with Bhasin's opinion (1996:8), that women are required to give sexual services to men according to the needs of men not women. This means that women are not allowed to reject men who invite him to have sexual relations, including in terms of position.

Magi, who was traumatized by Leba Ali's actions because he had been harassed and raped like a trophy, was included in the marginalization of control over women's sexuality. Women are required to provide sexual services to men according to the needs of men, not women. Men have power over their sexual desires. This means that women are not allowed to refuse men's desire to have sexual intercourse and women are not allowed to force their desire to have sexual relations on men. Magi had imagined that if he became his wife, Leba Ali would force his will to fulfill his own desires and not based on mutual desires.

Over time, Magi, who had migrated from his hometown, heard news from Sumba that Magi's father did not allow Manu to continue his studies and only ordered him to become a cellphone counter keeper or become a convenience store keeper, including marginalization of limiting the various actions of women contained in the following quote.

_Manu says their father will not send Manu to school. Manu could be the keeper of the cellphone counter or the only convenience store keeper in Waikabubak, the important thing is that once there is a mate, they will immediately marry off. (p. 196)_

Magi was devastated to hear the news that Manu, the only sister he had was not allowed by his father to continue his education until he was in college. Even though Magi has a beautiful dream about his sister who will attend college maybe in Kupang or in Java. But that dream is now gone. The treatment that Manu received was a form of limiting women's actions. Women have a lot of limits on what to do. Women must have permission from men (who are considered more powerful) to make important decisions in their lives.

The ban that his father gave him was made to stay made Manu according to his father's wishes. Restricting women's movements means limiting opportunities for development. According to Bhasin (1996:9) this restriction of movement for women is applied in a patriarchal society. The goal is that women continue to be marginalized and not beyond men destined to rule. This is because when there are restrictions on movement, there are also restrictions for women get an education. In fact, education is one way awareness of women, including awareness of their position marginalized by men. These restrictions prevent women from having the opportunity to learn to live independently outside or to have choices for their own lives.

This restriction on Manu's movement was applied by his father with the aim of making Manu only a cellphone counter guard or guarding a shop so that his father could marry him off to anyone who came to propose to his daughter. His father also didn't want Manu to be like Magi,
whom he taught and get a higher education but instead disappointed his father, became a
dissident, rebelled against his parents, violated customs and embarrassed his family for rejecting
Leba Ali's proposal by running away from the village. That way Magi doesn't want his sister to
lose her youth and spend time in the village and become victims of the war that Magi has waged
with his father, which is contained in the following quote.

_Leba Ali_ backed away releasing the stranglehold on Magi's neck, holding Magi's chest with his
left hand while his right hand pulled Magi's culottes down and ripped her panties off. Magi
struggled, but he knew this was futile. Leba Ali had already lowered his own underwear. Magi
could feel something hard and disgusting on his two thighs which he pressed tightly together.

The quote above explains the existence of control over women's sexuality. Leba Ali ignores
Magi's rights, namely in the form of marginalization in the position of having sexual relations.
Magi as women have to endure suffering in order to satisfy the lust of men. Magi has no right
when she wants to have sexual intercourse or not. This right is only owned by Leba Ali as her
husband. Magi did not object to the violence he received, because if he resisted or refused it
would be tantamount to killing himself, the violence by Leba Ali by strangling Magi's neck
made Magi think of pretending to be unconscious. Magi acted as if he had passed out and
whimpered silently in pain as Leba Ali tortured and raped him. but that didn't stop Leba Ali
from having sex with Magi. Leba Ali even held Magi's chest tore his underwear just like that. Resigned and pretended to be unconscious, he let Leba Ali lay on top of his body, which was not in the mood for sexual intercourse. The next quote explaining the demands on men's needs for sexuality is contained in the following quote.

He felt every beat that Leba Ali made while slapping his face and biting his breasts. I realize the devil woman! then he bit Magi's shoulder, "Wake up!" Leba Ali bit every part of Magi's body he could bite, trying his best to make Magi come to his senses. He felt every second, so vividly, as Leba Ali's cock forced its way into him and created excruciating pain (p. 292).

The quote above tells that Leba Ali raped Magi just to fulfill the man's lust, including the marginalization of demands for men's needs for sexuality. Women under a patriarchal climate are not only mothers, but also sex slaves. Women are only needed as objects of sexuality for men. Women are required to provide sexual services to men according to the needs of men, not women. Men have power over their sexual desires. This means that women are not allowed to refuse men's desire to have sexual intercourse and women are not allowed to force their desire to have sexual relations on men. Women become the party who is more disadvantaged and unable to fight in sexuality which should be their personal right.

The demands for a man's needs that Magi experienced very tortured him because Leba Ali forcibly raped Magi by slapping and biting Magi's shoulders to her breasts so that Magi woke up and came to her senses. But Magi had already sworn that he would refrain from faking a faint, because he had no more strength to fight back. He also did not want to die in vain for the violence committed by Leba Ali. Magi feels that hell is repeating itself, the rape and violence that happened a year ago is now coming back. He felt the pain so clearly when Leba Ali's genitals forced its way into him. The Magi's soul had been burned to the ground by anger, courage, and resentment that were increasingly churning without being able to do anything. However Magi had already sworn that he would succeed, so he refrained from pretending to be unconscious for plotting to rape himself.

5 Conclusion

Based on the results of research and discussion on the marginalization of women in Dian Purnomo's novel Perempuan yang Menangis kepada Bulan Hidam, 13 citations of data were obtained in the form of marginalization in limiting various women's actions, accepting unilateral decisions, controlling women's sexuality, demands for men's needs, and controlling women's economic assets and resources.

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Development of Biographical Text Teaching Materials Based on Higher Order Thinking Skills for Class X SMA

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Abstract. The development of teaching materials based on higher order thinking skills or often called HOTS in the form of modules organized according to the needs of students in the 2013 curriculum. The objective of this research is to produce teaching materials based on advanced thinking skills that are valid, practical and effective for learning. The research uses development (R&D) with the Brog and Gall development model that has been adapted to the demands of research. The data collection instrument used a questionnaire validation sheet, tests, and student response questionnaires. For data analysis techniques, we used validation analysis from experts, practicality analysis through practitioner questionnaires (teachers), effectiveness analysis through tests, and adopted student responses.

Keywords: Teaching Materials, HOTS, Biographical Text

1 Introduction

National education functions to develop capabilities and shape the character and civilization of a dignified nation in the context of educating the nation's life, aiming at developing the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. In accordance with Law No. 20 of 2003 concerning the National Education System, it explains that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious and spiritual strength, self-control, personality, intelligence, and noble character, as well as the skills needed by themselves, society, nation, and state.

Silfi (2016) defines teaching materials as "teaching materials or materials developed to resemble books by paying attention to the components in them." Teaching materials are one part of learning resources, which can be interpreted as something that contains learning messages, compiled based on the basic competencies that exist in a certain curriculum and used by students, both special and general in nature, that can be used for learning purposes (Suci, 2018:
Teaching materials consist of material about knowledge, skills, and theories. Therefore, teachers can be better prepared to develop and complete the demands of each basic competency (KD) with the help of relevant and more complex teaching materials. The existence of teaching materials provides many benefits to teachers and students, including: 1. Teaching materials can make the learning atmosphere more real to students during learning activities by presenting pictures, graphs, charts, and so on without the need for direct observation of the object that is the material. 2. Teaching materials broaden the horizons of thinking in the classroom because they contain a variety of knowledge and activities, especially those relating to language and literary skills, so that it is possible to present quotes from various sources while enriching knowledge outside of language, according to the theme raised from the topic of discussion. 3. Teaching materials can provide solutions to problems in the teaching process, especially in linguistic, literary, and literacy materials. Thus, the benefits of teaching materials greatly benefit the teacher at the time of giving the material.

The nature of teaching materials can increase students' creativity and critical-thinking abilities. This is where the teacher's role is needed in creating quality teaching materials as a stimulus to students so that there is a positive response. However, the learning atmosphere will feel monotonous if educators rely too much on textbooks without creating other types of teaching materials, resulting in a decrease in student interest in learning to understand the material. This is very contrary to the 2013 curriculum (K13), which requires creative and critical thinking skills, especially for the main facilitator, namely the teacher, in the learning process so that the desired learning objectives are achieved. The K13 learning material focuses on text in written or oral form. The text is an outpouring of thoughts that have contexts. So that students are able to use language not only as a communication tool but as a means to develop higher thinking skills, often called "High Order Thinking Skills" (HOTS), a way of learning for students to reach the stage of critical thinking.

As it is known, learning materials are included in the HOTS criteria if the questions presented can stimulate students' reasoning, not just recall the information that has been obtained. It has not supported the students' ability to do HOTS. Therefore, researchers will develop a module on biographical text material. The module is supported by expert theories and can be scientifically tested for validation and sentences that are easily understood by students. As a provision of knowledge.

Regarding the discussion above, the researcher took the initiative to conduct a pre-research precisely on April 17, 2021. Conducting interviews with 2 Indonesian language teachers at SMA Islam Miftahussalam Medan, explaining that there are still many teachers who are less creative in creating innovative teaching materials. So that the teaching materials at the school only use books published by the Ministry of Education and Culture in the 2017 revised edition that are not yet based on HOTS. The results of interviews show that of all the Indonesian language materials for class X, biographical texts are a theme that is less attractive because the teacher uses a lecture model and teaching materials that are less attractive, causing students to be less interested even though the contents are the results of someone's writing about an inspirational figure who can generate student motivation. Therefore, the authors distributed questionnaires to class X students majoring in automotives. Of the 200 students, only 140 filled out the Google
form. The results concluded from the questionnaire are: 1. Biographical text material is less desirable because the presentation is considered monotonous using only teaching materials in the form of textbooks without any additional teaching materials. 2. The characters presented have been discussed too often, one of which is in the student textbook pages 210–213, regarding the biography of B.J. Habibie, even though there are many other inspirational figures that can increase students' interest in reading them. So, based on the problems that the author examines in the background, accompanied by the pre-research above, the writer feels captivated by the research entitled "Development of Biographical Text Teaching Materials Based on Higher Level Thinking Ability for Class X SMA".

2 Research Methods

The research method used is research and development (R&D), described by Sugiyono (2015:1-712) in the book Research & Development Methods: Research and Development. The research model leads to the Brog and Gall model with a combination of Dick and Carey's learning development model (Triatno, 2007: 62). The stages are: (a) conducting pre-research, namely: (1) understanding the needs of the learning objectives and setting competency standards in the field of study; (2) reviewing learning by determining what skills are devoted to learning; (3) understanding the character of each student; (4) recording basic competencies and their indicators; (b) Compiling a summary in the form of a test as a reference in measuring students' understanding (c) collect teaching materials in the form of: (1) completeness of the material, (2) create illustrations; (d) development of teaching materials; (e) product validation; (f) revision; and (g) piloted. The development procedure was carried out to create teaching materials in the form of HOTS-based modules with the following biographical text materials: These development steps can be shown in the following figure: Research and Development (R&D) flow design (Dick and Carey Learning Development Model (Triatno, 2007:62)).
3 Result and Discussion

3.1 Result
The product of this research is teaching materials in the form of a Biography text module based on high-level thinking skills in class X SMA students. The module is designed based on learning based on higher-order thinking skills, where the text-based 2013 curriculum requires students to be able to have high-level understanding, critical thinking, collaboration and creative thinking.

Can describe the results of the analysis of understanding and the need for teaching materials to write a biography text as much as 93.3% of respondents stated that they knew what a biography text was. Then 62.6% stated that learning Biography texts still seemed ordinary. Then as many as 100% of respondents answered school books which are still a source of learning. As well as
responses regarding the learning resources used are still ordinary with a percentage of 66.6%. it can be described that as many as 86.6% of respondents want to write a biographical text explained in detail and clearly. and 96% of respondents wanted a clear and complete way of explaining Biography text in teaching materials and 60% of them wanted examples of questions in learning to write containing coherent work steps and accompanied by examples so that they were easy to understand.

Then, the needs analysis includes the third indicator with an analysis of student needs for the physical teaching materials that will be made. Students' physical needs for teaching materials for writing Biographical texts based on high-level thinking skills include 1) cover / front cover of teaching materials 2) layout / layout of color images and number of images 3) contents of back cover 4) paper size used.

Then as many as 93.3% of respondents agreed on learning resources that can be used as guides and 73% of them wanted more complex teaching materials and were equipped with interesting and up-to-date exercises and examples. Furthermore, the second indicator of monitoring and student needs for Biography text writing teaching materials is that there is one aspect of the content of the exposure in Biography text teaching materials based on high-level thinking skills with three questions.

The results of students' physical needs for teaching materials to write Biographical texts based on high-level thinking skills on the cover / front cover of teaching materials regarding the design of the front cover of teaching materials are 86.6% and the percentage of suitability of drawings on the front cover is 46.6%. Furthermore, for indicators of image layout, color and number of images in the aspect of image placement, 56.6% of respondents want images to be placed under the title, the size is adjusted. 66.6% of respondents want a striking color for color suitability in teaching materials. For the contents of the cover / back cover, as many as 93.3% of respondents wanted a striking color combined with poetry on the back cover. And for the size of the paper used as teaching material, the respondent wants to use A4 size paper as the size of the teaching material that will be made with a percentage requirement of 60%. Furthermore, students' needs for the content of teaching materials to write Biography texts based on high-level thinking skills are described with the following indicators. 1) in terms of the content of the material for writing biography text 2) table of contents 3) glossary 4) bibliography 5) use of language.

The percentage of data on student needs for the content of Biographical text writing teaching materials based on high-level thinking skills shows that respondents need material exposure, examples of writing Biography texts, and Biography text writing practice questions as seen from the percentage results that are 69.3%, with a good presentation. the same, namely 100% of respondents need the contents of teaching materials there is a table of contents, glossary and bibliography in teaching materials. Furthermore, the use of language in teaching materials for writing Biography texts based on high-level thinking skills shows 46.6% results. Furthermore, the questionnaire on the needs of Miftahussalam high school teachers for teaching materials for writing Biographical texts based on high-level thinking skills can be seen in the results of the teacher needs analysis.

Based on the results of the analysis of teacher needs for teaching materials to write Biography texts based on higher-order thinking skills, it is described as follows:

a. All teachers know what teaching materials are with a percentage of 100%. And in teaching 100% of teachers do not use teaching materials.
3.2 Result Learning Module Planning Stage
At this stage, the module is designed in easy-to-understand language, by selecting examples that are closely relevant to students' lives and highlight local life and historical sites, and in line with current technological developments. In this stage, the design is conceptualized to the aspects of literacy components, namely high understanding, critical thinking competence, collaborating and communicating components, and creative thinking. In the Biography writing module based on high-level thinking skills, loading the text, which includes scientific literacy in the information literacy design, is found in the corner of the dialog box in the module as information literacy in the module.

Then the aspects of high comprehension literacy, critical thinking competence, components of collaborating and communicating, and creative thinking are found at the end of each discussion, namely through questions and in the form of questions that provoke students' reactions to ask questions.

3.3 Presentation of Product Development Test Results Data

Material Expert Validation
The purpose of validating the module to experts is to determine the quality of the content, presentation, and language in it. The assessment carried out by the experts is determined by the average score of the respective assessment criteria. These results were analyzed to see whether or not the module for writing biographical texts was based on a high level. From the results of the average percentage obtained an average result of 88.23%, for the feasibility of the presentation an average percentage of 96.15% was obtained and for the feasibility of the language the average percentage was obtained as much as 90.38%. See table 1.1 below.
Furthermore, the data from the material expert validation on the feasibility of content, presentation feasibility and language assessment according to the material expert was considered "very good".

**Table 1.2. Validation Results by Material Experts**

<table>
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<th>No</th>
<th>Indicator</th>
<th>Average percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material equipment</td>
<td>100%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Material breadth</td>
<td>87.5%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Material depth</td>
<td>87.5%</td>
<td>Very good</td>
</tr>
<tr>
<td>4</td>
<td>Concept and definition accuracy</td>
<td>100%</td>
<td>Very good</td>
</tr>
</tbody>
</table>

**Design Expert Validation**

Assessment of the design of learning modules is carried out as an effort to improve the design of teaching materials developed in the form of modules. The results of the validation of the two design experts obtained an average result for the size of teaching materials as much as 93.75%, for the cover design of teaching materials the results were 91.66% and the design in teaching materials showed an average percentage of 80.92%. With the overall design of teaching materials in the very good category. Thus, the teaching materials in the form of learning modules for writing biographical texts based on high-level thinking skills have been developed to meet the demands of learning needs.

**Results of Assessment of Biographical Text Module Based on Higher Level Thinking Skills by Indonesian Language Teachers**

In the assessment of this module in the form of a score on Biographical text learning based on high-level thinking skills, especially in the material of writing biographical texts. The results of the responses of Indonesian language teachers concluded that biographical text teaching materials based on high-level thinking skills were included in the "very good" criteria with an average percentage of 97.91%.

**Presentation of Data on the Effectiveness of Product Development Test Results**
The results of the student trial assessment were carried out in 3 stages, namely individual trials (3 students), small group trials (9 students) and limited field trials (35 students). The individual trial results were declared "good" with an average percentage of 77.08%. With the initial response to the individual test as follows, interest is 80.56%, material is 82.40% and language is 79.63%, all of which are included in the "very good" criteria. Then the small group test was declared "very good" with a total average percentage of 83.79%. With the initial response of students in the small group test, namely interest 83.33%, material 83.79% and language 86.11% with the overall category "very good". The results of the Limited Field Trial were declared "very good" with a total average percentage of 84.22%. With the initial response of students on interest 78.80%, material 86.19% and language 91.66% with the overall category "very good".

Based on the discussion above, it can be concluded that the learning module for writing biographical texts based on high level is declared very feasible because the validation of material experts and media design experts is in the "very good" category. Likewise, the test results and student responses were in the "very good" category. The concepts presented in the module are easy to learn, understand and understand systematically. This module can be used as alternative teaching materials both classically, individually and independently.

3.4 Discussion on the Effectiveness of Using Teaching Materials for Writing Biographical Texts Based on Higher Order Thinking Skills

The effectiveness of using the learning module to write biographical texts based on Higher Level Thinking Ability can be seen from the average score obtained by students after using the developed module. However, there are differences in the average scores of students before and after using the developed product. The average score for writing exposition text in the pretest was 66.62 in the good criteria for KKM completeness as much as 75. While the posttest score was 80.25 in the "very good" category. This proves that the effectiveness of the exposition text writing module based on book literacy increased by 13.63% as seen from the difference in scores between the prettest and posttest conducted in class X SMA Miftahussalam.

4 Conclusion

Based on the results of research and discussion of research on the development of teaching materials for writing biographical texts based on high-level thinking skills in class X SMA students, the conclusions are as follows.1. Biography text-based teaching materials products for high-level thinking skills are teaching materials that improve thinking skills in text-based teaching. Where this understanding of thinking is integrated in language skills. The HOTS competencies in this case are: Understanding this is related to the students' ability to understand what concepts they will write. Critical thinking is the ability to utilize the power of thought and reasoning in criticizing and capturing the phenomena that occur around it, in this case the text contained in the teaching materials and which will be reviewed. Elaboration and communication are abilities related to the ability of students to work together to build a spirit of togetherness and be able to work in teams by interacting with the social environment. Creative thinking competence, in this competence the ability to produce ideas, processes and products that have more value.

The feasibility of teaching materials from material and design experts obtained very good criteria. The average acquisition of material experts for the feasibility of content in teaching materials obtained an average of 88.23%, the feasibility of presentation on teaching materials was 96.15% and for the feasibility of language assessment obtained an average of 90.38%. Then the results
from the design experts obtained an average of 93.75% for the size of teaching materials, the average acquisition for the cover design of teaching materials was 91.66% and for the content design of teaching materials the average acquisition was 80.92%. The results of the responses of Indonesian language teachers as many as two teachers obtained an average acquisition of 97.91% on the criteria of "very good". The effectiveness of the product of teaching materials for writing Biographical texts Based on Higher Level Thinking Skills that were tested on students obtained the following averages. For the individual test the average result was 77.08 in the "good" criteria. The small group test obtained an average of 83.79 on the "very good" criteria and the limited field group test obtained an average of 84.22 with the "very good" criteria. The test results (pretest) before using the developed product obtained an average of 66.62 on good criteria. after testing using the product (posttest) that has been developed, it is obtained an average of 80.11 on the "very good" criteria. with a difference of 13.49%.

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The Development of Short Story Writing Teaching Materials Using Concept Map Method With Lectora Inspire Media In Grade XI of SMA Negeri 1 Tigapanah, Kabupaten Karo

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Abstract. This study aims to develop short story writing teaching materials using the concept map method and to find out: (1) How is the process of the developing short story writing teaching materials using the concept map method with lectora inspire media for class XI students of SMA Negeri 1 Tigapanah, (2) How is the feasibility of the developing short story writing teaching materials using the concept map method with lectora inspire media in class XI students of SMA Negeri 1 Tigapanah?, (3) How is the effectiveness of the developing short story writing teaching materials with the concept map method in class XI students of SMA Negeri 1 Tigapanah? This type of research is research and development based on the Plomp research model. The subject of the research trial consisted of learning materials experts, learning design experts, class XI students of SMA Negeri 1 Tigapanah for limited group trials and thirty-six students for field trials. The data collection instrument used a response questionnaire. The results of this study indicate that the overall teaching material for writing short stories using the concept map method developed is effective for use as a learning medium for class XI students of SMA Negeri 1 Tigapanah, Kabupaten Karo. The results showed validation from learning material experts (88.32%), learning design experts (95.54%), limited field trials (83.25%), and field trials (84.76%) which overall stated that short story writing teaching materials were using the concept map method. "very good". The results of the effectiveness of teaching materials for writing short stories using the concept map method with lectora inspire media were obtained from the results of research on product effectiveness tests based on pretest and posttest. The results of the pretest of students before using teaching materials for writing short stories with the concept map method with an average of 70% on the "enough" criteria and for students' scores after using teaching materials for writing short stories with the concept map method is 89.17% on the "very good" criteria, it can be concluded that student learning outcomes using teaching materials to write short stories using the concept map method with lectora inspire media can improve student learning outcomes.

Keywords: teaching materials, short story writing, concept map method, lectora inspire

1. Introduction

Learning Indonesian at school includes two things, namely, language learning and literature. The implementation of the 2013 Revised 2017 curriculum is a text-based curriculum that places a lot of emphasis on students' writing activities. Writing activities emphasize the activity of assembling the flow of thinking based on experience and observations. In addition,
activities are a creative thinking process that requires students to be able to organize ideas and ideas into a series of creative and informative sentences. Through text-based learning, students are expected to be able to produce writings in various types of texts, including literary texts, namely short stories.

Referring to the regulation of the Minister of Education number 42 of 2018 regarding the national policy on language and literature, it states that literary education is carried out through mentoring in teaching literature, providing facilities and creating a conducive atmosphere in literature. Literature development aims to increase interest, love, desire to create and grow the nation's competitiveness. Literature is able to express the author's personality in the expression of his beliefs, experiences, feelings, and even his passion [2].

Like language learning, literary learning also includes four things, namely, speaking, reading, listening, and writing skills. These four skills have a relationship between one another so that when doing writing activities other skills will be integrated [6]. One of the writing skills in literature is writing short stories. Short stories have a role in increasing students' understanding and basically learning to write short stories is very relevant to life, so learning to write short stories occupies an important position in learning and life. If the short story writing activity is carried out properly, this will certainly have a positive impact on students in addressing problems related to their experiences and observations. Short stories can evoke thoughts in a person in response to reading results and relate them to relevant life activities.

Writing skills are not acquired automatically, but are the result of a continuous process of practice and practice. This practice and practice demands the role of educators. Teaching writing, especially writing short stories in schools, has not been carried out properly as expected in curriculum achievements. The results of interviews with Indonesian language teachers at SMA Negeri 1 Tigapanah, it was found that learning to write short stories was not optimal, especially during a pandemic where the learning system was online. Learning to write at school, including writing short stories, is carried out with assignment techniques (note assignments and writing exercises through the WA group or google classroom). The condition of learning in the network using the Indonesian Ministry of Education and Culture's teaching materials without any additional references is also an obstacle. Most of the books in the library are also textbooks/packaged books so that there are very few guidelines and references for writing activities. The learning process that is still changing from offline or face-to-face learning in class to online or online learning makes it difficult for teachers to prepare the material optimally. Independent teaching materials that can guide and assist students in distance learning independently have not been found in this school.

Meanwhile, from conversations with several students, the writer found that they had difficulty with the material presented by the teacher through material summaries and slides/power points. Meanwhile, if a meeting is held via the Zoom or Google Meet application, they are often constrained by the internet network. Another obstacle for students is their confusion when they start writing activities. Students have difficulty choosing a theme, pouring and developing ideas into appropriate sentences. They find it very difficult to choose words, use spelling, and use sentences effectively.

This phenomenon explains that the short story writing learning system in schools needs to be improved, teaching materials are needed that are able to stimulate students to be ready to accept learning independently, make it easier for teachers to carry out learning, and provide a strong understanding of short story writing techniques.
The description of the obstacles in learning to write in the explanation above directs the author to plan the development of teaching materials that aim to facilitate teachers and students in teaching and learning activities to write short stories. The development of these teaching materials can be used online or offline. The development in question is in the form of a digital module developed using the mind mapping method or concept map.

Concept map is a comprehensive and directed thinking activity. Thinking activities on concept maps involve divergent thinking skills which involve maturity, weighing up to organizing ideas into a discourse. Mind mapping, which is often also referred to as a concept, really helps a person in compiling and organizing important information in the mind, making it easier for someone to find the information when needed, [6]. With the application of the concept map learning method in learning to write short stories, it will greatly assist students in organizing ideas and story directions before they are assembled into a short story. The use of the concept map method in the development of teaching materials is a method that seeks to guide students to form mind maps which will later assist students in compiling an article. The existence of a mind map will help students to keep every idea that will be developed while students make effective word selection and sentence arrangement. One example of application in the development of this module is producing short stories.

The application of the concept map learning method is not something new in the world of education, including in writing learning. Several studies related to the application of the concept map learning method have also been carried out and show positive results. [8] Research conducted on the effectiveness of the use of mind mapping in the training for the development of mastery of learning materials shows that 36.7% of students’ learning outcomes are very good, 43.3% are good, and 20% are quite. The use of mind mapping learning methods compiled by e-learning in short story writing activities is able to increase the average grade value even though there are some students who have not passed the minimum score limit or KKM [1]. Furthermore, the results of research [9] found that the use of concept maps had increased students’ ability to write short stories with the theme of local wisdom, but there were still 10-30% of students who had not finished.

Aryuni (2015: 7), The concept map method with its development steps is very necessary in order to increase students’ passion and enthusiasm for learning, especially in writing activities. This development is carried out to maximize the achievement of learning to write short stories by students.

Nowadays, the use of teaching materials is increasingly diverse and innovating, including those using media, applications or what is commonly referred to as e-learning. E-learning is considered capable of increasing understanding of knowledge and increasing student interest in learning. In addition, e-learning provides interactive learning options that can be combined using millennial technology. Learning becomes more effective, easy, and fun for students. Students can access learning materials and even additional information via the network. (Susilo & Suhardi, 2018).

effective interactive learning that can be utilized by educators in helping their students is by using Lectora inspire. Lectora Inspire is software in the computer world that can be used in developing learning. The use of this tool is quite easy/simple and does not require an understanding of complex programming languages. This device allows teachers to compose interesting learning materials, either in the form of videos or images and animations related to
the subject matter. In addition, learning designs using applications can be used online or offline so that they do not hinder students in using them.

Based on the description on this background, the writer is interested in innovating teaching materials through digital modules with the topic "Development of Short Story Writing Teaching Materials with the Lectora Inspire Media-Assisted Concept Map Method in Class XI SMA Negeri 1 Tigapanah"

2. Method

The location that will be used in this study is class XI SMA Negeri 1 Tigapanah, Karo Regency with the research time being in the even semester of the 2021/2022 academic year. The high school is a public school located on Tigapanah Street, Number 1, Tigapanah, Karo Regency. The research subjects were students of class XI SMA Negeri 1 Tigapanah, Karo Regency. The initial first stage is conducting an initial investigation phase, namely carrying out a needs analysis at SMA Negeri 1 Tigapanah, Karo Regency by distributing questionnaires to 3 teachers and 35 students of class XI SMA Negeri 1 Tigapanah in May 2022.

teaching material uses the Plomp model (1997) because it is considered more flexible and flexible than other models. There are five (5) phases of the research using the Plomp model, namely, the preliminary investigation phase, the design phase, the realization/construction phase (realization/construction), and the test, evaluation and revision phase (test, evaluation), and revision) and implementation (implementation).

Research and development model is a research method that produces a product, and tests the effectiveness of the product. The development procedure that must be carried out to produce short story writing teaching materials using the concept map method in class XI SMA Negeri 1 Tigapanah, Karo Regency using the Plomp development model. The development procedure taken to produce teaching material products will be divided into five stages, namely: (1) Initial investigation stage. The activities carried out in the preliminary study are: Conducting a theoretical study of learning with the concept map method assisted by the media Lectora inspire and learning to write short stories and discover related research results. Conducting pre-field surveys. This is intended to obtain an initial description of the conditions of learning to write short stories carried out by teachers and students at the school. The conditions referred to are the learning methods used, the design and learning materials that are prepared, the availability of existing facilities, and the teaching and learning process that takes place between teachers and students. (2) Design phase, At this stage will be carried out: Designing problem solving (solution) starting from the problem definition from the initial investigation phase, compiling product/module designs which include; Competency Standards, Basic Competencies, Materials, Learning Objectives, Methods, Strategies, Media, and Evaluation tools. Planning field trials which include; form of activity, place of activity and time. Product validation and material validation and discussing the results with the supervisor to get improvements to the initial draft before being tested. This phase aims to prepare teaching materials/modules as a result of research development. The learning stages arranged in modules using the concept map method based on Sugiar's opinion in Purwodo (2012: 18) are described as follows: Delivering competency standards, Presentation of material, Directing students to prepare tools the necessary tools and materials (paper, colored markers, pencils, erasers, and rulers), Provide an explanation of the use of concept maps, Distribute material with the concept map method assisted by the Lectora inspire media, Reflect and evaluate. (3) Phase of
Realization/Construction (Realization/Construction) At this stage the design or initial draft that is arranged is then realized for problem solving. This phase will produce the basic form of the product according to the design in the design phase. (4) The Test, Evaluation and Revision Phase (test, evaluation and revision) is conducting tests and evaluations of the products that have been compiled. The product will be tested in practice for further evaluation to collect and analyze information systematically so that the realization value of the solution is obtained. In addition, in this phase validation is also carried out to material experts and design experts. The results of the practice analysis and validation from the two experts will then be used as a reference for making revisions. (5) Implementation Phase namely the phase where the product will be applied in a broad scope of education.

Data analysis in the preliminary study is descriptive qualitative or explanations with a logical narrative of the data and explanations for the validation data will be described in a quantitative descriptive manner. Questionnaire data collected from learning materials experts, learning design experts, and students were analyzed descriptively using a Likert scale using the formula proposed by Sudjono (2009:43) as follows:

\[ x = \frac{f}{N} \times 100 \]  

Description,

\( x \) : percentage number
\( f \) : the frequency to be searched for the percentage
\( N \) : Number of case (number of frequencies)

With the criteria for the percentage score of the assessment according to [4] as shown in table 1. following:

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Good (SB)</td>
<td>75% ≤ X ≤ 100%</td>
</tr>
<tr>
<td>2</td>
<td>Good (B)</td>
<td>55% ≤ X ≤ 75%</td>
</tr>
<tr>
<td>3</td>
<td>Not Good (KB)</td>
<td>40% ≤ X ≤ 55%</td>
</tr>
<tr>
<td>4</td>
<td>Not Good (TB)</td>
<td>X ≤ 40%</td>
</tr>
</tbody>
</table>

Data or scores from the assessment results from learning material experts and learning design experts are then used as the basis for determining the criteria for assessing the feasibility of developing the model. The score of the assessment results from the experts is then converted into a value to obtain the eligibility criteria.

| Table 2. Eligibility Assessment Criteria |
3. Results And Discussion

3.1 Product Feasibility Test Research Results
Based on the results of the validation carried out, the short story writing teaching materials using the concept map method were declared suitable for use as learning media. The results of the questionnaire that has been submitted to the material expert gave a response of 88.32% that the teaching material for writing short stories using the concept map method is feasible because it contains material and delivery criteria that meet the requirements for delivering messages to students. Learning design experts gave a response of 95.54% that teaching materials for writing short stories with the concept map method can be used because they have been designed in such a way and meet learning design standards. The results of the limited field trial gave a response of 83.25% that teaching materials for writing short stories using the concept map method were feasible to use. The results of the small field trial gave a response of 84.76% that teaching materials for writing short stories using the concept map method were suitable for use in learning.

Based on the results of validation and testing, teaching materials for writing short stories with the concept map method are very suitable for use in the learning process of writing short stories. Thus, the media is very suitable to be used in the learning process to write short stories to support the effectiveness of the learning process.

3.2 Discussion of Product Effectiveness Test Results
Test the effectiveness of learning products, namely teaching materials for writing short stories with the concept map method by comparing the average test results of students who study with learning products that have been developed with the average value of tests of student learning outcomes who learn by using the module.

Based on the results of the data analysis, the effectiveness of the product after using teaching materials for writing short stories with the concept map method assisted by the media Lectora inspire is 89.17%. While the learning outcomes before using teaching materials to write short stories with the concept map method assisted by the media Lectora inspire is 70%. This proves that the use of short story writing teaching materials with the concept map method is more feasible and effective in improving students' competence and knowledge than before using short story writing teaching materials with the concept map method because the short story writing teaching materials with the concept map method are arranged based on competence and learning objectives and access to these teaching materials is obtained within the scope of the school. This is also in line with the findings of previous research conducted by [8] and also research conducted by Subakti [9] which showed the effectiveness of the concept map method in short story writing learning materials.
4. Conclusion

Based on the formulation of the problem, objectives, as well as the results and discussion of research on the development of short story writing teaching materials using the concept map method that has been described previously, the following conclusions can be drawn: The process of developing short story writing teaching materials using the concept map method assisted by Lectora inspire media in class XI SMA Negeri 1 Tigapanah, Karo Regency as a whole, from the aspect of the assessment given by the product design reviewer, the development of teaching materials for writing short stories using the concept map method was very good. The product of short story writing teaching materials using the concept map method with the help of Lectora inspire media which was developed for class XI students of SMA Negeri 1 Tigapanah has met the requirements and is suitable for use as teaching materials. This is concluded based on the results of assessments from learning material experts (88.32%), learning design experts (95.54%), limited field trials (83.25%), and field trials (84.76%) which overall stated that short story writing teaching materials were “very good” concept map. The use of short story writing teaching materials with the concept map method assisted by the Lectora inspire media that was developed is considered effective in improving student learning outcomes. This can be seen from the learning outcomes of students who were taught after using short story writing teaching materials with the concept map method assisted by the Lectora Inspire media, which was higher than the learning outcomes of students who were taught before using short story writing teaching materials with the concept map method assisted by the Lectora Inspire media. Based on the results of the pretest assessment with an average value of 70% while the posttest with an average value of 89.17%.

References

Development of Interactive Learning Media Based on Multiliteration for Ability to Develop Exposition Texts in Class X Students of SMA Negeri 1 Salapian

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Abstract. Interactive learning media based on multiliteracy is designed to be used by students at school and at home. This study also aims to help Indonesian teachers in Indonesian learning at school. This research was conducted at SMA Negeri 1 Salapian by taking samples for testing using interactive media based on multiliteracy in Class X students of SMA Negeri 1 Salapian using the R&D method by Borg and Gall (2003:570) which consisted of the preliminary study stage, initial product development and product trial. The value of the daily test results before using interactive media as a pretest and test scores using interactive media as a posttest were then compared to determine whether or not there was an effect after using this interactive media. The final result of this development research is that the difference between the pretest and posttest is 9.53, the increase in score is greater than before.

Keywords: Media, Interactive, Indonesian, multiliteracy

1 Introduction

Multiliteracy-based learning is one of the learning designs used in the context of K 13. The concept of multiliteracy is designed to answer the skills needed in the 21st century. Meeting the demands of the 21st century, teachers should choose appropriate, effective learning strategies that are also able to stimulate students to think critically. Technology, especially multimedia, has an important role in the learning process. In the learning process, apart from teachers and students very important elements are learning methods and learning media.

The research of Cahyasari, I (2016) are similar studies that discuss the development of interactive learning media. Researchers essentially concluded in research that interactive learning media can provide effectiveness in learning. Learning media is very important in its contribution to learning, so a good learning media is needed in the learning process, especially Indonesian language lessons.
Language is the driver of knowledge of all kinds of knowledge using language as a medium of delivery. [1]

Language is one of the most important things in life, especially Indonesian. Interesting and interactive learning media are very important to support the Indonesian language learning process, especially in exposition text material. It is unfortunate that there is no interactive learning media available in schools to support Indonesian language learning. The teaching process in Indonesian language learning feels stiff and lacks creativity, without interactive media it makes students feel bored to the point of difficulty in understanding the lesson so that the value obtained is relatively low, even only at a sufficient percentage. Multiliteracy-based interactive learning media will be a new nuance in learning.

2 Methods

This study uses the Research and Development (R&D) method at level IV. Sugiyono, 2017:47 Research and Development (R&D) method at level IV which refers to the research of the Borg and Gall model to research, test, and develop existing products and are adapted based on the research model [2]. This research was conducted at SMA N 1 Salapian by taking samples for testing of interactive media based on multiliteracy in Class X students at SMA N 1 Salapian.

3 Results and Discussion

3.1 Research Results

This research is a development research, so the product of this research is an interactive learning media based on multiliteracy.

Needs Analysis. Before testing the feasibility of learning media, researchers first analyzed the needs of teachers and students for multiliteracy-based learning media. It is known from the results of the teacher's questionnaire analysis where 100% of teachers stated that there was no multiliterate-based exposition text learning media. 100% of teachers have never used multi-literacy-based learning media and from these students it was found that 85.15% of students answered that they needed multi-literacy-based learning media.

Testing the feasibility of the Assessment

Instrument. Based on the results of the study showed that results of the validation of material experts and design experts on learning media. The results of material expert validation on the feasibility of content obtained an average of 84.37% in the "Very valid" category, the presentation feasibility aspect obtained an average of 93.75% in the "Very valid" category and the language assessment obtained an average of 93.05% in the "Very valid" category. For graphic assessment by design experts, an average of 77.60% was obtained in the "valid" category.
Analyzing effectiveness learning. Based on effectiveness analysis the assessment instrument of the two teachers obtained reached 93.05% and for the thirty students obtained 85.80%, meaning that this assessment the instrument is effective. Based on the results of the test of student learning outcomes in writing exposition texts. At the time of pretest obtained an average of 70.68 and at the time of posttest obtained an average of 80.21. The difference between pretest and posttest is 9.53 which indicates that learning using multiliterate learning media in exposition text material is better than before. research on the feasibility and effectiveness of multiliterate-based interactive learning media is said to be good and feasible to use as a learning reference.

3.2 Discussion

Characteristics of Developing Interactive Learning Media Writing Exposition Texts Based on Multiliteration for Class X High School Students. The characteristics of the development of interactive learning media in writing multiliterate-based expository texts for class X high school students are based on theoretical analysis and analysis of the needs of students and teachers. Based on these results, it can be described the characteristics of media development in developing interactive exposition texts based on multiliteracy. Abidin (2015: 258) The characteristics of multiliterate learning media are: multiform, multicreative, and multifunctional. Rich in nature, which is able to reflect all authentic literacy models that exist in everyday life. Child-friendly, which is in accordance with the authentic experience of the child and in accordance with the various characteristics of other children. Elaborative is concerned with all types of literacy. Comprehensive, namely the model with respect to various fields of science. [3]

After the interactive learning media products developed in web form have been completed, the next step is checking. Checks are carried out both internally and externally. If the product runs smoothly without a hitch, proceed with the product validation stage. The product validation stage is carried out by material experts, media experts, and practitioners (teachers), then finally proceed to the trial stage, namely testing to students. The results of the assessment of material experts, media experts, and practitioners (teachers) on product quality indicate the feasibility of interactive learning media content in learning to develop multiliterate-based exposition texts for class X high school students including in the good category. Likewise, the results of the assessment of material experts, media experts, and practitioners (teachers) on product quality in terms of presentation feasibility, language feasibility shows that the results of material expert validation on content feasibility get an average of 84.37% in the "Very valid" category, the presentation feasibility aspect gets an average of 93.75% in the "Very valid" category and the language assessment obtained an average of 93.05% in the "Very good" category. For the graphic assessment by design experts, an average of 77.60% was obtained in the "valid" category. Interactive learning media in learning to write expository texts based on multiliteracy for high school students grade X is considered effective based on the results of the pretest obtained an average of 70.68% and at the time of post-test obtained an average of 80.21%. The difference between pretest and posttest is 9.53% which indicates that learning using multiliterate learning media in exposition text material is better than before.
Prototype and Results of Expert Assessment of Interactive Learning Media Writing Exposition Texts Based on Multiliteracy. The resulting interactive learning media products are packaged in web form. The production process of this interactive learning media is processed in the ISpring program. Broadly speaking, the interactive learning media product developed contains: (1) core competencies and basic competencies, (2) instructions for use, and (3) subject matter (4). Profile (5) learning activities 1 (6) learning activities 2 (7) evaluation (8) interactive quiz (9) discussion room. For more details, the process of research and development of multiliteracy-based learning media is described as follows. The main homepage contains the title of the learning media and the Start icon to enter the learning media view. Color selection has also been consulted with media design experts. This homepage displays the logo, namely the UNIMED logo. This main menu section contains 6 menus of 1) core competencies and basic competencies, (2) instructions for use, and (3) subject matter (4). Profile (5) learning activities 1 (6) learning activities 2 (7) evaluation (8) interactive quiz (9) discussion room. At the top of the main menu there is the title of learning media. At the bottom corner of the learning media there is a button that functions to close the program.

This part of the learning media contains 3 learning materials, namely Learning Activity 1 includes basic competencies, identifying the contents of the exposition text, distinguishing facts and opinions from the exposition text, completing the thesis with supporting arguments, retelling the ideas in the exposition text, and exercises. Learning activities 2 include revealing the structure of the exposition text, knowing the linguistics of the exposition text, analyzing the structure and language of the exposition text, compiling the exposition text and exercises. A discussion room is also provided for teacher or student questions and answers as well as a student discussion room for group division.

There is a Mozart Symphony No. 40 In G Minor, K.550 [complete]. According to Claudia Katika Panutan's research (2016) entitled the influence of Mozart's classical music on spatial ability, it shows that Mozart's classical music has a significant effect on spatial ability (p= 0.034; p<0.05).[4] This learning media also contains interactive quizzes in the form of multiple choice.

This study was adapted using Borg and Gall's R&D research, there were 10 stages, namely; The first stage is to find relevant literature sources and research results; analyzing the need for interactive media for learning to write multiliteracy-based exposition texts for students of class X SMA. The second stage is compiling the characteristics of interactive media development in developing multiliteracy-based exposition texts for students of class X SMA. The third stage is to design interactive media in developing multiliteracy-based exposition texts for students of class X SMA as needed; preparation for the preparation of interactive learning media. The fourth stage is expert validation of interactive learning media. The fifth stage is the first revision of the main product based on the advice of expert validators and teachers.

The sixth stage is individual trial (individual group questionnaire by 3 students with characteristics of high, medium, and low ability); Assessment questionnaires are given to users individually with the aim of knowing the validity of the product after it has been repaired based on a review consisting of three students. The input from this individual trial is then used as a basis for making improvements to the product.

The seventh stage is the second revision of the product if it requires revision; Small group trial (9 students), using a questionnaire. If there are deficiencies that need to be corrected from the
developed product, it will be revised. The eighth stage of the third revision of the results of the small group trial if necessary; Limited field group trial (32 students) namely class X SMA N 1 Salapian.

The ninth stage The fourth revision of the product if it still exists, analyzing and processing data, making conclusions. Stage ten The final product of multiliteracy -based learning media is learning media that has been developed and is ready to be applied to exposition text learning activities to help students improve understanding of the material being taught. The data in this study include three types of data, namely the results of observations, interviews, and questionnaires.

**Product acceptance.** Interactive learning media in learning to develop multiliterate -based exposition texts for high school students in class X is needed to support students' success in learning to develop exposition texts. The need for interactive learning media must be adjusted to the appropriateness standards of interactive learning media. Interactive learning media in learning to develop multiliterate-based exposition texts for X grade high school students is considered valid by experts.

Interactive learning media in developing multiliterate-based exposition texts for high school students in class X has been tested on students at school. This media got a response, positive results from students and teachers with evidence of increased ability to use interactive learning media. Based on these data, the researcher concluded that interactive learning media in learning to write expository texts could be accepted by students and teachers.

**Product benefits.** Interactive learning media in learning to develop multiliterate -based exposition texts for high school students in class X is important to support Indonesian language learning, especially the material for developing exposition texts. The focus of this interactive learning media is to train students to be able to develop exposition texts. In addition, there is also information about exposition texts and interactive quizzes.

Interactive learning media in learning to develop multiliteracy -based exposition texts for high school students in class X are designed in an attractive way so that students will not feel bored when practicing writing exposition texts. As is known, Indonesian subjects have an important role in K13. Indonesian language subjects at K13 are text-based and serve as a paradigm for the development of language functions. Not only as a medium of communication, Indonesian is also a source of knowledge.

The position of Indonesian as the state language that functions in the development of culture and the use of modern science and technology. This interactive learning media has been adapted to the characteristics of the text-based curriculum, so that if this interactive learning media is used outside the classroom, students can still understand the learning flow of this interactive learning media. Students who are accustomed to learning with a text-based curriculum will easily know the flow of thinking of this interactive learning media, so that independent learning will be effective. Likewise, students who are not familiar with the text-based curriculum, with an attractive design, students who play this interactive learning media will easily understand the material and flow of thinking contained in interactive learning media in learning to write multiliterate exposition texts for high school students in class X.
In addition, the content contained in interactive learning media in learning to write multiliterate exposition texts for high school students in class X is very useful to strengthen and preserve Indonesian culture. Students will be accustomed to making observations related to the culture that is used as writing material. Students know more about the culture that exists in Indonesia by practicing developing exposition texts from this interactive learning media.

4 Conclusion

Multiliterate-based interactive learning media can have a positive impact on increasing student learning motivation. Students are increasingly developing in the world of technology as well as increasing student literacy. It is clear that the use of multiliterate-based interactive learning media is one of the supports that can increase students' learning motivation in learning Indonesian.

References

The Effectiveness of Teaching Materials for Procedure Text Assisted by Powtoon Media for Students Class VII SMP Negeri 1 Sibolga

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Abstract. The purpose of this study was to describe the effectiveness of using procedural text learning materials assisted by Powtoon media in improving student learning outcomes. This research is included in the type of research and development (R&D) using data analysis on the assessment of learning outcomes in writing procedure text with qualitative analysis techniques. The effectiveness of procedural text teaching materials assisted by powtoon media showed an increase of 10.37% from 73.53% pretest results to 83.90% posttest results. The overall results of this study indicate that the teaching materials of procedural text materials assisted by powtoon media are declared to be feasible and effective to be used in the learning process.

Keywords: Teaching materials, procedure texts, powtoon media

1 Introduction

Indonesian language learning in junior high schools presents various types of texts, one of which is procedure text. The description of the Basic Competencies taught in procedure texts are (1) 3.5 making procedure texts on how to do things and ways (how to play musical instruments/regional dances, how to make regional specialties, etc.) from various sources that are read and listened to, (2) 4.5 Summarizing the contents of procedural texts about how to do something and how to make (how to play musical instruments/regional dances, how to make regional specialties, etc.) from various sources that are read and heard, (3) 3.6 Reviewing and linguistic aspects procedure text on how to do something and how to make (how to play a musical instrument/regional dance, how to make souvenirs, etc.) from various sources that are read and heard, and (4) 4.6 Presenting the data of a series of activities in the form of procedural text (about how to play regional musical instruments, regional dances, how to make souvenirs, etc.) by paying attention to the structure, linguistic elements, and oral and written content.

These Basic Competencies will later be developed in the form of interesting and motivating teaching materials so that students are expected to be able to present data on a series of activities in the form of procedural texts by paying attention to structure, linguistic elements, and content independently. Indonesian subjects are one of the compulsory subjects for students. There are four skills in language that must be mastered by every student. These four skills include: listening skills, speaking skills, reading skills, and writing skills. The learning process is related
to a series of activities that involves various components which include, learning objectives of learning materials, learning media and evaluation [1]. The habit of increasing knowledge is getting less due to the impact of technological developments. Most of the students prefer to play games with laptops or gadgets [2]. Currently, students also tend to be less interested in reading if the teaching material is thick and less interesting. So there needs to be an effort to make teaching materials something interesting, so that it will give pleasure to participants students to be interested in seeing books and reading them [3].

Appart to teaching materials, media can be used as a tool in the teaching and learning process so that children do not feel bored and bored during the learning process in the classroom. The teacher realizes that without the help of the media, the learning materials are difficult for every student to understand, especially complex or complex learning materials. The use of learning media that attracts the attention of students is expected to help students improve students' understanding in studying procedural texts. Learning media is a component of a delivery strategy that can contain messages that will be conveyed to students in the form of people, tools, and materials [4]. Learning media can be understood as everything that can convey and distribute messages from sources in a planned manner so as to create a conducive learning environment where the recipient can carry out the learning process efficiently and effectively [5].

Based on the results of initial observations made by researchers on March 22, 2021 at SMP Negeri 1 Sibolga, students still experience obstacles that often arise in teaching and learning activities, especially in procedural text material. Students are still less active, look bored, and less enthusiastic about paying attention to the teacher when the teacher explains the procedural text material. At the school, teachers only use powerpoint as a medium in the procedure of learning texts. But powerpoint is used if you have time. If you don't have time, the teacher only uses the whiteboard to explain the text procedure. According to the teacher, when learning is interspersed with several pictures or videos, students become more active and enthusiastic in the learning process.

In this case it can be said that the teacher does not optimally utilize the use of learning media in delivering learning materials to students. Delivery of messages using the lecture method and the use of the blackboard makes learning uninteresting and monotonous. This results in a lack of student interest in learning and results in a lack of student understanding. Students' interest in studying procedural texts is evidenced by obtaining student assignments on average getting a score of 70 and still not passing the Minimum Completeness Criteria (KKM) in the Indonesian language study field, which is 78. Teachers only use media so that students do not expect to learn because the learning process is slow. continuously using only the same learning module.

Solutions to solve existing problems, teachers to be more creative in the development of learning media, as an effort to improve the quality of learning in schools. One of the teacher's creativity in question is being able to design various learning media that are suitable for learning.

The relevant study related to this research is the thesis written by Bastiar Ismail Adkhar in 2016 entitled Development of Powtoon-Based Learning Animation Video Media in Grade 2 Natural Science Subjects at SD Labschool UNNES [6]. The research resulted in a product in the form of an animated Powtoon video for natural science learning at SD Labschool UNNES. The research method used is using qualitative methods combined with classroom action research. The differences and similarities contained in the topic of research conducted by Bastiar Ismail Adkhar with research conducted by researchers. The difference between this research and
Bastiar Ismail Adkhar's research is that it is a preliminary researcher as a means for learning natural sciences for grade 2 students of SD Labschool UNNES. The similarity is that the research conducted by Bastiar Ismail Adkhar and the researcher is both using powtoon media for the development of teaching materials.

2 Literature Review

A. Teaching Materials
Teaching materials can also be interpreted as all forms of materials that are systematically arranged that allow students to learn independently and are designed according to the applicable curriculum. Teaching materials that are selected properly will provide many benefits, including students will be interested and grow their interest in mastering and mastering the material that has been given.

Teaching materials are a set of learning tools or tools, methods, limitations, and ways of evaluating that are designed systematically and interestingly in order to achieve the expected goals, namely achieving complex potential [7]. Teaching materials in general are all materials (text, tools, information) that are summarized regularly by presenting a complete figure of competence that will be understood by students and used in the learning process with the aim of planning and observing the implementation of learning [8]. In principle, all books can be used for study material learning, as long as it is relevant to the subject matter of the lesson [9].

It can be conclude that teaching materials used to facilitate the learning process. Teaching materials are arranged with reference to the curriculum used so that the learning process can run smoothly and learning objectives can be achieved in accordance with learning competencies.

B. Procedure Text
Procedure text is a text that contains steps that must be followed so that a job can run properly rule. Procedure text describes how something can be done through a series of steps or actions. Procedure text is the type of text that can be found around us [10].

Procedure text is a text that provides instructions on how to do something through a series of actions or steps/shows several stages in accordance with predetermined step [11].

So, the procedure text is a text that explains the stages in a systematic activity with the aim of providing information to the reader so that they can carry out these activities in everyday life.

C. Powtoon Media
Powtoon is a company engaged in the field of information and communication technology. The company was founded by Ilya Spitalnik and Daniel Zaturansky on 24 October 2011 located in London, United Kingdom. This Powtoon company operates online and is service providers in the form of web apps to create presentations or animated cartoon videos in an easy way. Powtoon has very interesting animation features, including handwritten animation, cartoon animation, and more vivid transition effects and easier timeline settings. By using Powtoon we will find it easier to create animations for videos or presentations.
3 Method

This research is a research development (R&D) method used to develop teaching materials for procedural texts assisted by Powtoon media. The research development model used is Borg & Gall. R&D Method using data analysis on the assessment of learning outcomes in writing procedure texts using qualitative analysis techniques. The analysis is useful to see if there is a significant difference in student learning outcomes using teaching materials in the form of a procedure text module assisted by Powtoon media.

This research was conducted on seventh grade students of SMP Negeri 1 Sibolga. The population of this study were students of class VII-1 of SMP Negeri 1 Sibolga. The effectiveness of procedural text teaching materials assisted by Powtoon media that has been developed is known by conducting an effectiveness test. The effectiveness test on the module is done by giving a written test in the form of a description to class VII-1 students, totaling 30 people. The test is given before and after using the module with the aim of seeing an increase in student learning outcomes. The analysis is useful to see if there is a significant difference in student learning outcomes by using the module, so the formula used is the formula for calculating the effectiveness as follows.

\[
\bar{x} = \frac{\text{Total score obtained}}{\text{The total number of ideal scores for all times}} \times 100
\]  

4 Results And Discussion

4.1 Analysis of Improved Learning Outcomes

This is to determine the increase in student learning outcomes in the procedural text. Between before and before using the module that developed in learning.

<table>
<thead>
<tr>
<th>Mastery Level</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 ≤ Score ≤ 100</td>
<td>Very good</td>
</tr>
<tr>
<td>71 ≤ Score ≤ 85</td>
<td>Good</td>
</tr>
<tr>
<td>56 ≤ Score ≤ 71</td>
<td>Enough</td>
</tr>
<tr>
<td>41 ≤ Score ≤ 56</td>
<td>Less</td>
</tr>
<tr>
<td>0 ≤ Score &lt; 41</td>
<td>Very Less</td>
</tr>
</tbody>
</table>

To find out whether there is a difference between the pretest and posttest scores of one sample before and after the learning process is carried out. The results of data analysis on student learning outcomes in procedural text material before using the procedure text learning module assisted by Powtoon media obtained an average score of 75.87 with "good" criteria. The results of the pretest scores carried out on 30 students can be seen in the following frequency distribution table.
**Table 2. Frequency Distribution of Student Pretest Results on Procedure Text Materials Before Using Procedure Text Teaching Materials Assisted by Powtoon Media**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 – 72</td>
<td>16</td>
<td>53</td>
</tr>
<tr>
<td>73 – 75</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>76 – 78</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>79 – 81</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>82 – 84</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>85 – 87</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Σ</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the data contained in the table above, it can be seen that students who scored 70-72 were 16 people with a percentage of 53%, students who scored 73-75 were 8 people with a percentage of 27%, students who scored 76-78 were 1 person with a percentage of 3%, students who scored 79 – 81 were 2 people with a percentage of 7%, students who scored 82 – 84 were 3 people with a percentage of 10%, and students who scored 85 – 87 were 0 people with a percentage 0%. For more details, the frequency distribution table on the pretest can be described in the form of the histogram below.

**Fig 1. Frequency of Pretest Score Results Before Using Procedure Text Teaching Materials Assisted by Powtoon Media**

The results of data analysis on student learning outcomes in procedural text material after using the procedure text learning module assisted by Powtoon media obtained an average score of 83.90 with the criteria of "very good".

The results of posttest scores on 30 students can be seen in the following frequency distribution table.
Table 3. Frequency Distribution of Student Posttest Results on Procedure Text Materials After Using Procedure Text Teaching Materials Assisted by Powtoon Media

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>76 - 79</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>80 - 83</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>84 - 87</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>88 - 91</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>92 - 95</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>96 - 99</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>∑</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the data contained in the table above, it can be seen that students who scored 76 – 79 were 6 people with a percentage of 20%, students who scored 80 – 83 were 12 people with a percentage of 40%, students who scored 84 – 87 were 4 people with a percentage of 13%, students who scored 88 – 91 were 5 people with a percentage of 17%, students who scored 92 – 95 were 3 people with a percentage of 10%, and students who scored 96 – 99 were 0 people with a percentage 0%. The results of the frequency distribution above can be seen in the following histogram form.

Fig 2. Frequency of Posttest Score Results After Using Procedure Text Teaching Materials Assisted by Powtoon Media

Based on the results of the pretest and posttest on procedural text material carried out by class VII-1 students of SMP Negeri 1 Sibolga, there was an increase in learning outcomes in the learning process using the procedure text learning module using powtoon media so that the effectiveness of teaching materials developed on student learning outcomes in class.

5 Conclusion

After doing the research it is found that the use of procedural text teaching materials assisted by powtoon media is declared effective in improving student learning outcomes in procedural text materials. This is supported by student learning outcomes which have increased after using the developed module. Based on the results of data analysis before using the module (pretest) an average score of 73.53 was obtained, then for the results of data analysis after using the module (post-test) an average score of 83.90 was obtained. Thus, there is an increase in student learning outcomes before and after using the procedure text learning module with an increase of 10.37.
The score obtained before using the procedure text learning module in this aspect of procedure text writing was 258 with an average of 8.6. However, after using the procedure text learning module, the score obtained was 321 with an average of 10.7. The improvement in writing procedure text after using the procedure text learning module is that as many as 7 students get a score of 13 with the criteria of "very good" and 23 students get a score of 10 with the criteria of "good". Meanwhile, before using the procedure text learning module, 9 students scored 10 with "good" criteria and 21 students scored 8 with "enough" criteria in writing procedure text.

References


Policy Implementation Learn from Homes in State High Schools of Medan City based on SE Kemendikbud Number. 15 of 2020

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Abstract. This research aimed to describe the implementation of learning from home policies at SMA Negeri Medan City based on SE Kemendikbud No. 15 of 2020, as outlined by Edward III's policy implementation theory. This study is descriptive and employs a qualitative research style. Data was gathered via interviews, papers, and observations conducted with the Head of the South Medan Education Office Branch, school principals, and state high school instructors in Medan City. The study's findings indicate that the policy's substance does not explain graduating standards, teachers' lack of self-development, and poor interest in attending seminars, workshops, and online apps created by the government and academics.

Keywords: Policy, Implementation, and Home-Based Learning

1 Introduction

Conscious and planned human effort in self-improvement to achieve good trust, self-control, character, ability, and good behavior by creating an atmosphere and learning process, which is the meaning of education for humans who have quality and can play a candle in the times. Amidst changing to realize competence, it is very dependent on those who regulate education governance that can recognize the wishes of the people based on religion, belief, income, and level in society, state, peace, habits, work pressure, development, and state needs. This means that a review of the establishment of educational policies should look at various aspects and problems that are vital for the people, the state, and the pressures of the times.

The world of education is currently facing health problems that have shaken the whole world. The simultaneous discovery of pneumonia in the South China seafood market in Wuhan, Hubei Province, China, occurred in December 2019 (Chaolin Huang et al., 2020: 497–506). China's National Health Commission sent an expert to Wuhan to study the virus named COVID-19 (COronaVIrus Disease 19), which was found at the Virology Laboratory, Chinese Center for Disease Control and Prevention, on January 7, 2020 (The State Council of The People's
Republic of China. 2020. The total number of sufferers of the Covid-19 virus has increased and spread throughout China, even reaching the whole world.

Coronavirus disease (Covid-19) is shaking the world. The big event triggered by this infectious disease was beyond many people's predictions, even among practitioners and experts in the field of crisis management. Now all sectors are affected, including the world of education, even touching on the way of worship and social life.

Indonesia is one of the Asian countries affected by the COVID-19 outbreak. Released by the Covid-19 Task Force as of June 21, 2020, the number of confirmed positive patients increased by 862 to 45,891, and patients recovered from 18,404 and 2,465 people (imam Shubi, 2020). One of the steps to prevent coronavirus infection is to encourage health coronavirus to sit visits to crowded places and direct contact with other people, better known as Social Distancing. The application of social distancing means that a person cannot shake hands (physical touch) and maintain a distance of at least 1 (one) meter when interacting with other people during the Covid-19 pandemic. The implementation of social distancing carried out in the field of education includes studying from home (work from home), studying at home online for school and university students, and conducting online meetings or meetings via video and conference or teleconference.

In this regard, the Minister of Education and Culture of the Republic of Indonesia issued Circular Letter Number 6962/MPK.A/HK/2020, dated March 17, 2020, concerning Online Learning and Learning from Home in the context of Preventing the Spread of Covid 19. To respond further to Caused Covid 19 in the education sector, the government issued Circular Letter 4 of 2020 regarding implementing education in the Coronavirus disease (Covid-19) emergency. In this condition, education services in schools are implemented by Learning From Home (BDR) through distance learning. The goal is to provide a meaningful learning experience for students focused on life skills education, activities, and various learning tasks.

Policies include a work-from-Home system or Work From Home (work-from-home-schools and even learning at colleges as well as the online procedure is the result of the government's formulation. This government formulation comes from all societal events (Thoha, 2012). The COVID-19 epidemic has spread rapidly to people in almost all countries in the world. Thus, the government issued a policy of working remotely, namely WFH or working from home.

The Learning From Home policy in educational institutions significantly impacts the learning and assessment process. Therefore, the Circular Letter of the Ministry of Education and Culture Number 15 of 2020 concerning guidelines for implementing Learning from home has set the learning mechanism from home so that distance learning needs to be redesigned using an online, offline, or combination approach. Schools can take advantage of the availability of infrastructure to carry out the learning process optimally. Based on the Circular of the Ministry of Education and Culture Number 15 of 2020, the purpose of learning from home is to provide a meaningful learning experience for students, focused on life skills education, activities, and varied teaching tasks.

The North Sumatra Provincial Education Office is a branch of the Ministry of Education and Culture of the Republic of Indonesia which is in line with policy rules from the center based on the Medan Mayor Regulation Number 27 of 2020 regarding the adaptation of new habits during the COVID-19 pandemic in Medan City, namely regarding the BDR policy, especially in SMA Negeri in the City. Medan, one of the provincial capitals in Indonesia, uses the theory of George C. Edwards III, which is viewed from the aspect of Communication, resources, disposition, and
bureaucratic structure. According to George Edward III in Widodo (2010: 96), four factors influence success or failure, four factors influencing (1) communication, (2) resources, (3) disposition, and (4) bureaucratic structure. The reason for choosing the Edward III Theory is because the four variables or dimensions in the model built by Edward have a relationship between one factor and another in achieving the goals and objectives of the program/policy. All of them synergize to attain goals, and approaches based on Edward III's theory can answer problems regarding implementation that often occur in policy implementation activities.

2 Research Methods

The research uses qualitative, field, or case, study models. According to well, case study research is research that exam according to the a program, event, process, individual, or group activity. The location of the research implementation in the context of extracting data is in the object of the research title, namely the State Senior High School in the City of Medan under the auspices of the South Medan Education Office Branch Office, North Sumatra Province.

Objects or informants to obtain data sources in this study were the head of the high school section of the south field education office, the principal of the public high school, and the deputy head of the curriculum, teachings, and students public high school in the teachings, but students emphasized here that each informant used are people who have in-depth and relevant knowledge, implement policies and who receive the impact of policies.

The stages of research carried out in this study are: (1) Pre-Field Stage consists of developing a research design, Selecting a research location based on a preliminary analysis, Managing permits, and Determining respondents, Determining resealed instruments. (2) The Field Activity Phase consists of entering the field, holding interviews and observations, and conducting interviews with the head of the education office, principal, teachers, and parents of students. (3) The Data Processing Phase consists of selecting, clarifying, and summarizing data. (4) The Stage of Research Results that have been carried out by researchers who will later use or not Policy Learning From Home Through distance learning will be a recommendation for the government, education offices, and schools. The research will ultimately get results. The Learn work from Home Policy is based on the Circular Letter of the Ministry of Education and Culture Number 15 of 2020.

3. Results and Discussion

data from this study refers to George C. Edward III's Grand Theory (Agustino, 2014:149), which refers to four variables, namely Communication, resources, disposition, and bureaucratic structure, in implementing the Learning from Home Policy based on the circular letter of the Ministry of Education and Culture Number 15 of 2020 at the South Medan Education Office Branch and State High School in Medan City, can be described as follows:

3.1 The Communication Process in the Implementation of Home Learning Policies for State Senior High Schools in the City of Medan based on the SE Kemendikbud No. 15 of 2020

Based on the results of the study, the communication process in implementing the Learning from a home policy at a public high school in the City of Medan uses a form of Downward
section, which is Communication that goes down from one level to a lower level slowly towards the bottom. The standard policy communication process is carried out by the head of the Provincial Education Office to the Head of the Education Office Branch, the Head of the Education Office Branch to the school principal, and then the school principal has the responsibility to pass on information on SE Kemendikbud policy number 15 of 2020 to all staff, teachers, and parents of students.

The information received by the teacher is clear but not understandable enough to implement the Learning from a home policy at a public high school in the City of Medan, as interviews, monitoring results from the Education Office Branch and school supervisors, as well as reports on BDR activities that are reported to the Office Branch every month. The communication process about the BDR policy of Public Senior High Schools in the City of Medan is carried out consistently by the Branch Office and the Ministry of Education and Culture through the SIMPKB application on the teacher learning and sharing menu in the SIMPKB teacher application and Internet Social Media, Ministry of Education and Culture institutions such as P4TK often carry out online socialization, training and workshop activities (On the network) with Zoom Mett, but there is no obligation to participate in online socialization, training, and workshop activities so there is no firmness.

The success of leadership depends on the leader's ability to translate policies and ideas into practical terms that his followers can understand and implement. Handoko (2012:72) Communication is a process of transferring understanding through pictures or information from one person to another. The transfer of Learning involves not only the words used in conversation but also facial expressions, intonation, vocal focal points, etc. Furthermore, Dedy Mulyana (2005:22) provides an understanding of Communication as stated by Harold D. Laswell that Communication is the process of passing symbols, ideas, feelings, and thoughts to others by answering the questions "who say" thoughts to whom with what effect? (who says what, with what channel to whom, and how does it affect?). So it can be concluded that Communication is an activity of delivering and understanding messages, information and ideas conveyed in verbal and non-verbal forms from one person to another. from one person to another, it will create the same meaning and achieve the goals that have been set.

Based on the explanations of several research informants, the communication process in implementing the BDR policy was carried out with socialization organized by the South Medan Education Office Branch. Workshops, as for training activities and seminars carried out by the P4TK Education institution for each subject that is informed through social media which is carried out online, through the menu of learning teachers and sharing on the SIMPKB teacher account and also school policies using BOS funds as did SMA Negeri 3 Medan, while the Education Office Branch only acts as a facilitator. These two factors are causing the south Branch Office, not These two factors workshops, namely: first, the limited quota of participants in an activity. This is because the number of public and private schools under the auspices of the south Medan Branch Office is quite large, so there is a limited quota of participants in the implementation of activities, and there is no funding from the government because there have been school operational assistance funds (BOS) that have been distributed and handed over to schools that can be used—not budgeted for training activities and workshops depending on school policy.

Within the scope of schools, in addition to the principal, deputy principal, and staff, the implementation of SE Kemendikbud number 15 of 2020 is also disseminated to teachers and parents of students. The submission of the contents of the SE Kemendikbud number 15 of 2020
can be seen from the rein on BDR activities received by the Branch Office every month. However, it must be acknowledged that in some matters related to determining essential materials and meaningful Learning and adjusting learning standards, there are still shortcomings. This is in agreement with Edward III's argument that policies can be implemented as desired, so the implementation instructions must not only be accepted by policy implementers. It can be concluded that the indicators of clarity on the implementation of the Learning at home policy at public high schools in the City of Medan are going quite well. This can be seen from the participation of students in the learning process from home.

Based on the discussion above, it can be concluded that the communication process in implementing the Learning from a Home policy in public high schools in the City of Medan based on policy kemendikbud number 15 of 2020 uses the Downward Communication model (downward Communication). The clarity of informant received by the teacher is quite evident because the implementation of learning from home is going well, as evidenced by student’s participation in learning from home and the decrease in Covid-19 cases.

The Ministry of Education and Culture, in collaboration with P4TK and LPMP, Consistently socializes, holds online learning workshops that are informed of the registration link on social media, and develops Learning and sharing menus in the SIMPKB application. Actioners learn from each other and share that it is connected with all teachers in Indonesia. The South Medan Education Office branch has also carried out socialization and monitoring but has not yet held workshops and training due to the absence of funding allocations for training and workshop activities. The school principal submits training activities and workshops using the School Operational Assistance budget. There are still schools that have not held seminars and training for teachers due to limited BOS funds. However, socialization activities, workshops, and training seminars are consistently carried out by the Ministry of Education and Culture in collaboration with P4TK and LPMP online, who are informed of the registration link on social media.

Principal and teachers at public high schools in the City of Medan are also consistent in implementing the Learning from a home policy by conducting online Learning, conducting evaluation meetings three times a semester, and making reports on distance learning activities every month.

3.2 Resource Support in the Implementation of Home Learning Policies for State Senior High Schools in the City of Medan based on SE Kemendikbud number 15 of 2020

Based on the results of the study, it can be concluded that the support of resources in implementing the Learning from Home (BDR) policy for SMA Negeri in the City of Medan consists of human/staff resources, information, budget resources, authority, equipment resources/facilities are essential factors for the implementation of the policy. The number of staff in the South Medan Branch of the Education Office (Branch Service) is 4 (four) people, consisting of 1 (one) Head of the Senior High School Branch of the South Medan Service Office and three staff. Every public high school in the City of Medan has 4 (four) vice principals, 2 (two) Guidance Counseling (BK), and 4 (four) to 5 (five) teachers per 17 (Seventeen) subjects who are responsible for implementing the complete on of BDR in schools. In carrying out the task, the availability of supporting facilities used by all education staff and students is in the form of computers, printers, and wifi, which are available in the computer laboratory and their respective work units at public high schools in the City of Medan. Facilities in the form of laptops and internet quotas used by Medan State High School teachers use personal laptops and
percentages from the government. In addition, students use individual laptops and internet quotas from the government if there are problems with using facilities at school.

Budget resources in managing the implementation of BDR, funds in schools come from BOS funds (School Operational Assistance) of the Ministry of Education and Culture (Kemendikbud), and school committee funds. The principal has the authority to implement the BDR policy. The power of the implementers is formal, as evidenced by an assignment decree from the Head of the North Sumatra Province Education Office.

The success of policy implementation is highly dependent on the ability and use of existing resources. Resources, according to the KBBI, are factors of production consisting of land, labor, and capital used in one activity to produce goods and services. MTE Hariandja (2002:2) states that Human Resources is one of the most critical factors in a company, in addition to other supporting factors such as capital. Therefore, human resources must be appropriately managed to increase the effectiveness and efficiency of the organization. Then Sasongko and Parulian (2015: 2) argue that budgetary resources are activity plans that will be carried out by management in a period that is stated quantitatively. Information that can be obtained from the budget includes the number of products and their selling prices for next year".

Within the scope of the school, information is hierarchically sourced from the principal. The school principal provides information to all education staff regarding guidelines, instructions, procedures for implementation, technical implementation, and, also, eating regarding the performance of SE Kemendikbud number 15 of 2020.

This kind of information model can also be called an information model that Downward Communication (from superiors to subordinates). This information delivery model generally occurs in every institution or agency. This information delivery model certainly has advantages and disadvantages. The side of the benefits in a model like this is that the implementer obtains instructions or directions relating to the implementation of the policy from a clear source. Meanwhile, the downside is the delivery of information in layers, so that sometimes tricky for implementers to decide on something urgent. Because the work in the field sometimes does not fully match what has been written: "on paper."

Authority (authority legit the intimacy for policy implementers (implementers) that are formal. The legality of power in the implementation of SE Kemendikbud No. 15 of 2020 lies in the work units in two agencies. The first is at the North Sumatra Provincial Education Office Branch. It is responsible for coordinating, ensuring, and facilitating schools under the auspices of the South Medan Office Branch in carrying out the SE Kemendikbud No. 15 of 2020. In the institutional structure at the South Medan Branch Office, there is a field of work, namely the SMA Section. The SMA section is given the authority to monitor and evaluate the implementation of SE Kemendikbud number 15 of 2020.

In the implementation of the Ministry of Education and Culture's SE number 15 of 2020 concerning the Implementation of BDR Public High Schools in Medan City, two budgets can be spent for the benefit of facilities and infrastructure, namely the budget sourced from the Ministry of Education and Culture's BOS (School Operational Assistance) funds and school committee funds.

Regarding the source of funds, generally, madras, a committee fund, come from grants or donations from parents of students—the parents of these students get several gifts every month. Currently, BOS funds are generally used to pay the salaries of honorary teachers and the
fulfillment of consumable facilities and infrastructure. Meanwhile, the school committee funds are used for maintenance costs and unexpected costs.

The availability of supporting facilities for the implementation of SE Kemendikbud No. 15 of 2020 and a mandatory requirement for implementers is a set of computers/laptops, and internet networks, in addition to desks, rooms, and others which have become facilities that must exist in every agency. The availability of computers/laptops, printers, and internet networks at SMA Negeri in the City of Medan has been fulfilled by the needs in implementing BDR implementation management. In the process of implementing SE Kemendikbud number 15 of 2020, it seems that the physical facilities needed by the implementer do not have too many items because the dimension of resources for implementing the SE Kemendikbud Policy No. 15 of 2020 concerning the Implementation of BDR is closely related to the primary resource, namely budgetary (financial) resources.

Based on the discussion above, it can be concluded that resource support in implementing the learning policy from a public high school home in the City of Medan consists of human/staff resources, information, budget resources, authority, and equipment/facilities resources. Support of human resources/staff in implementing the BDR policy of Public SMA in Medan City totals four people consisting of 1 (one) Head of the South Medan Education Office Branch, 1 (one) Head of the SMA Section of the South Medan Education Office Branch and 3 (three) Section staff of the SMA Branch of the South Medan Education Office. In SMA, the entire education staff consists of the principal, vice principal, Counseling Guidance, and Teachers.

The budget for implementing the BDR policy comes from the North Sumatra Provincial Education Office's BOS (School Operational Assistance) and school committee funds. Furthermore, each position holder has their respective authority, which is the legitimacy of formal policy implementers (implementers). Then in carrying out their duties and responsibilities, the Head of the South Medan Education Office Branch and the principal of a public high school in the City of Medan are supported by adequate facilities such as laptops and internet networks in addition to comfortable tables, ch, an IRS, and rooms.

3.3 Disposition in implementing the Learning from home policy for public high schools in the City of Medan based on SE Kemendikbud number 15 of 2020

Based on the results of field research on dispositions in implementing the Learning From home policy at public high schools in the City of Medan, it was concluded that the appointment of sections and staff of the Branch Office of Education and all education personnel in senior high schools who were civil servants placed by the Governor of North Sumatra, while honorary staff and honorary teachers were selected. PNS teachers do not get incentives, while honorary teachers are given incentives from the central government and the Social Security Administration through Wage Subsidy Assistance.

Disposal is related to the implementers' attitude to support policy implementation. Good and bad policy implementation depends on the attitude response of the implementer in carrying out the policy. According to work commitment is an essential behavioral dimension that can be used to assess employee tendencies. Commitment is the involvement and desire of someone who is relatively strong in the organization to maintain membership in the organization and is willing to strive for the achievement of organizational goals. Furthermore, Robbins in Sopiah (155-156)
defines organizational commitment as "an attitude that reflects the likes or dislikes of employees towards the organization.

If the implementer has a positive attitude towards the implementation of the policy, it is possible that the procedure can be implemented in accordance with the policy objectives. On the other hand, if the implementers are negative, the policy implementation process will be hampered. Within the South Medan Education Office Branch, the South Medan Education Office Branch Head has the authority to appoint honorary staff and coordinate the senior high school and high school section heads in the City of Medan under the auspices of the South Medan Office Branch. While in the school environment, the principal has the authority to appoint honorary staff and teachers and coordinate all education personnel in the school.

So far, the people appointed by the head of the work unit have shown an attitude of support or a positive attitude towards the implementation process of SE Kemendikbud number 15 of 2020. This can be seen from the commitment of implementers to carry out roles, functions, and responsibilities related to SE Kemendikbud number 15, 2020. The promise of these implementers can be by the om level of student attendance following learning from home. As discussed in the "communication consistency" section, the achievement of the attendance of State Senior High School students in Medan City following learning from home is good. This achievement shows that there is a positive attitude from implementers in implementing SE Kemendikbud number 15 of 2020.

Then the provision of incentives to policy implementers (implementation) is one way to generate work motivation to implement a policy. Without specific incentives or additional costs obtained by the implementers, the process of implementing a policy will falter. Because according to George C. Edward III, a person moves not only based on the interests of the institution's progress but also in their sets for himself. So the provision of incentives can influence actions and create a positive attitude in carrying out their duties and responsibilities in implementing a policy. Within the scope of the school, all ASN employees have received incentives. The incentives provided are in the form of additional salaries, while honorary employees receive incentives in the form of wage subsidies from the central government and salaries from BOS funds.

Based on the above discussion, it can be concluded that the disposition in the implementation of the Learning from home policy for public high schools in Medan City is that the appointment of sections and staff at the South Medan Education Office Branch who are ASN are placed by the Governor of North Sumatra. In contrast, honorary staff and teachers are fully appointed based on prerogatives. Principal. The branch of the Education Office and all public high school education staff in the City of Medan have a significant commitment and desire for the advancement of education in the City of Medan. Then all ASN employees at the school received incentives, while the staff and teachers were honorary Batuan Subsidies. Wages come from the center, and salaries come from BOS funds.

3.4 Support of the Bureaucratic Structure in the Implementation of Home Learning Policies for SMA Negeri in the City of Medan based on the SE Kemendikbud No. 15 of 2020

Based on the results of research data regarding the support of the bureaucratic structure in the implementation of the Learning from Home (BDR) policy for public high schools in the City of Medan based on the SE Kemendikbud number 15 of 2020, it is known that the South Medan Education Office Branch and also public high schools in the City of Medan already have an organizational structure that is already in place. Determine the duties and functions of the
In implementing the BDR policy based on the Circular Letter of the Ministry of Education and Culture Number 15 of 2020 both at both Medan Service Branch and State Senior High Schools in Medan City, they do not have an SOP (Standard Operational Procedure on the technical implementation of the SE Ministry of Education and Culture No. 15 of 2020 concerning Guidelines for the Implementation of Learning from Home), intended for Elementary School/Madrasah Ibtidaiyah (SD/MI), Junior High School/Madrasah Tsanawiyah (SMP/MTs), and High School/Madrasah Aliyah (SMA/MA).

The structure within an organization is made to run the organization in the duties and functions of each position. The organizational structure is clear to separate the responsibilities and authorities of its members. According to Robbins and Coulter (2007:284), organizational structure can be interpreted as a formal organizational framework in which work tasks are divided, grouped, and coordinated. Furthermore, Hasibuan (2004:128) explains the organizational structure to describe the type of organization, departmental organization, position and authority of officials, fields ad, relationships, lines of command and responsibility, and span of control and organizational leadership system.

Within the scope of the South Medan Office Branch, the reference becomes the handle of the Head of the Education Office Branch in the process of implementing SE Kemendikbud number 15 of 2020. This means that the SOP on the technical implementation of SE Kemendikbud number 15 of 2020 is not formulated by the South Medan Office Branch, but implementation efforts and the performance of BDR running based on the workflow mechanism that has been defined in each field. The workflow is formed based on the division of tasks and responsibilities in each work unit area at the South Medan Education Office Branch.

SMA Negeri, under the auspices of the South Medan Office Branch in Medan City, the technical SOP on implementing the SE Kemendikbud No. 15 of 2020 has also not been formulated. As for matters relating to the performance of the BDR implementation, it is directly adjusted to the contents of the SE Kemendikbud number 15 of 2020. The SE Kemendikbud No. 15 of 2020 is a reference for schools to seek the availability of educational services within public high schools in the City of Medan.

Like wise, with the Medan Selatan Office Branch, the technical implementation of the implementation of SE Kemendikbud number 15 of 2020 is based on the working mechanism of school principals and teachers in carrying out their duties and responsibilities. Generally, principals monitor the implementation of learning from home, and teachers prepare for Online Learning (on the network) or BDR.

Although the SOP on technical work related to the implementation of SE Kemendikbud number 15 of 2020 is not stipulated in a formal policy, implementers still carry out their duties and responsibilities based on the work mechanisms contained in each unit or field of work. The working tool in each work unit is to provide uniformity to new implementers to adapt appropriate ways of working for implement kemendikbud No. 15 of 2020. In general, the duties of the Head of the Education Office Branch and the Head of the High School Section of the Education Office Branch are in the process of implementing the SE Kemendikbud number 15 of 2020 relates to the guidance, coordination, service for the implementation of BDR SMA Negeri under the auspices of the South Medan Office Branch.

Then the principal and teachers carry out the duties and responsibilities related to the implementation of the SE Kemendikbud No. 15 of 2020 and the implementation of Learning from home at the Medan City Public High School. The division of tasks in implementing the
SE policy of the Ministry of Education and Culture No. 15 of 2020 within the South Medan Education Office Branch and State Senior High Schools in Medan City has been determined firmly and clearly in the organizational structure. Each agency that is the implementer already has a working unit that functions and is responsible for implementing policies. A clear division of responsibilities will avoid overlapping the implementation of the SE Kemendikbud No. 15 of 2020 at SMA Negeri Medan City.

The South Medan Education Office branch has three sectional sections, and three staff are added in each area, namely the Head of the General Sub-Section, the Head of the High School Section on the ad, and the Head of the Vocational School. And the Medan Selatan Service Branch and Medan City Senior High School have their national structure on the above discussion. It can be concluded that the support for the bureaucratic system in implementing the BDR policy for public high schools in the City of Medan based on the SE Kemendikbud number 15 of 2020 the Branch of the South Medan Education Office and also public high schools in the City of Medan already have an organizational structure that has determined the duties and functions of positions. In implementing the Learning from Home policy based on the Circular Letter of the Ministry of Education and Culture No. 15 of 2020, the South Medan Education Office Branch and also public high schools in the City of Medan do not have an SOP (Standard Operational Procedure on the technical implementation of SE Ministry of Education and Culture No. 15 of 2020 regarding guidelines for implementing Learning from home intended for Elementary School/Madrasah Ibtidaiyah (SDMI), Junior High School/Madrasah Tsanawiyah (SMP/MTs), and High School/Madrasah Aliyah (SMA/MA).

4 Conclusion

Based on the results of research and discussion on the implementation of the policy of Learning From Home at State Senior High Schools in Medan City based on SE Kemendikbud number 15 of 2020 using the C. George Edward III policy implementation model, it can be concluded that: The communication process in the implementation of the BDR policy for Public Senior High Schools in the City of Medan based on SE Kemendikbud number 15 of 2020 is Communication from top to bottom with (a) Clarity of information received by teachers is relatively straightforward because it provides information on learning resources for teachers so that teachers are asked to be aware of their duties and responsibilities in increasing creativity. Learning from home by looking for information on social media regarding seminars, workshops, and training by educational institutions such as P4TK, LPM, P anther, ers and also the Ministry of Education and Culture developed a shared teacher menu program in the SIMPKB teacher application to share and learn with all teachers in Indonesia. Furthermore, the Ministry of Education and Culture, the South Medan Education Office Branch, School principals, is, and Teachers consistently carry out socialization, monitoring, and evaluation activities. However, there are no training, BIMTEK, and workshop due to the limitations of the Education Office Branch because there are many schools under the auspices of the South Medan Office Branch, and there is no budget from the Ministry of Education and Culture. Local and central governments, but the Ministry of Education and Culture consistently carries out socialization, workshops, or training in collaboration with educational institutions that are informed on social media and television, which are carried out online.

Support resources in implementing the BDR policy of SMA Negeri in the City of Medan consist of resource sources/staff, budget resources, authority, and resources facilities test for human
resources/staff in the implementation of the BDR policy of State Senior High Schools in the City of Medan are academic oral staff consisting of school principals, vice principals (WK) Curriculum, Student Working Groups, Public Relations WK, facilities and infrastructure WK, Counseling Guidance Teachers, and all teachers consisting of seventeen (17) subjects and each subject has four (4) to five (5) teachers in SMA Negeri in the City of Medan and is in teacher's task load, which is a maximum of twenty-four (24) hours of study per week. Then the budget resources for implementing this BDR policy come from the BOS (School Operational Assistance) of the Ministry of Education and culture and school committee funds. Formal. Then in carrying out their duties and responsibilities, all education staff and students at the Medan city public high school are supported by adequate facilities such as laptops, wifi intended as, and comfortable tables, chairs, and rooms.

The disposition in implementing the public SMA BDR policy in Medan City is the appointment of employees who are ASN carried out by the local government. In contrast, Honorary Employees are entirely appointed based on the prerogative of the principal, as well as the appointment of employees within the South Medan Education Office Branch. The South Medan Branch Office and the State Senior High School in Medan City have a significant commitment and desire to advance State Senior High School Education in Medan City. Then ASN employees received incentives in the form of adequate salaries and allowances. At the same time, honorary employees are given Wage Subsidy Assistance from the central government and the Social Security Administering Agency.

The support of the bureaucratic structure in implementing the BDR policy for public high schools in the City of Medan based on SE Kemendikbud No. 15 of 2020, it is known that the South Medan Education Office Branch and also public high schools in the City of Medan already have an organizational structure that has determined the duties and functions of positions. Circular of the Ministry of Education and Culture No. 15 of 2020. The branch of the South Medan Education Office and SMA Negeri in Medan City, do nant havStandardSanandard Operational Procedure) regarding the technical implementation of the SE Ministry of Education and Culture No. 15 tahtın 2020 regarding guidelines for the performance of BDR intended for Elementary Schools / Madrasas Ibtidaiyah (SD/MI), Junior High School/Madrasah Tsanawiyah (SMP/MTs), and High School/Madrasah Aliyah (SMA/MA).

5 Implication

The Learning From Home (BDR) policy is analyzed to explain the mechanism for implementing BDR policies in the future so that they can be used as a reference in the following policy implementation process in the field. Analysis of BDR implementation was carried out to determine the suitability between policy implementation and policy targets so that the Education Sector could evaluate BDR policies for the improvement and progress of education in State Senior High Schools in the City of Medan.

The results of this study illustrate that the process of analyzing the implementation of the BDR policy of Public Senior High Schools in the City of Medari based on the SE Kemendikbud number 15 of 2020 needs to be improved and analyzed according to the ideal conditions for the learning process that has been determinant so that this can have the following implications:
There is no obligation for teachers to attend workshops or training in implementing the BDR policy, so there are teachers who have not provided meaningful lessons according to the contents of the BDR policy.

The availability of resources supports learning from home policies in Medan city public high schools so that distance learning can be implemented or called learning from home.

Based on the Circular of the Ministry of Education and Culture, the policy of learning from home ignores the achievement of competencies, so the quality of graduates decreases.

Implementing the learning process from home at the Medan City Public High School is due to the collaboration between the South Medan Branch Office and the Medan City Public High School, which is good in terms of the communication process, resources, disposition, and also bureaucratic structure. There is a division of tasks between the South Medan Office Branch and the State Senior High School in the City of Medan. Education services are created rente amid COVID-19 pandemic situation.

6 Suggestion

Based on the conclusions and implications of research results on Policy Implementation Learning From Home SMA Negeri in Medan City based on SE Kemendikbud Number 15 of 2020", suggestions can be submitted to various parties, including:

The Head of the North Sumatra Education Office should organize and require teachers to participate in workshops, training, and technical guidance activities in implementing SE Kemendikbud No. 15 of 2020. So that implementers at the SMA level in Medan City can implement SE Kemendikbud No. 15 of 2020, especially in terms of providing learning meaning.

The Head of the South Medan Education Office Branch should monitor, coordinate and assess the learning policy implementation based on the SE Kemendikbud No. 15 of 2020 in the Education Unit, which is under the auspices of the Education Office Branch.

Principals of public high schools in the City of Medan should monitor, coordinate and assess teacher learning from home and implement Learning from home policies based on SE Kemendikbud No. 15 of 2020.

Teachers should seek information, adapt quickly, and develop competence in implementing Learning from home policies based on SE Kemendikbud No. 15 of 2020.

References

Development of Creative Thinking Skills Test
Instruments Momentum and Impulse

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Abstract. To find out the creative thinking skills possessed by students needs to be carried out and evaluation. One of the evaluations in education can use a test that functions to obtain information. The purpose of this study was to determine the characteristics of creative thinking skills test on Momentum and Impulse material. Research participants were first grade students of senior high school who had received Momentum and Impulse material. The type of research used is research and development (R&D). The research carried out refers to product development in the form of a creative thinking skill test instrument. Before the test instrument for creative thinking skills was tested on students, the test was validated first. The product development subjects consist of content or material experts, instrument experts, and linguists. The data analysis technique used in this research is descriptive analysis technique. From the results of small group and large group trials, 10 test instruments on Momentum and Impulse material were declared valid. The conclusion obtained after the research is the characteristics of the creative thinking skills test instrument developed were declared valid with high interpretation, reliable with very high interpretation, and the level of difficulty and discriminatory power was classified as good; The research participants' creative thinking skills were quite adequate.

Keywords: Development, Creative Thinking Skill Test, Momentum and Impulse, Valid, Reliable

1. Introduction

In the era of the industrial revolution 4.0, Indonesia requires human resources who are able to think creatively and critically to produce individuals who have sharp analysis, make appropriate decisions and can produce innovative work. At the beginning of the 21st century, creativity is needed and continues to increase in every field of human activity. In order to face changes in aspects of life that take place very quickly in this globalization era, people must be able to think creatively, be able to act quickly and precisely, be able to solve problems effectively, and be able to adapt to changes that occur. Creative thinking skills are very important for a person to have in order to foster smooth and flexible idea-giving thinking, be able to review problems from various points of view, and be able to come up with original and unique ideas.
Creative thinking skills are a person's ability to generate ideas, have different points of view, are imaginative, skilled in expanding and solving problems. Creative thinking requires both parts of the brain, namely the balance between logic and intuition which is very important. If someone has the ability to think creatively, then they can solve problems in real life in a variety of possible ways that they can do. According to Guilford, creativity or creative thinking as the ability to see various possible solutions to a problem, is a form of thinking that until now has received less attention in formal education. The results of a national survey of education in Indonesia show that the formal education system in Indonesia in general still does not provide opportunities for the development of creativity.

In education, to find out the creative thinking skills possessed by students, an evaluation needs to be carried out. One of the evaluations in education can use tests that function to provide information about certain aspects. In addition to getting information about a person's creative thinking skills, the use of tests can also improve creative thinking skills. But in general, the tests used in schools only include assignments that must find one correct answer, so that students' creative thinking skills cannot be measured significantly. In learning physics in SMA, students are required to achieve maximum learning goals in terms of developing skills to understand conceptual and creative thinking by studying every problem that occurs in life using appropriate physics concepts. Meanwhile, with the right learning objectives adapted to the problems that occur in life, it is necessary to develop in terms of assessing student skills. One of the evaluation instruments used to measure each skill possessed is by using a test.

Evaluation instruments such as test instruments must be developed with careful planning to measure higher order thinking skills, namely creative thinking. Creative thinking skills are basically skills that arise because they often solve problems using different ways. Therefore, one of the efforts that need to be made to improve creative thinking skills is to often practice solving a physics problem in life. Research related to the development of students' creative thinking skills in learning has not been widely studied. Likewise, the development of creative thinking skills tests has not been widely carried out. Based on the description of the background above, the authors need to develop a test instrument that is valid, reliable, has good discriminating power, and has a good level of difficulty.

2. Method

The research was conducted at a school that implemented the revised 2013 curriculum and has been accredited A, namely SMA Negeri 1 Ujungbatu. The time of the research was carried out in the academic year 2021/2022 semester I. Research on the development of creative thinking skills instruments on momentum and impulse materials will be carried out face-to-face and the product development concept used by researchers is the concept of research and development.

The concept used is the development of Analysis, Design, Development, Implement and Evaluation (ADDIE) by Robert Maribe Branc, namely, analyze, design, develop, implement, and evaluate. The analyze (analysis) stage includes information gathering consisting of the methods used, field observations, selection of physics material, qualification of the materials developed, preparation of making creative thinking skills test instruments and product
assessment literature studies. The design stage includes the design of scoring guidelines and the design of creative thinking skills test instruments. The develop stage includes expert validation of the creative thinking skills test instrument. The implementation stage is testing the creative thinking skills test instrument in schools. The evaluation stage is the analysis and evaluation of the validation results obtained in the field. For data processing analysis using the help of the ANATES program.

3. Results

3.1 Analyze

The analysis stage is the initial stage of development research. At this stage, information was collected by using interviews with subject teachers to see the characteristics of students, teaching and learning processes and student learning outcomes. Based on the results of interviews with teachers in the field of physics, it is known that the average character of class X MIPA 1 and X MIPA 2 SMA Negeri 1 Ujungbatu has an interest in learning in the medium category. It is still rare for teachers to use creative thinking skills tests which causes students to be less able to develop creative thinking skills and students are also still accustomed to working on procedural questions, causing students to find more answers than finding many ways/answers to solve a problem related to the problem. Physics concept. After the analysis stage is carried out at the research site, the next stage is to design a test instrument for creative thinking skills and design quality criteria for the question instrument.

3.2 Design

At the design stage, namely designing a test instrument for creative thinking skills on momentum and impulse material by making a grid of questions that refers to indicators of achievement of learning competencies. The grid is a table containing the specifications of the test items that will be made as a reference for the authors, so that whoever writes them will produce test items with relatively the same content and level of difficulty. The next stage after making a question grid is to make scoring guidelines and assessment designs for creative thinking skills instruments on momentum and impulse material, then the author designs the criteria for the quality of the question instruments. These criteria are needed as a reference to determine the quality of the instrument questions that have been designed are good or not. Then the criteria for the test instrument were compiled, including:

1. The criteria for the content of the questions are said to be good if the test instrument has a validity calculation result ($\geq 0.60$)
2. The reliability criteria are said to be good if the test instrument has a degree of reliability ($> 0.70$).
3. The criteria for the level of difficulty (difficulty) are said to be good if the test instrument has a level of difficulty (0.31-0.70).
4. The criterion for discriminating power is said to be good if the test instrument has sufficient discriminatory power ($\geq 0.30$).

The stage of designing the test instrument for creative thinking skills on momentum and impulse material has been completed.

The following is the scoring guideline for the creative thinking skills test instrument which is written in table 1.
### Table 1. Assessment guide for creative thinking skills test instrument on momentum and impulse material

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluency</td>
<td>Score 0: did not answer at all the questions given That is, did not make a mind map to support the answer to the given problem.</td>
</tr>
<tr>
<td></td>
<td>Score 1: Able to make a mind map to support the answer to the given problem.</td>
</tr>
<tr>
<td></td>
<td>Score 2: Able to make a mind map, and provide several answers in answering questions.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Score 0: did not answer at all the questions given.</td>
</tr>
<tr>
<td></td>
<td>Score 1: Able to give opinion/interpretation of an image/story/problem.</td>
</tr>
<tr>
<td></td>
<td>Score 2: Able to provide an opinion/interpretation of a picture/story/problem and explain the concept of motion to solve the given problem.</td>
</tr>
<tr>
<td>Originality</td>
<td>Score 0: did not answer at all the questions given.</td>
</tr>
<tr>
<td></td>
<td>Score 1: Able to give birth to new ideas / ideas to solve the given problem.</td>
</tr>
<tr>
<td></td>
<td>Score 2: Able to give birth to new ideas / ideas to solve the given problem and able to combine two different ways to solve different problems.</td>
</tr>
<tr>
<td>Elaboration</td>
<td>Score 0: did not answer at all the questions given.</td>
</tr>
<tr>
<td></td>
<td>Score 1: Able to write detailed objectives of the experimental design made.</td>
</tr>
<tr>
<td></td>
<td>Score 2: Able to write down the purpose of the experimental design made and able to provide appropriate experimental procedures and details of the designed experiment</td>
</tr>
</tbody>
</table>

#### 3.3 Development

At the development stage, the authors conducted instrument validity about creative thinking skills on momentum and impulse material. The purpose of validity is to obtain information, criticism, and suggestions so that the creative thinking skills test instrument developed becomes a quality product in terms of material, construction and linguistic aspects. The instrument validity was carried out by three experts. Based on expert review, the instrument developed was categorized as valid with revision. Suggestions given by several experts include: questions must be adjusted to indicators of creative thinking skills, and the use of sentences must be effective and easily understood by readers. Changes in questions before and after revision can be seen in table 2 below.
Table 2. Changes in questions before and after revision

<table>
<thead>
<tr>
<th>Questions before revision</th>
<th>Questions after revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write down as many examples of collision events as possible in everyday life!</td>
<td>1. Write down at least three examples of collision events in everyday life!</td>
</tr>
<tr>
<td>2. The image is not clear because it is too small</td>
<td>2. Enlarge the image</td>
</tr>
<tr>
<td>3. Compose a simple experiment about collisions</td>
<td>3. Design a simple experiment to determine the coefficient of restitution and the type of collision</td>
</tr>
</tbody>
</table>

3.4 Implementation

The implementation phase is the testing phase of the instrument about creative thinking skills on momentum and impulse material. The questions will be tested in large groups involving 40 participants who have previously received teaching on momentum and impulse material. The purpose of the test is to find out the characteristics of the questions that have been designed, namely validity, reliability, discriminatory power and level of difficulty of the questions.

Empirical Validity Analysis

Empirical Validity is used to determine whether the questions can be said to be valid (appropriate to use) or invalid (not feasible to use). From the test results obtained 14 valid questions and 2 invalid questions, the average value of r count items is 0.62. This means that the average test instrument for creative thinking skills has valid criteria with a high category. The distribution of the 22 items based on validity is in Figure 1

![Figure 1. Test Instrument Validity Results](image)

Reliability Analysis

Reliability refers to the consistency or stability of the assessment results. From the results of the reliability test obtained using the assistance of the ANATES program, the test reliability results were 0.89, so that the test instrument was categorized as having "Very High" reliability.
**Discriminatory Power Analysis**
The purpose of discriminatory power is to distinguish between high-ability test takers and low-ability test takers. Of the 16 questions tested, there was 1 question in the very good category of discriminating power, 5 questions in the good category, 8 questions in the sufficient category, and 2 in the bad category. Because there are 2 questions with bad categories, then 2 questions must be revised first. Overall, the average value of the distinguishing ability test of creative thinking skills has a value of 0.43 which is classified as good category. The results of the discriminatory power analysis can be seen in Figure 2 below.

![Fig. 2. Results of Calculation of Discriminatory Power of Questions from Large Group Trials](image)

**Difficulty Analysis**
That a good question is a question that is not too easy and not too difficult, therefore, it can be stated that a good question is a question with a moderate level of difficulty. Based on the analysis of valid question data, obtained 9 questions in the medium category, 6 questions in the Easy category and 1 question in the very easy category. The results of the difficulty level analysis are presented in Figure 3.

![Fig. 3 The Result of the Calculation of the Difficulty of the Questions from the Large Group Trials](image)
**Evaluation**

The evaluation process is carried out to find out questions that can be said to be valid and analyze the answers of research participants. Based on the test results, there are 14 questions that are declared valid. The results of identification and analysis of students' answers can be concluded that the mastery of students' creative thinking skills on momentum and impulse material still needs to be improved. Improving students' creative thinking skills can be done by creating appropriate learning to be able to facilitate students to find many ways and can find new ideas to solve contextual problems and increase their conceptual knowledge on momentum and impulse material.

**Results of Quality Analysis of Creative Thinking Skills Test Instruments**

Based on the results obtained from the data analysis of validity, reliability, discriminatory power and level of difficulty, the criteria for the developed test instrument were produced. This criterion is needed to determine the quality of the test instrument that has been developed is good or not. The results of the analysis of the quality of the creative thinking skills test instrument are:

1. The criteria for the content of the items are classified as good because the calculation of the average value of validity is 0.60.
2. The test reliability criteria are classified as good because the test instrument has an average reliability value of > 0.70.
3. The criteria for the level of difficulty of the questions are classified as good because the test instrument has a difficulty level value (0.31-0.70).
4. The criteria for discriminating power of questions are classified as good because the test instrument has a discriminatory value (> 0.30).

From the four criteria, the creative thinking skills test instrument developed has a good quality instrument.

**Development of Creative Thinking Skills Test Instruments to Develop Students' Creative Thinking Skills**

Students' creative thinking skills based on the analysis results obtained the average creative thinking skills of students on test is 68.27 with sufficient category. The average results obtained by students are good, but further efforts are still needed by the teacher so that they can provide more frequent questions that can spur students' creative thinking skills to become very good (very creative). The creative thinking skill instrument that has been developed is valid and reliable and meets the criteria for a good test, it will be able to measure students' creative thinking skills. This result is also strengthened by research which shows that to measure the creativity of physics students, standard instruments are used and are useful for developing physics-specific instruments, while also increasing creativity through direct instruction. The measurement of creativity in students can be seen from the score of fluent thinking ability (number of ideas or answers), elaboration thinking ability (number of details on answers or ideas), flexible thinking ability (number of categories or different ideas)., and original thinking skills (number of unique ideas judged by experts or by statistical tabulation).
From the results of the study, it is known that the percentage of achievement of the fluency indicator is the highest value compared to other indicators. This means that in general students are able to generate many ideas, answers, problem solving, provide many ways or suggestions for doing many things and are able to make mind maps. On the percentage of achievement of the original thinking indicator, the lowest percentage was obtained compared to other indicators. This shows that students have not been able to maximally generate new ideas/ideas to solve the given problem, combine 2 different ways to solve the given problem and produce imaginative ideas to design something in the future. This is in line with research conducted in terms of developing a creative thinking skill test instrument where the lowest indicator results are obtained on the indicator of original thinking in planning new things, the low level of original thinking of students in the research area can be caused by the dominant students working on questions that are procedural in nature so that students are less skilled in solving problems whose nature demands to get something novelty.

In the percentage of achievement indicators of flexible thinking and elaboration, the percentage obtained with sufficient categories shows that students are able to express their opinions on a problem, students are able to express what physics concepts are used to solve a problem both in general and in general. Contextually and physically, students are quite able to use different ways to solve a problem, and students are able to provide a detailed explanation of the experimental design or practicum related to momentum and impulse material. This can be seen from the category that is classified as sufficient for the two indicators of creative thinking.

The use of test instruments as an assessment for learning is needed to develop students' thinking skills. This is in line with research [21]. The results obtained indicate that assessment for learning, the process of identifying learning development, is able to develop students' thinking skills. Thus, the use of creative thinking skills test instrument as an assessment for learning is able to develop students' thinking skills.

**Contribution of Creative Thinking Skills Instrument to the Learning Process**

The 2013 curriculum targets to increase the creativity of students as optimally as possible so that they are able to innovate to answer increasingly complex future challenges, this is in line with the statement which states that to prepare quality human resources, education must focus on a training process that focuses on innovation and creativity. For learning physics in SMA students are required to achieve maximum learning goals in terms of developing skills, to understand conceptually and think creatively by studying every problem that occurs in life using appropriate physics concepts. In addition, creative thinking skills are needed in an effort to solve a problem.

Problem solving is done by using the knowledge and skills possessed to answer unanswered problems or facing difficult situations, for that researchers design and create instruments for creative thinking skills on momentum and impulse material in SMA, so that students are skilled in solving contextual problems related to motion. such as students are invited to find various ways to minimize accidents on toll roads, on circular roads, and students are also invited to find the benefits of learning a concept of motion in everyday life.
It is hoped that the existence of a creative thinking skill test instrument on momentum and impulse material makes learning more innovative and meaningful for students so that students are more skilled in creative thinking. Creativity will make life more beautiful and varied. People who are not creative and always do activities with certain routines will quickly feel bored and unmotivated. While people who do creative things will make life more varied so that they are always excited because they find something new, besides being skilled in creative thinking, students are expected to be able to face the Industrial Revolution 4.0, and skilled in facing increasingly fierce global competition in the 21st century.

4. Conclusion

Based on the results and discussion, the creative thinking skill test instrument on the momentum and impulse material developed can be declared valid, reliable, has good discriminating power, and has a good level of difficulty

References

Development of a Non-Text Book on Environmental Literacy-Based Plastic Waste Management as a Learning Source for High School Students in Asahan

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Abstract. The research instrument is an assessment sheet for material expert validators, learning design experts and assessment of Biology teacher responses and student responses. The results of the assessment of the feasibility of the contents of the book from material experts are included in the "Very Good" category with a percentage of 90.2%. The results of the design expert's assessment included the "Very Good" category with a percentage of 93%. The results of the responses of Biology teachers and students to books get a percentage of 90.6% and 90.7% in the "Very Good" category. The results of the test of the effectiveness of non-text books on environmental literacy-based plastic waste processing are quite effective with an N-Gain percentage of 70.6%.

Keywords: Nonteks Books, plastic waste, environmental literacy

1 Introduction

Education is an important process in the national development of a nation and state. In the process of national development, quality human resources are absolutely necessary. One of them is the formation and cultivation of the nature of environmental care. It is time to lead to the formation and cultivation of an awareness of caring for the environment and the natural surroundings. The formation of environmental awareness can be done with a branch of science that is closely related to human life and the environment, namely Biology (Nur.dkk, 2020).

Many environmental problems faced by the world and Indonesia are caused by human attitudes and behavior towards the environment. Individual behavior towards the environment reflects their environmental literacy. The solution to overcome environmental problems is to develop a community that has environmental literacy and has more responsible behavior towards the environment (Mega, 2017)
Basically, if it is processed properly, the problem of plastic waste can be solved. One of them is by processing plastic waste into oil, as well as other waste processing that can produce products that can be sold in the market, such as those found in Kisaran, Asahan district. The results of the questionnaires and observations showed that there were still few high school textbooks in Asahan that utilized sources from the environment around students as seen from the results of questionnaires (only 35% of books used sources from the environment) and interviews with teachers at the school. While the results of the interview with the resource person for processing plastic waste, Mr. Suyadi in Mekar Sari Village, Buntu Pane District, Asahan Regency, processing waste into oil shows that it is still rare for residents to use waste properly.

Asahan Regency has a fairly large area, but the final landfill in the Asahan area is still very minimal, but if the waste can be processed and used as a learning resource it is relevant and close to the daily lives of students. So based on this background, the research wants to develop a non-text book on processing waste into oil based on environmental literacy as a learning resource for students in Asahan.

2 Research Method

This research is a research and development (Research and Development) which is a type of research that is used to produce a product. This research is to develop non-text books, so this research is also known as Research and Development (R&D) research. The non-text book development model used is the development model according to Thiagarajanya, which is 4-D (four-D models) which consists of four stages, (Trianto, 2009), namely the define stage, the design stage, the develop stage and desseminate stage (spread). The researcher chose the 4 (four) D development model to develop non-text books because it was more detailed and systematic.

3 Result

The stages that have been carried out in the implementation of the development of the non-text book on Plastic Waste Processing in Asahan refers to the 4-D development model developed by Thiagarajyan which consists of the Define, Design, Development & Disseminate stages. These stages are described in this chapter, as follows

At this definition stage, it aims to determine and define the needs that are carried out by analyzing the objectives and limitations of the Plastic Waste Processing book in Asahan. The stages that have been carried out are as follows: Preliminary Analysis, Book Content Analysis, Teacher Needs Analysis, Student Needs Analysis.

At the planning stage, what is done is to design a non-text book for processing plastic waste based on environmental literacy with the learning objectives that have been described in the definition stage. Therefore, the design for the manufacture of non-text books was carried out with the stages of material preparation, preparation of book writing formats and initial design. The following format is made in a non-text book on environmental literacy-based plastic waste processing as follows: 1) book size: 14.8 x 21.0 cm; 2) book thickness: 1 cm; 3) book color: white; 4) paper color: white.
At this development stage, starting from conducting field research to obtain information and the process of making plastic waste into fuel oil, the data obtained is then used in compiling a Plastic Waste Processing book and becomes the initial product of the development stage. After the initial product is finished, then this book is assessed by the validator using a questionnaire, there are two phases in the product assessment, namely the assessment of the expert team and the assessment by teachers and students. The assessment of the design expert serves to examine the correctness of the design design and the assessment of the presentation of non-text books on plastic waste processing. Material expert assessment serves to find out the material that is summarized according to the criteria and does not widen from the material that should be. This stage is carried out to revise the product (book) that has been developed, and then the product will be tested on class X high school students with an instrument in the form of product responses that have been developed.

Based on the data obtained by research with the title "Development of a Non-Text Book of Plastic Waste Processing Based on Environmental Literacy as a Learning Resource for High School Students in Asahan" there are four sources of data obtained from four questionnaires, there are four questionnaires, namely a validation sheet filled out by a team of material experts, validation by a team of design experts, the response of teachers in the field of biology studies and responses by students.

The product that has been developed by the researcher is a non-text book on processing plastic waste that is structured and systematic in accordance with the learning objectives and the needs of students in order to achieve the learning objectives. The development of non-text books uses Thiagarajan’s four-D (4-D) model development with four stages, namely define, design, development and disseminate. The goal in developing this non-text book is to produce quality book products that can increase students’ insight and knowledge.

4 Discussion

Based on the results of validation from material experts and design experts on the feasibility of the non-text book on plastic waste processing based on environmental literacy that was developed, it shows that: 1) material validation by material experts shows a percentage of 87% which is categorized as "Very Good", 2) Design validation by design experts based on the average presentation with a value of 93% which is categorized as "Very Good". The results of the validation show that the non-text book for processing plastic waste based on environmental literacy can be said to be valid after because the results of the category analysis are in accordance with predetermined criteria. Furthermore, the non-text book can be tested for its effectiveness. In accordance with the previous development research regarding the development of non-text books by Rof’ah and Sulifah (2021) the results of the assessment of the results of quantitative data analysis that have been validated by the validator with an average percentage of book value of 85.75% are included in the very valid eligibility criteria. And according to Rozana (2021) non-text books are said to be very valid and ready to be used in the field if they have a value between 81.1-100%.

Furthermore, apart from being seen from the validation results from the experts, the researchers also conducted an assessment of the biology subject teachers and class X students. The results of the research on non-text books by the teacher showed a percentage of 90% with a very good category. While the assessment of grade X SMA 2 Kisaran students shows an
average percentage of 88.9% which is declared very good category. This is in accordance with the research of Najmah, Dhormono and Maulana (2022) in the development of scientific books, the assessment obtained an average score of 93% which is included in the "very good" category.

After seeing the results of the subsequent validation of non-text books on environmental literacy-based plastic waste processing, the data from the N-Gain test results also proves that the book is able to influence student learning outcomes. The N-Gain test data in the control class and experimental class show that the non-text book on waste management based on environmental literacy is included in the quite effective category with a percentage of 70% experimental class while the control class is 27.1%. This is in accordance with the research of Astuti, Muhammad and Aminuddin (2021), namely the development of the book to get an average N-Gain value of 0.8 in the high category, and a percent score of 80% in the effective category.

5 Conclusion

Based on the results and discussion in the previous chapter, it can be concluded from this research as follows: The feasibility of presenting non-text book learning on plastic waste processing based on environmental literacy according to learning design experts is included in the "Very Good" category with a percentage of 93%. The feasibility of presenting a non-text book on plastic waste processing based on environmental literacy according to material experts is "Very Good" with a percentage of 90.2%. The teacher's assessment of the non-text book of processing plastic waste based on environmental literacy is included in the "Very Good" category with a percentage of 90.6%. Students' assessment of non-text books on environmental literacy-based plastic waste processing is included in the "Very Good" category with a percentage of 90.7%.

References

Development of a PISA-based Electrical Problem Instrument at SMA N 1 Beringin

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Abstract. It is necessary to improve test equipment in learning because usually only low-level questions are available, so students are not ready to discuss and understand material for selection in scientific standards. This study aims to develop a PISA-based test instrument with objective types of questions for the subject of Electricity in SMA, in accordance with good test proficiency standards in terms of validity, reliability, discriminating power, level of difficulty, and distractor effectiveness. This study uses research and development using the ADDIE design with analysis, design, development and evaluation. The research sample was class X students of the Ministry of Home Affairs, State Medical Academy 1 Beringina, who were selected using the simple random sampling method. At the analysis stage, the results showed that there was no difference in grades, and students still lack PISA-based physics questions, especially on electricity. The physics material developed includes static and dynamic electricity. The design stage produces 50 questions based on PISA's scientific literacy competencies, which are classified into three competency standards, namely: explaining scientific phenomena, assessing and planning scientific research, and interpreting scientific data and evidence. The validators in this study were two lecturers and two teachers. Reality uses Cronbach's alpha formula, and qualitative research is carried out by asking for expert opinions covering aspects of educational material, design, and language.

Keywords: PISA, electricity

1. Introduction

Literally, literacy means "literacy" and science means knowledge of nature. PISA defines scientific literacy as the ability to use scientific knowledge, question and draw conclusions from evidence to understand and make decisions about nature and its changes due to human activities (OECD, 2003). Meanwhile, the National Academy of Sciences (1996) argues that the emphasis on scientific literacy is not only on aspects of knowledge and understanding of scientific concepts and processes, but also focuses on how one can make decisions and participate in social and cultural life, and economic growth.

OECD (2013) defines scientific literacy as (1) individual scientific knowledge and the ability to use that knowledge to identify problems, acquire new knowledge, explain scientific phenomena,
and draw conclusions from data about scientific questions; (2) understand the basic characteristics of knowledge built on the basis of human knowledge and research; (3) sensitive to how science and technology shape the material, intellectual and cultural environment; (4) there is a willingness to participate in issues and ideas related to science. This understanding was then simplified again by Toharudin et al. (2013), who defines scientific literacy as a person’s ability to understand science, communicate science (oral and written), and apply scientific knowledge to solve problems so that they have a high attitude and sensitivity to themselves and their environment when making decisions based on scientific evidence. consideration. According to PISA 2006 (Astuti, 2016), scientific literacy can be described as consisting of four aspects that need to be obtained, namely: 1) Be aware of life situations related to science and technology. This is the unit context and assessment elements; 2) understand nature, including technology, based on scientific knowledge, including knowledge of nature and knowledge of science itself; 3) competence includes formulation of scientific questions, explanation of scientific phenomena, use of scientific data as arguments in conclusions and decision making. According to Hayat and Yusuf (2010) PISA scores are different With Other values in Terms as the Next this one ) PISA uses approach literacy innovative , _ _ concept learning related _ With ability students _ per apply knowledge and skills in the eyes lesson key accompanied With ability per learn , let ’ s reason and report it with thereby efficient too _ solve and interpret problem in different situation .

2) PISA is policy oriented design and method evaluation and reporting individual With needs for each PISA member country lamp pulled lesson about political who has done by the participating countries through comparison of available data .  

3) Application score in PISA by way of regularly in cover time condition which allows participating countries per progress monitor They according to With destination look for know what ’ s installed four ) Draft study in PISA is With draft study through alive , that is draft look for know what is wrong is limited by the student ’ s competency rating according to With curriculum and concept Cross curriculum but also motivation _ learn , concept I alone They self they own and learning strategies them .

5) Application ball PISA scores are very broad , covering 49 participating countries plus 11 countries that joined in 2006 , among others one third from world population .

Latest PISA 2018 results based on ability literacy knowledge ranked 71st out of 79 participating countries in PISA. The results of studies conducted by PISA show What ability Indonesian students compete at the international level Permanent owned by low . Indonesian students with achievement check literacy knowledge around < 400 points method new capable remember knowledge scientific based on fact simple (e.g. name , fact , term , formula only ) and use knowledge scientific General per pull or evaluation something conclusion ( Rustaman , 2011). The low PISA test score for Indonesia is because students are not yet sufficiently prepared to solve PISA questions, and the questions available in physics class are generally still limited by the LOTS criteria. From the results of observations and conversations with several students and physics teachers at SMA No. 1, Beringin received information that the questions posed to students were still memorized and calculated, not questions related to life and the world of technology. The training resulted in students becoming familiar with questions that lead to measuring scientific literacy, especially scientific literacy questions in PISA. this fact convincing _ Researcher per Doing study With develop Student-customer test kit based on PISA can again know , practice as good used to I alone in the face about PISA. _
2. PISA scientific literacy

PISA divides scientific literacy into three main dimensions, namely: content/knowledge science, scientific competence/process and context of application of science (OECD, 2001). Since 2006, PISA has divided the field of scientific literacy into four main areas, namely science content, science competencies/processes, science application contexts, and attitudes. (OECD, 2007).

One) The content of science refers to the key concepts of science needed to understand natural phenomena and changes introduced to nature as a result of human activities (Sciati, et al., 2013). This may help explain aspects of the physical environment. Questions that can be asked from various fields of science, such as the concepts of physics, chemistry, biology, earth science and space.

Process science refers to mental processes that involve answering questions or solving problems, such as identifying as good interpret evidence and explain conclusions (Rustaman, 2011). The abilities tested in the science process include; 1) identify scientific questions 2) identify evidence; 3) interesting conclusion; 4) communication of findings; 5) understanding of scientific concepts.

3) The context of applying science places more emphasis on everyday life and applying science to solving real problems.

Four) An attitude consisting of support for scientific research, self-confidence, interest in science and a sense of responsibility towards resources and the environment.

Judging from its four dimensions, scientific literacy is closely related to the nature of science itself, namely science as a process of science, science as a product of science, and science as a scientific approach (Carin & Sund, 1997 in Naruta, 2018). Science as a scientific process implies that Science represents certain steps in studying a problem, for example: observation, hypothesis development, experiment design and execution, data interpretation, measurement, etc. Science as a scientific product can be interpreted in such a way that there are facts in science, principles, laws and theories that are accepted as truth. Science as a scientific attitude contains values and morality, including: high curiosity, critical, creative, humble, open-minded, etc. (Narut, 2018).

PISA (Program for International Student Assessment) is an international education assessment program. Originally created by OECD (Organization for Economic Cooperation and Development) countries in response to their own needs, PISA has now become an educational policy tool for non-OECD countries. PISA (Program for International Student Assessment) is a program that measures the achievement of 15-year-old children in math, science and literacy skills. Assessments conducted by PISA are held every 3 (three) years with a focus on education in the country (Hewi, 2020). PISA measures three dimensions, namely mathematical literacy, scientific literacy, and reading literacy, with the following details (OECD, 2019):

a. literacy (mathematical literacy), including the ability to define and understand, use the basis of mathematics in life that a person needs in the face of life every day.

b. scientific literacy, cover the ability to use knowledge, identify problems in life within the framework of understanding facts and make solutions about the nature and changes in life.

c. Reading Literacy (reading literacy), closes the ability to understand, use and reflect in writing.
C. PISA goals
The age of 15 years was chosen as the PISA target group because in many countries compulsory schooling ends at this age. In addition to assessing facts and knowledge, PISA assesses students’ ability to use scientific knowledge to solve real-world problems. Therefore, the term “literacy” is used because it implies not only domain knowledge but also the ability to apply that knowledge. The main objectives of PISA are:

a. Assess real knowledge and skills, as well as students’ readiness for lifelong learning and adult participation in society;
b. Ensure internationally comparable student performance in key areas at or near the end of compulsory schooling;
c. Provide a wider context for countries to interpret the results;
d. Determine the nature and extent of the relationship between school and student factors and achievement outcomes;
e. Check trends in each subject area over time;
f. Provide direction on the development of educational policies.

3 Research methods
This study uses research and development methods (Research & Development). According to Sugiyono (2018), the development research method is a research method used to produce certain products and test product effectiveness. In the study, the research was carried out in 3 stages: analysis, design and development. The flow of research procedures can be seen in Figure 1 below:

![Figure 1. PISA-based test design](#)
4 Discussion

1. **Analysis Phase (Analysis)**
   - **Need analysis**
     The results of the analysis are based on interviews with the physics teacher at GMA Negeri 1 Beringin that the teacher has never assessed student learning outcomes using similar test kits or based on scientific literacy or based on PISA. The lack of variety in assessments makes students less able to develop scientific literacy skills, and students are also less socialized with PISA-based questions. Based on an interview with one of the students at SMA Negeri 1 Beringina, students have never been given PISA-based questions, especially electricity. Usually students are given multiple choice questions or descriptive questions which are used as examples of questions posed on the blackboard, and usually the level of the questions is simple or clear. Thus, students never know the form of PISA questions and what are the advantages, disadvantages or similarities to PISA questions.
     Up to this point the researchers found that students of SMAN 1 Beringin, especially class X IPA, generally never completed PISA-based tests related to scientific literacy in physics learning, especially in the electricity subject. This is because the PISA-based test kits have not been used in schools and the questions used in schools are still formulaic and conceptual. The lack of variety in assessments makes students less able to develop scientific literacy skills, and students are also less socialized with PISA-based questions. The tool developed is a PISA-based test tool on electricity in SMA. about PISA.
   - **Material Analysis**
     This learning material is electricity material, the selection of material is based on the needs of students who rarely get questions PISA material electricity. Except What Theory rick list be very careful application in life every day. Lots of trouble common occurs in related life everyday. With rick list. Proficiency in the material used in learning is an indicator derived from competence literacy. knowledge evaluation PISA namely; explain scientific phenomenon; evaluate and design scientific research; and interpret data and evidence scientific.
   - **Study of literature**
     Literature studied With look for information accurate guys through book or publication scientific about PISA, about list of PISA materials, various questions used in PISA and validators.

2. **Stage Design (Design)**
   The outcome of this PROJECT is an initial blueprint for an objective PISA-based electrical testing tool for SMA. The design of the tool consists of a grid of test questions, 40 questions, and an assessment guide. Results of Test Question Grids Based on Material Analysis and Literature Study, the results of the PISA-based objective test instrumental grids on Electrical Materials in High School with characteristics and scores related to Pisa literacy-based competencies for Phenomenon and Nature of Wave Topics (Sahyar et al., 2020). The initial planning step is to determine the purpose of the test and determine the appropriate form of the test for analysis. The design analysis phase is completed, after which a table of questions related to the indicators of achievement of scientific literacy competencies that have been set is created. The purpose of the test developed is to teach students to solve scientific literacy-based questions that are usually asked in PISA competitions. The form of the test instrument used is multiple choice, seeing the benefits of multiple choice tests, the researcher believes that this test will be better and can be used to measure the level of understanding or
ability of students related to scientific literacy in electrical material. Because this test has great
difficulty, heavy in choosing the most appropriate answer among the other answer choices. The
indicators developed are indicators of scientific literacy objective tests in the PISA competition.

3. Development stage (Development)

This stage aims to design a scientific literacy test tool that functions to measure students'
electrical science literacy abilities. Activities at this stage include:

- **Test Equipment Training based on scientific literacy**
  At this stage, scientific literacy-based test kits are prepared which consist of: a grid of
  questions, scientific literacy-based test questions, and an assessment guide.

- **Score Validators**
  The validator was asked to assess the scientific literacy test tool developed based on
  scorecard items, as well as provide criticism and suggestions. The validation carried out is
  the completeness and feasibility of the material content, structure and grammar that have
  been developed. This validity was carried out by asking for advice or consideration from
  experts, namely 5 people.

  The results of the assessment are given by the validator will grouped in 3 levels important
  that is not replaceable (3), useful but Not significant (2), and no required (1) and calculated
  the reality With use Ratio Formula Content Validity, namely:

  \[ CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}} \]  

  Description:
  \( n_e \) = estimate the number of SMEs of the same subject important
  \( n \) = the number of SMEs that score

  CVR interpreted with thereby relatively in the range -1.0 to with +1.0. All items with negative
  CVR must excluded, whereas element with a positive CVR can used. Category validity can
  seen from table 3.1. Next that are:

<table>
<thead>
<tr>
<th>CVR</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 - 1.0</td>
<td>Legitimate</td>
</tr>
<tr>
<td>0.1 - 0.4</td>
<td>legal, obligatory header plan</td>
</tr>
<tr>
<td>-0.1 - 1.0</td>
<td>Invalid, replaced</td>
</tr>
</tbody>
</table>

The results of the tests carried out on the following test equipment are shown in Table 3:

<table>
<thead>
<tr>
<th>Category</th>
<th>Inquiry number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received</td>
<td>1, 2, 3, 4, 5, 6, 7, 8, 9, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40</td>
<td>34, four</td>
</tr>
<tr>
<td>Fixed</td>
<td>10, 11, 12, 13</td>
<td></td>
</tr>
<tr>
<td>Rejected</td>
<td>39.40</td>
<td>2</td>
</tr>
</tbody>
</table>

Number of questions | 40
Table 3. Qualitative Results Corn Question

<table>
<thead>
<tr>
<th>No</th>
<th>Qualitative Corn Question</th>
<th>Corn Question</th>
<th>Quantity</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>one</td>
<td>validity</td>
<td>2,6,14,16,22,25,27,30</td>
<td>eight</td>
<td>21.05%</td>
</tr>
<tr>
<td>2</td>
<td>Level Problem</td>
<td>1,3,5,7,8,9,10,13,16,17,20,23,24,25,26,27,30,34,35,36,38</td>
<td>21</td>
<td>55.26%</td>
</tr>
<tr>
<td>3</td>
<td>Strength differentiator</td>
<td>2,3,5,6,7,9,10,12,14,16,20,23,24,25,27,30,32,38</td>
<td>eighteen</td>
<td>47.37%</td>
</tr>
<tr>
<td>four</td>
<td>efficiency cheater</td>
<td>2,6,14,16,22,25,27,30</td>
<td>eight</td>
<td>21.05%</td>
</tr>
</tbody>
</table>

High School Electrical PISA based on peer review in terms of material, construction and language aspects Objective Tests based on Sound Waves PISA SMA is in very good condition. category (90.9%). From the results of an analysis of the 40 public test items, namely small group tests and large group tests, 30 items were obtained that were acceptable and stored in the question bank for objective testing based on PISA sound waves in secondary schools that met the requirements. for a good proficiency test (standardized test), 10 questions were rejected and could not be used because they did not meet the criteria for validity, difficulty level, discriminatory ability, and distractor effectiveness. The questions that were declared valid in the PISA objective test "Electricity" at the State Medical Academy No. 1 "Beringin" consists of 30 questions out of 40 questions developed. The reliability of the PISA-based objective electrical test at CMA # 1 Beringin already has high reliability. PISA-based objective electrical test difficulty level at CMA No. 1 Beringina is good and is in the medium category. The discriminating power of the PISA-based objective electrical test at CMA No. 1 Beringin is in the category good.

5 Conclusion

Based on these data, it is known that 30 items can be accepted and stored in the PISA-Based High School Objective Test Question Bank because they have good suitability, validity, difficulty level, discriminating ability, and distractor performance. The advantage of this research is that researchers can develop objective questions based on PISA (program per international student assessment) for high school level with scientific literacy competencies, such as explaining scientific phenomena, assessing and designing scientific research, and interpreting scientific data and evidence. The materials developed are electrical materials that have never been developed by previous researchers. And the analysis of research results was analyzed not only with the help of Excel software, but also using the SPSS 24 application, and the calculations were checked manually, so that the accuracy of the calculations was high. The similarities in the questions developed in this panel are more related to activities in daily life, so that students can get more benefits from learning physics, and the development of test questions is to get a value of validity, reliability, discriminatory power, level of difficulty, and efficiency.

The limitations/weaknesses in this study were that the questions were designed only on the basis of objective questions, while the international PISA questions were in the form of multiple...
choice questions, true-false questions, short answer questions, and other forms of questions. This research also has a limited number of questions and a limited number of respondents, the researcher really hopes for further research to further enrich the question bank, and respondents and students should repeat the material tested before the research, if necessary in order to better understand the questions asked during the test. The time allocation given during the test must be adjusted to the number of questions to be tested.

References


Development of 3D Animation-Based Learning Media With a Scientific on the Sub-theme of Colonial National Events in Grade V of SD Negeri 085115 Sibolga

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Abstract. This study aims to: (1) determine the feasibility of scientific-based 3D animation video learning media on the sub-themes of colonial era national events at SD Negeri 085115 Sibolga, and (2) to find out the effectiveness of learning media based on scientific 3D animation videos on the sub-themes of colonial era national events effectively at SD Negeri 085115 Sibolga. This type of research is Research & Development (R&D) with a 4-D development model. The research method consists of two stages, namely the first stage to develop learning multimedia and the second stage to test the effectiveness of the product. The results showed that the teaching media product developed was very feasible. Assessment of student learning outcomes based on pretest and posttest analyzed using N-Gain obtained an average gain value of 0.7 which is included in the high category. with the results of being able to increase interest and activity as well as being effective for improving student learning outcomes.

Keywords: Research Development, 3D Animation Video Media and Scientific

1 Introduction

The use of technology in education is still considered low compared to other fields such as industry, agriculture, transportation and communication. This is the opinion of [1]Tirtarahardja and Sulo (2005:47). The lack of use of technology, especially informatics, can be seen from how learning is carried out in the classroom. There is still a lot of learning using conventional methods. Whereas in this era of globalization the development of science and technology is very fast, especially in the fields of transportation, telecommunications, informatics and so on. Especially in bringing up the historical events of the Battle of Sibolga Bay, actual media is needed that can bring students back to experience the events experienced by their regional heroes to increase children's nationalism in accordance with the locality of the surrounding area. A wide selection of software today is required to produce visually appealing media. The ability to understand the nuances of the app and the creator's individual creativity are both necessary to produce engaging content. Lumions is a program for creating three-dimensional animated films. One of the features of this app is that it is free and easy to use. 3D animation media based
on the Lumions application is a cartoon video that can be filled with subject matter and is suitable for elementary school students because of its interesting nature and humorous appearance. As schools rely on teaching aids to make learning and teaching easier, there is a push to create better teaching media. Students abilities can be improved by using instructional videos that are packaged and optimized for function. Taking a scientific approach to education is considered an appropriate method of teaching and learning. The scientific approach to education places emphasis on students rather than teachers as the main source of information (teacher centered) with the stages of observation, asking, trying, processing data, and communicate [2] Hosnan, M (2014: 37-76). There are several factors that cause most students still have not reached the KKM. Teachers still use traditional methods such as lectures and individual assignments even though the 2013 curriculum is a reference in the learning process in elementary schools. If teachers want to implement that year's curriculum, at least they must be able to master the scientific learning model.

Students are easily bored during the learning process because of the unavailability of learning resources that incorporate 3D animation or other interesting videos. In the sub-theme of national events during the colonial period, teachers were less innovative in developing learning media, especially those related to the Battle of Sibolga Bay. Students have difficulty understanding what their teachers teach because teachers often lack the time and ability to explain complex concepts. Many students do not pay attention when the teacher tells them to listen to the book; this is seen when students are asked to answer questions about the content.

Thus, educators must constantly experiment with new ways of teaching. Teachers should consider using computer-aided learning media to help students better understand the material and shift the focus of learning from teacher to student. Unfortunately, many learning media out there are not in line with student expectations. Media coverage is aimed at the general public and does not take into account the special needs of the school that will use it, so examples and illustrations in the media do not refer to the environment, and are not in accordance with the school curriculum.

One way to develop teacher learning media is to use educational technology to create learning media for students. More and more studies have shown that students benefit greatly from media-based learning. As a result, educators are working harder than ever to create media that meet the specific learning needs of students. One of the purposes of making this 3D animated video learning media is to make it easier for teachers to deliver material and help students better understand the material they are studying. The increase in the average student learning outcomes in the social studies subject experimental class at SMP N 6 Banjarmasin [2] Rahmatulllah's previous research showed an increase in student learning outcomes by 2.33 but it also showed an increase in student interest in learning, and a desire to participate in class activities. Students are better able to understand social studies concepts if they are able to observe them in action.

Summary It is now possible to show animated films in the classroom as a means to teach social studies concepts that were previously only shown in textbooks.

Researchers are trying to develop educational media in the form of 3D animated videos with a scientific approach on the sub-theme of national events during the colonial period, because the results of the overall needs analysis show that teachers need learning media in this sub-theme.

2 Research methodology

In this case, it is a form of research and development (R&D). The purpose of this research is to create an educational media that focuses on the national events of the colonial era. The process of product development and validation is part of educational development research. Researchers seek to develop products that can be used effectively in education through research and development. Lumion 3D animation learning media was developed as a result of this research to help students learn more effectively.

To conduct this research, we collected data from students at SD Negeri 085115 Sibolga who were given 3D animation-based learning media with a scientific approach in class V. Learning media and test results learning is the main focus of learning. There are four stages in the device development process as described by Thiagarajan in [4]Trianto (2011:190): defining; designing; develop; and disseminate.

3 Research result

Using the 4-D Thiagarajan model in product development of learning media products based on 3D animation videos with a scientific approach to achieve products that meet the criteria of appropriate, valid, and effective learning media.

3.1. Description of Development Stages

3.1.1. Description of the Defining Stage

At this stage, an initial analysis of the learning process was carried out at SD Negeri 085115 Sibolga to identify the main challenges in developing 3D animated video-based learning media with a scientific approach. Observing classrooms full of students during the teaching and learning process and reviewing previous student learning outcomes on the sub-themes of colonial era national events enabled researchers to identify problems in the learning process. Student learning outcomes are low below the Minimum Mastery Criteria when teachers use lecture techniques and are assisted by little media, including whiteboards and powerpoint presentations.

Then, the researchers analyzed the needs and identified the initial characteristics and behavior of students at SD Negeri 085115 Sibolga through a questionnaire distributed to 2 teachers and 27 students. The questionnaire contains a description of the definition of a 3D animated video on the scientific-based sub-theme of national colonial events, which aims to give respondents instructions about what to ask in the questionnaire given.

The results of the questionnaire distribution were 100% of teachers and 100% of students stated that 3D animation videos on the scientific-based sub-theme of national colonial events were needed in learning. explains the needs of the following 3D animation video learning media:
a. most of the students (68.96%) stated that they were not familiar with the 3D animation video learning media based on process skills on the sub-theme of the colonial period national events. A small percentage (31.03%) of teachers and students stated that they were familiar with learning media based on 3D animation videos on scientific sub-theme of national colonial scientific.

b. 100% of the total number of teachers and students said they did not apply learning media based on 3D animation videos on the scientific.

c. based sub-theme of colonial-era national events scientific.

Furthermore, the results of the analysis of the characteristics of students, namely students show a visual learning style. Students are more interested in participating in learning activities that stimulate themselves through visual learning that they can see directly. By studying students' reactions to learning media based on 3D animation videos, researchers can learn more about how students respond to visual information. The development of this learning media certainly displays visual material in the form of writing, attractive images and concept maps to make it easier for students to master the learning delivered.

In the end, it was determined that task analysis led to concept analysis. In addition, task analysis on the sub-themes of national events during the colonial period refers to the Competency Standards and Basic Competencies at that time. Each student receives a mix of individual and group assignments when they receive their assignments from the teacher. Independent assignments are given in the form of questions in class discussions and assignments as homework. For group assignments, students are given a Student Activity Sheet containing questions and each student in the group discusses the question by digging up information beforehand from the text presented in the student book that has been developed.

3.1.2. Description of Design Stage

After obtaining the problem at the definition stage, then the design stage is carried out. Designing a media that is used in learning is the goal of this design stage. This is based on the preparation of learning objectives as a benchmark for measuring student understanding in the form of products, processes, psychomotor during and after learning activities. There are a number of questions in the test related to the sub-theme of national events during the colonial period, which include 50 evaluation questions. The validity of the evaluation questions is sought after being compiled. In media, valid questions will be used to measure audience understanding. Two sets of evaluation questions were used in this study. There are a total of 20 questions in each section. In June 2022, 27 fifth grade students of SD Negeri 085115 Sibolga tested the validity and reliability of this learning media evaluation. There is an attachment with valid and reliable test results. 25 of the 50 questions tested for validity, discriminatory power and difficulty were declared invalid, so that only 25 questions were used; but only 20 questions were used because they represent all the indicators that have been created.

Student needs and material characteristics are considered when determining which media to use. Student analysis, concept and task analysis, user characteristics, and implementation plans can all benefit from media that combines attributes from multiple sources. Acquiring the desired basic competencies and skills becomes easier with this. Lumion 6.0 and other supporting software such as Cyberlink Powerdirector, Recforth, and Google Earth were chosen by the

researchers in this study to be used in making learning media. As a result of the software's extensive support for educational media creation, the team decided to go with Lumion 6.0.

Figure 3.1. 3D Animation media (Lumion 6.0 apps)

The material in the 3D animation video has 2 choices given by students, namely the national events of the colonial period and the history of the Sibolga Sea Battle. In the sub-theme there are explanations related to the material, there are also videos that are relevant and related to clarify the material presented.

The 3D animation learning video role credits are evaluated at the end of the evaluation stage, along with the music and layout. Then 20 multiple-choice questions are provided on a piece of paper related to the material on the National Event of the Colonial Period which has been shown on the 3D animated video that has been shown.

Before proceeding to the next step, the product design should be tested. Colleagues, such as professors or teachers in the same field of study, validate product designs. While it is possible that the validated device still requires revision based on input from the validator, it turns out that minor process improvements are needed if deficiencies are found in the future, according to the results.

3.1.3. Description of Development Stage

Validation of the developed media is Obtaining an initial design of 3D animation-based learning media with a scientific approach on the sub-theme of the colonial period national events is the understanding of this development stage. The above is based on three aspects, namely, learning aspects, 3D animation media material aspects and evaluation aspects, shows the average value of each 4.33 on the learning aspect, 4.67 on the 3D animation material aspect and 4.40 on the evaluation aspect. Overall these three aspects are in the "very feasible" category, which means that the use of 3D animation media with a scientific meets the needs of students.

Assessment of media experts on 3D animation learning media with a scientific, The above is based on four aspects, namely the design display aspect, the image display aspect, the animation display aspect and the attractiveness aspect, shows an average value of 4.71 for the design display aspect, 5.00 for the image display aspect, 4.80 for the animation aspect and 4.50 for the attractiveness aspect and media principles in 3D animation learning media with a scientific, which overall are in the "very feasible"”, so it can be said that 3D animation learning media with a scientific can provide convenience for students to obtain the desired information.
Assessment of design experts on 3D animation learning media with a scientific, the above is based on three aspects, namely aspects of media design quality, graphic aspects, and linguistic aspects, shows an average value of 5.00 for the quality aspect of media design, 4.50 for the graphic aspect, and 5.00 for the language aspect and media principles in 3D animation learning media with a Scientific, which as a whole are in the "very feasible" category according to the criteria for determining the score range percentage of assessment according to [5]Sriadhi (2018: 1-15), so it can be said that the media 3D animation learning with a scientific can provide convenience for students to obtain the desired information.

3.1.4. Deployment Stage Description

After going through the expert validation and feasibility stages, the effectiveness of the learning tools developed for 3D animation media were tested through the pretest and posttest learning outcomes at the final stage of development, namely the dissemination stage. Results of the first trial obtained the following results:

<table>
<thead>
<tr>
<th>Number</th>
<th>Range Numbers</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70-100</td>
<td>19</td>
<td>70.37%</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>0-69</td>
<td>8</td>
<td>29.62%</td>
<td>Unfinished, Completeness</td>
</tr>
<tr>
<td>Amoun</td>
<td></td>
<td></td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of data analysis in table 3.1 obtained data on student learning outcomes in the first trial as much as 70.37% or 19 students were declared complete. Meanwhile, 29.62% or 8 people have not completed it. The increase in student learning outcomes can be seen from the value of N-gain. Calculation results using Ms Excel obtained an average gain 0.32. Value gain is interpreted into the criteria for the gain which is in the medium category. With these results, it can be concluded that students who use learning media using Lumion 6.0 can improve learning outcomes in the sub-themes of national events during the colonial period.

The second trial needs to be done because there are still shortcomings that must be corrected, especially in the media section on the evaluation aspect where several problems were found. While the results of the second trial obtained the following results:

---

Table 3.2. Result

<table>
<thead>
<tr>
<th>Number</th>
<th>Range Numbers</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70-100</td>
<td>25</td>
<td>92.59%</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>0-69</td>
<td>2</td>
<td>7.41%</td>
<td>Unfinished</td>
</tr>
</tbody>
</table>

Amoun 27 100%

Based on the results of data analysis in table 4.20 obtained data on student learning outcomes on the test try II as many as 92.59% or 25 students declared complete. Meanwhile, there are 7.41% or 2 people who have not completed it. Calculation results using Ms Excel obtained an average gain 0.70. Value gain is interpreted into the criteria for the gain which is in the high category. Overall, the results of the second trial data analysis show that the 3D animation learning media with the scientific has met the effective criteria. Thus, it is known that the results of trial II are better than trial I.

![Figure 3.3 Mastery diagram of trial learning outcomes 2](image)

This is because the learning media used in trial II is a revised learning media from learning media revision I, it can be concluded that the 3D animation learning media with the scientific developed has been effective.

4 Summary and Conclusion

Based on the results of the validation carried out, the 3D animation learning media product with a Scientific is declared suitable for use as learning media on the sub-theme of the colonial period national events to become an alternative learning resources, especially for fifth grade students on the sub-theme of colonial-era national events. Based on the results of validation and testing, 3D animation-based learning media with a scientific approach is very suitable for the sub-theme of national events during the colonial period. Thus, the media is very suitable to be used in the sub-theme of national events during the colonial period to support the effectiveness of the learning process. There are 4.23 media validation results and 4.26 media expert validation results in line with [6] Basori's research (2016).

Learning media is categorized as effective if students can understand the subject matter and student learning outcomes as expected. The percentage of classical completeness (PKK) of students was 88.89%. This PKK was obtained from the posttest of student learning outcomes after using 3D animation-based thematic learning media.
The increase in students’ learning outcomes was analyzed using N-Gain obtained from pretest scores and posttest scores. The average gain of N-Gain is 0.70. The average is categorized as high because Gain > 0.70. Therefore, student learning outcomes increase after using 3D animation-based thematic learning media.

References

The Development of Science Process Skills Based on Science Student Worksheets to Improve Students' Critical Thinking Skills on Single Substance and Mixed Substances

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Abstract. This research is based on the use of Student Worksheets and the learning process that has not developed science process skills. This research is a development research through 4D model by Thiagarajan. This study aims to determine the feasibility of Science Student Worksheets based on Science Process Skills (KPS) to improve students' critical thinking skills in science learning. The reason for this research is that science learning outcomes are still low and science learning tends to only use printed teaching materials. The results showed that the results of material expert validation and media expert validation were included in very good criteria and were declared very valid and feasible to use. Science Student Worksheets based on Science Process Skills are said to be effective in learning with the assumption that students' science scores are higher when using Science Student Worksheets.

Keywords : Science Process Skills, Critical Thinking Skills

1 Introduction

The rapid development of science today produces many concepts that students must learn through learning, while teachers are no longer possible to teach many concepts to students. Learning today is the need to develop learning that is adapted to advances in science and technology so that it can be a solution to problems related to technology and science. Currently, education demands human resources to have critical thinking skills. Critical thinking is part of a complex or high-level thinking pattern that is convergent. The implementation of the learning process that takes place in the classroom is only limited to memorizing information. They are not required to conduct experiments and relate the material to situations in everyday life.
Science process skills are skills that scientists use in forming knowledge in solving problems and formulating results. Student worksheets are also part of teaching materials that can develop thinking skills, ask questions, and answer questions, make connections and assess student learning outcomes. Science process skills are needed because they are preparation and practice in dealing with the realities of life in society because students are trained to think logically in solving problems. In developing science process skills, children must be creative in order to be able to learn science at a higher level in a short time.[1]

In learning science, students should not only learn products, but there must be some students whose learning outcomes are still low and do not pay attention when the teacher explains. In addition, many students do not understand the existing subject matter because there are too many materials and only use books as a learning resource. Problems that occur in the field indicate the low learning outcomes of students in science learning. Learning activities carried out by teachers always use learning media in the form of printed teaching materials. The student worksheets themselves are very helpful for students to solve various problems because the student worksheets used contain a lot of practice questions, but for experiments they do not show scientific process skills and critical thinking because the student worksheets used only contain a variety of questions. kinds of questions for assignments. For self-experiment, the student worksheets that are often used are less helpful. For experimental activities there are no columns or orders to formulate hypotheses, or to write conclusions. So that teachers sometimes still use additional books or additional media, especially in material that conducts experiments.

This is the background of the author to examine student worksheets on science subjects. During the preliminary survey activities conducted by researchers at SDN 158468 Lumut 5, it showed that the critical thinking skills of high-grade students in science subjects tended to be lower.

In learning science, students should not only learn products, but must learn about aspects of process, attitude and technology so that students really understand science as a whole. But in reality, teaching is the transfer of knowledge from teachers to students. So it is not surprising why many teachers teach by means of lectures, because for them science is a collection of knowledge that must be transferred to students[2]. Currently, education demands human resources to have critical thinking skills. Critical thinking is part of a complex or high-level thinking pattern that is convergent. Critical thinking is a cognitive activity related to the use of reason. Learning to think critically means using mental processes, such as paying attention, categorizing, selecting, and judging/deciding. Constructivism has influenced many studies of misconceptions and alternative conceptions in the field of science and now science has shown a shift that emphasizes teaching and learning processes and research methods that emphasize the concept that in learning a person contracts his knowledge.

Critical thinking skills are students' ability to analyze arguments, make conclusions using reasoning, assess or evaluate, and make decisions or problem solving. Critical thinking is a process of making reasoned decisions based on the consideration of available evidence, analyzing and evaluating arguments from various points of view[3]. Students form their own knowledge actively through interaction with their environment, because conceptual
development is the result of the interaction between existing concepts and new experiences. Therefore, a process approach can provide opportunities for students to participate in the discovery process or develop a concept as a process skill. Thus a learning process is not only a transfer of knowledge.

2 Method

This research was conducted at SD Negeri 158468 Lumut 5, Lumut District, Central Tapanuli Regency, North Sumatra Province. The reason for choosing the location of this research is because there is no available Student Worksheet based on Science Process Skills. The research carried out is included in the type of quantitative description research with research and development methods, namely the process or method used to validate product development [4]. The learning device development model used in this research is the 4-D Thiagarajan model, namely Define, Design, Develop, and Disseminate. The definition stage includes the initial analysis stage (front-end analysis), student analysis (learner analysis), task analysis (task analysis), concept analysis, and formulating learning objectives (specifying instructional objectives). The design stage is carried out by designing a Student Worksheet model based on Science Process Skills. At this stage, the preparation of research instruments was also carried out. The development stage (Develop) is carried out by implementing learning tools and instruments that have been validated. The dissemination stage is the stage of disseminating the development product. This data collection uses a questionnaire sheet and a student worksheet validation sheet.

3 Results and discussion

a. Material expert validation data analysis

The results of the validation in the form of an assessment score on aspects of the learning material which include the feasibility of content, quality of presentation, comments and suggestions for improvement and conclusions can be seen in table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Total Score</th>
<th>Mean Score</th>
<th>Assessment Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Content Feasibility Aspect</td>
<td>44</td>
<td>3.67</td>
<td>Very Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Language Feasibility Aspect</td>
<td>45</td>
<td>3.75</td>
<td>Very Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Presentation Feasibility Aspect</td>
<td>37</td>
<td>3.36</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Total 179 3.65 Very Valid
The assessment of the material experts on the Science student worksheets based on the science process skills table above is based on four aspects, namely, content feasibility aspects, language feasibility aspects, presentation feasibility aspects and science process skills assessment. The table shows the average score of 3.6 on the content feasibility aspect, 3.7 on the language feasibility aspect, 3.3 on the presentation feasibility aspect, and 3.8 on the science process skills assessment. Overall, these aspects are in the "very valid" category, which means that the use of Science Student Worksheets based on science process skills meets the needs of students. Thus, Science student worksheets based on science process skills can be tested in the field with revisions. The results of the assessment of learning materials on the basic competence of single substances and mixed substances show some comments and suggestions that are not conceptual errors and can be corrected through revision.

b. Data analysis of media expert validation results

The results of the assessment of learning media showed some comments and suggestions that were not conceptual errors and could be corrected through revision. Science student worksheets based on science process skills by media experts were declared eligible for field trials with revisions in the missing sections. The results of the media expert validation can be seen in table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Mean Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Student Worksheet Size</td>
<td>4.0</td>
<td>Very Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Student Worksheet Cover Design</td>
<td>3.5</td>
<td>Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Student Worksheet Content Design</td>
<td>3.7</td>
<td>Very Valid</td>
</tr>
</tbody>
</table>

c. Analysis of the effectiveness of student learning outcomes in trial II

The test results obtained by researchers were analyzed to see students' mastery in learning trial II. Criteria: 0% Family Planning < 70% of students have not finished studying, 70% Family Planning 100% of students have finished studying. Based on the criteria for mastery learning trial II which is based on the ability of students, it is classified in the criteria for completion, including:
Table 3. Results of pre-test and post-test Trial II

<table>
<thead>
<tr>
<th></th>
<th>Pre-test Result of Trial II</th>
<th>Post-test Result of Trial II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>60</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75.44</td>
</tr>
<tr>
<td>PKK</td>
<td>34 %</td>
<td>PKK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88 %</td>
</tr>
</tbody>
</table>

Based on the data of individual learning completeness according to the results of the student's ability, it is known that there are 17 students who are "incomplete" and 8 students are "completed". Meanwhile, based on the data on individual learning provisions according to the results of students' abilities, it is known that there are three students who are "unfinished" and there are 22 students who are "completed". Based on the classical learning completeness data above, there are 88% of students who have achieved KB 70%. Based on the data on student learning outcomes in the second trial, it can be classified into complete and incomplete levels. For that can be seen in the following table.

Table 4. Completeness data on learning outcomes

<table>
<thead>
<tr>
<th>No</th>
<th>Range Numbers</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70-100</td>
<td>22</td>
<td>88 %</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>0-69</td>
<td>3</td>
<td>12 %</td>
<td>Unfinished</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>25</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the data analysis in the table, it was obtained that the student learning outcomes in the second trial were 88% or 22 students were declared complete. While those who have not completed there are 12% or 3 people. After the students' mastery in individual and classical learning is analyzed, the results of the pretest and posttest are calculated with a gain score to see an increase in the value and effectiveness of the student worksheets that were developed between before and after using the gain score. Based on the gain score, the results obtained are 0.38. The gain score in the second trial is still classified as moderate. Overall, the results of the second trial data analysis showed that the science process skill-based science student worksheets had met the effective criteria. Thus it is known that the results of the second trial are better than the first trial. This is because the learning media used in the second trial is a revised learning media from the revision I learning media, so it can be concluded that the science student worksheets are based on science process skills to improve The developed students' critical thinking skills have been effective.
4 Discussion

One of the objectives obtained from the development of learning tools in this study is to increase students' critical thinking skills. Zahroh & Yuliani (2021) in their research stated that student worksheets can construct thoughts and improve students' abilities to analyze and evaluate lesson concepts in solving problems. When students have mastered the ability to analyze and evaluate then they can be said to have been able to think critically [5]. This is also in line with the research of Sari et al (2019) in their research stating that student worksheets can be an alternative support for practicing critical thinking skills in students, so students can easily understand a problem encountered in everyday life and then analyze the problem by identifying problems, looking for clear and accurate references to answer problems that occur [6].

Based on the results of the analysis of the improvement of students' critical thinking skills in the first and second trials, it showed that the children's critical thinking skills increased as seen from the students' learning outcomes before using the student worksheets and after using the student worksheets. The increase in learning outcomes can be seen by the percentage of learning completeness in the first trial which is 76% and 88% in the second trial with a very good category. The increase in learning outcomes can also be seen from the gain score in trial 1 only got 0.38 medium category with an average pretest of 48 and posttest of 70, so it is necessary to implement a trial design II. In the second trial, the gain score was 0.49 in the medium category with an average pretest of 60 and posttest of 75. So it was concluded that students' thinking skills increased with an afternoon gain of 0.49 in the medium category.

Based on the exposure and data analysis of critical thinking skills above, it is known that learning science student worksheets based on science process skills encourages students to be able to communicate things that have been understood to build new knowledge through finding answers to a problem.

5 Conclusion

The conclusion in this study is based on the findings of the research data, the systematic presentation is carried out by taking into account the research objectives that have been formulated. The conclusions include: Based on the results of the validation of material experts 3.65 (very valid) and media experts 3.78 (very valid), the science student worksheets developed are included in very good criteria and are declared valid and feasible to use. Based on the students' critical thinking mastery data before using the science student worksheets, an average score of 60.72 was obtained, while after using the students' critical thinking mastery data obtained an average of 81.04 students' critical thinking mastery data with a gain score of 0.52 into the medium category. Based on these data, science student worksheets based on science process skills were declared effective for use in learning. Children's critical thinking ability increases as seen from student learning outcomes before using student worksheets and after using LKPD. The increase in learning outcomes can be seen by the percentage of learning
completeness in trial 1 which is 72% and 88% in trial II with a very good category. The increase in learning outcomes can also be seen from the gain score in the first trial which only got 0.32 categories so it was necessary to carry out the second trial design. In the second trial, a gain score of 0.52 was obtained in the medium category.

Acknowledgment. Praise and gratitude the researcher would like to say to God Almighty for His grace, the researcher was able to complete the writing of this scientific journal. Thank you to all those who have helped the researcher. Suggestions and improvements are still highly expected in the writing of this scientific paper. Finally, the researcher would like to say thank you very much.

References


Development of Problem Based Learning Models Assisted by Autograph to Improve Problem Solving Ability of Students in Class XI Students of Mentari Bangsa School Medan

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Abstract. This research is categorized into Research and Development research (research and development). This research includes development research using 4D model to develop Project Based Learning learning model assisted by Autograph on Turunan Fungsi material and all required research instruments. This study used a limited trial to 30 students of class XI at senior high school Mentari Bangsa. The results showed that: Based on the normalized gain index, it was found that in the first trial there was an increase in the problem solving ability of students with the low criterion and in the second trial there was an increase in the score with the “medium” criterion. The increase is also seen from the acquisition of an average N-gain score of 2.50 which is in the high category.

Keywords: Model development, Problem Based Learning, Problem Solving Ability

1 Introduction

Mathematics education is planned by teachers in various ways so that mathematics learning programs can develop and grow optimally, students can carry out their learning activities efficiently, and students can carry out their learning activities efficiently. The process of interaction between teachers and students is related to the development of thought patterns and logic in the realm of learning. According to Andriani (2015:5), to have human values, mathematics learning must begin with contextual or real-life problems that are relevant to students' direct and social lives.

In fact, Ningsih (2011:3) found that when teaching mathematics in schools, most teachers still dominate the teaching and learning process by applying behavioral theory-based learning such as direct learning models. Consistent with Ningsih, Halim (2017:2) states that teachers in general are too focused on solving problems.

During learning, teachers usually explain concepts informatively, provide sample questions, and provide exercises. During learning activities, students are very passive, they just listen and absorb explanations and work on questions while the teacher concentrates. In addition, student assessment with practice. But understanding mathematics learning is not easy. Many students do not understand the concept of a teacher. Students are taught mathematics passively and
may even memorize formulas without understanding the meaning or utility of what they are learning. As a result, mathematics achievement in school is still relatively low.

To achieve more meaningful mathematics learning and ensure high student achievement, teachers need to be creative and innovative in developing learning activities during the teaching and learning process. Pentury (2017:2) states that education is no longer an effort to impart knowledge, but an effort to create an environmental system that teaches students in the best way to achieve educational goals. Teaching in this sense requires the right strategy to achieve the goals to be achieved and encourage teacher creativity in managing educational programs using various teaching and learning strategies.

Nani, Hamid, and Bahara (2018:49) argue that the learning model is selected and adapted to the environment that is relevant to real life. Learning models are needed so that they have a positive impact on students' skills and activities in learning (Ainin, Mulyono, Syahputra, 2020:2). In line with this, Rahmawati and Suryanto (2018: 89) argue that a learning model consists of 5 components that affect the achievement of learning objectives.

However, the reality contradicts the existing theory. As explained by Abidin, Mohamed and Ghani (2016: 80), in carrying out learning activities, teachers use learning models that are not in accordance with the subject. The majority of teachers use the traditional model to carry out learning activities, and the learning model prioritizes the teacher as the main source of information. The teacher centered model does not pay attention to the active participation of students in the learning process. Wiwobbo, Budiyono, and Subanti (2014:695) suggest that the learning model used by school teachers still does not encourage students to develop thinking skills. Ainin, Mulyono, and Syahputra (2020:2) added that the use of innovative learning models has not been effectively applied in the mathematics learning process.

The development of learning models must pay attention to curriculum requirements. In other words, the learning tools that you develop must be in line with the curriculum. In addition, it is necessary to pay attention to the characteristics of students who are formed, such as the social environment, geography, culture, stage of development, initial abilities, interests, and family background, namely the characteristics of the intended person. Therefore, a learning model must be designed to carry out its functions effectively in order to achieve the expected learning objectives.

One of the educational models that can be developed is a problem-based learning model. In its application, PBL creates problems at the beginning of the educational process. The cases presented in the problem-based model are contextual cases, which are close to students' daily lives. In addition to the problems that are the starting point in this model, PBL students have the opportunity to build knowledge and communicate mathematical ideas through problem generation and problem solving activities. This has been confirmed by Arends and Kilcher (2010:328). He reports that problem-based learning has been shown to actively engage students in relevant learning experiences. Teaching that engages students actively in learning helps them to use your existing knowledge to deepen your knowledge. Furthermore, Arends & Kilcher (2010:328) argue that problem-based learning assesses learning in a way that demonstrates understanding rather than acquisition.

Therefore, it can be said that the PBL model can help students achieve the goals of mathematics education, especially mathematical problem solving skills.
2 Theoretical study

a. Problem Solving Skill

NCTM (2000:52) defines problem solving as a goal and an approach. Solving problems means solving problems, and we don't know how to solve problems before. To create solutions, students must practice what they have previously learned and practice through the process of developing new mathematical descriptions. Problem solving is not only the goal of mathematics education, but also a means to carry out the educational process (NCTM, 2000:52).

In addition, the NCTM explains the problem solving criteria in learning mathematics in the context of problem solving. It aims to enable all students to develop new mathematical skills through problem solving, problem solving encountered in mathematics and other mathematics learning situations. Apply and adapt appropriate problem solving strategies to observe and reflect on the math problem solving process for pre-kindergarten to grade 12. Problem solving is an integral part of all mathematics learning. It consists of five criteria in its application to learning.

The following is a detailed explanation of the criteria for solving problems in mathematics education from NCTM (2000:52). In other words, in mathematics education, students can:

1. Build new mathematical knowledge through problem solving. Good problems give students the opportunity to consolidate and expand their knowledge and, when selected properly, can inspire students to study mathematics. Problem solving helps students develop special skills. The mathematical purpose of this problem is to allow students to think about the possible and control their thinking systematically without waiting for them to become proficient.

2. Unpacking problems that arise in mathematics and other contexts. Naturally, good problem solvers tend to carefully analyze the situation mathematically and propose problems based on what they observe.

3. Practicing and adapting various appropriate problem-solving strategies.

Different strategies are needed when students are faced with more environmental problems. Strategies are learned over time, applied to specific contexts, and become better, more detailed, and more flexible when used in a more environmental problem setting.

4. Observing and reflecting on the process of solving mathematical problems. Good problem solvers keep track of things and make adjustments. To make sure that students fully understand the problem, review them and adjust your strategy as you uncover the problem.

b. Problem Based Learning

Mathematics learning begins at every opportunity by introducing situational problems (contextual problems) so that students have the opportunity to formulate questions and conduct investigations so that these problems can be solved in the context of the student's knowledge building process. Problem-based learning is a structured model that helps students build knowledge and problem-solving skills and helps students acquire critical knowledge (Delisle, 1997:6). As Delisle notes (1997:8), the problems experienced in problem-based learning are contextual problems and relevant to students' daily lives, "problem-based learning deals with problems that are as close to real life situations as possible".
The design of the PBL model refers to the 5 main components of the learning model. Hypothetically, the design of the components of the PBL Model is described as follows:

1. PBL Model Syntax
   a. Open learning
   b. Explaining learning objectives and motivating students (problem orientation)
   c. Giving apperception (problem orientation)
   d. Guiding students in forming groups, each group consisting of 4-5 students (organizing students to learn)
   e. LAS distribution and explanation of work instructions (observations)
   f. Guiding students to discuss problems with group members and find solutions to problems (individual/group teaching experience)
   g. Making works in report format (elaboration and presentation of works)
   h. Announcement of the results of group discussions (development and presentation of work) and providing reinforcements
   i. Giving gifts to groups
   j. Review and completion of learning materials (analysis and evaluation of the problem solving process)
   k. Ask evaluation questions
   l. Provide follow-up care

2. Social system

   The social system establishes the roles and relationships between students and teachers and the norms that govern the PBL model. In group discussions, students interact with each other. At that time, they had the opportunity to work together, defend each other's opinions, ask each other questions, respond to each other, and reach an agreement to resolve the problems they faced, to guide, direct and control the flow of discussion.

3. Principle of Reaction Management

   The principle of reaction relates to how the teacher pays attention and treats students, and responds to stimuli that come from students such as questions, answers, responses and other activities.

4. Support System

   To support the smooth implementation of this learning model, supporting devices are needed consisting of: Learning media materials and learning assessments equipped with an assessment/assessment rubric.

5. Instructional Impact and Accompaniment Impact

   Effects of learning or teaching are learning outcomes that are directly achieved by directing students towards the expected goals. Accompanying effects are other learning outcomes produced by the learning process as a result of creating a learning environment experienced by students without direct direction from the teacher. The educational effect of this research is to improve the quality of mathematics learning. A side effect of implementing the PBL
development model is that students understand the importance of benefits in their lives, teamwork, and knowledge sharing.

<table>
<thead>
<tr>
<th>Fase</th>
<th>Indicator</th>
<th>Teacher Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student orientation on problems</td>
<td>The teacher explains the learning objectives, explains the tools and materials needed, motivates students to be involved in problem solving activities.</td>
</tr>
<tr>
<td>2</td>
<td>Organizing students to study</td>
<td>The teacher divides students into several groups, helps students define and organize learning tasks, and determines learning resources that can help students solve problems.</td>
</tr>
<tr>
<td>3</td>
<td>Organizing students to get to know Autograph</td>
<td>The teacher introduces the Autograph software to students which will later be used by students to help solve the problems given and distribute the software to students.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The teacher encourages students to collect the information provided in the problem, then guides in determining the strategic plan, and becomes a facilitator in implementing the strategy and carrying out observations to solve the problem.</td>
</tr>
<tr>
<td>5</td>
<td>Develop and present the work</td>
<td>The teacher helps students in planning and preparing appropriate works such as reports, and helps them to share assignments with their friends.</td>
</tr>
<tr>
<td>6</td>
<td>Analyze and evaluate the problem solving</td>
<td>The teacher helps students to reflect or evaluate with the help of the Autograph on their investigations and the processes they use.</td>
</tr>
</tbody>
</table>

### 3 Research methods

Four D model is the development model used in this study to develop Problem Based Learning models with all the required instruments. The study used a limited trial of 30 samples, namely class XI at senior high school Mentari Bangsa Medan.

Mentari Bangsa school which is located at Mujahir street, Medan, North Sumatra Province is where this research is carried out. Research time is in the odd semester of the 2021/2022 academic year in October 2022.

The research subject was some 30 students in class XI Mentari Bangsa school. The reasons and considerations for choosing the subject of this study were based on considerations of Piaget's level of intellectual development theory where children aged over 11 years have entered the formal operational stage, which is the child's ability to think creatively. While the object is the problem based learning model on Turunan Fungsi material.
The developed problem based learning models is used in *Turunan Fungsi* learning if the model is valid, practical, and effective. The validity of this study was tested by introducing several experienced experts in evaluating learning model products, both learning and model design. The criteria are if the level of validity of the problem based learning assisted by Autograph and the minimum validity and level validity are, then it is "valid" ($3 V_a < 4$).

### 4 Research Result

The research results are the problem based learning model for learning materials for students in Mentari Bangsa school grade XI. This research design uses the four D model. The results of the data analysis of Test I and Test II were obtained. In other words, 1) the learning model developed is valid. 2) The learning model developed is practical. 3) The learning model developed is effective.

Based on the results of testing the problem based learning model assisted by Autograph by the researcher, it has been validated with considerable validity. Due to the validity achieved, the developed model and device are suitable for use in research. In addition, the results of the validation of the Learning Implementation Plan (RPP) are 4.60, the Student Guide Book is 4.60, teachers book is 4.70, the Student Worksheet (LKPD) is 4.60. From that data, all validation values range $4 \leq V_a < 5$ with valid category.

For the practicality of the problem based developed, it has met the practicality category in terms of the results of the analysis of observations and observations of the implementation of learning activities. Test I obtained a score of 3.80 which was in the "Medium" criteria and did not reach the successful category. However, after making several revisions, the
implementation of test II obtained a score of the results of the implementation of observations and observations of learning activities that increased the score of 4.93 was in the "High" category. The conclusion was practical.

The problem based learning model by assisted by Autograph developed has met the effectiveness categories, namely: (1) 26 students or 86.67% have completed the second trial; (2) in the second trial, each item has reached the achievement of the learning objectives are achieved with criteria 75% of the maximum score for each item (3) in the second trial the students gave a positive response of 97.71%; and (4) the use of learning time does not exceed the usual learning time set by the school.

The development of this model based on the opinion of Joyce, Weil and Calhourn (2009: 48-51) there are five elements, namely: (1) syntax, (2) social system, (3) reaction principles, (4) support systems, and (5) instructional impact and accompaniment.

5 Conclusion

Based on the results of the analysis and discussion in this study, it was concluded that the development of problem based learning models assisted by Autograph was declared valid, practical and effective so that it was feasible to use.

References


Differences in Students Mathematical Representation Ability Taught with Problem Based Learning Model and Missouri Mathematics Project in Class X High School Students

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Abstract. The goals of this study are to determine two things: (1) whether students who are taught using a problem-based learning approach have better mathematical representation skills than those who are taught using a Missouri mathematics project approach; and (2) how students' mathematical representation skills change depending on their early math skills. This study is kind of like an experiment. This study used students from class X at SMA Negeri 2 Bagan Sinembah as the population, and a random sample was used to select the sample. The instruments used were a math pre-ability test and a post-test of the students' ability to represent math. Two-way ANOVA was used to analyze the data. The findings demonstrated the following: (1) There is no interaction between the learning model and early mathematics ability on students' mathematical representation ability; (2) There are differences in the mathematical representation abilities of students who are taught through the problem-based learning model and students who are taught through the Missouri mathematics project model.

Keywords: The Missouri Mathematics Project, Problem-Based Learning, and Students' Ability to Represent Mathematical Concepts.

1 Introduction

Mathematics is a science that cannot be separated from human life. Mathematics also has a very important role in the development of science and technology. The role of mathematics in the life and development of today's era is the reason for the importance of studying mathematics and improving the quality of mathematics education. Learning mathematics is expected to make students think logically, analytically, systematically, critically and creatively, as well as problem solving abilities.

Materials in learning mathematics are interrelated with one another, even mathematics also has links with other disciplines and problems in everyday life. Therefore, it is very important
to improve students' mathematical abilities. Thus, mathematics needs to be considered at every type and level of education in order to improve the quality of education. However, the high demands for mastering mathematics are still not directly proportional to student learning outcomes. Sumarno (Simamora, 2019: 2) suggests that students' mathematics learning outcomes have not been satisfactory, as well as learning difficulties faced by students and difficulties faced by teachers in teaching mathematics.

The low student learning outcomes can also be seen from the basic competencies that have not been met by students in learning mathematics, this agrees with Maulydia, Surya and Syahputra (2017: 2966) who say that: "in the process of learning mathematics there are still many students who have not achieved the basic competencies required. has been established". In addition, there are still many students who do not realize the importance of mathematics and consider mathematics as a difficult, scary, abstract subject, and a compulsory subject which is only limited to routine calculations.

This is in accordance with the findings of the researcher based on the results of observations and interviews at SMA Negeri 2 Bagan Sinembah. Is one of the math teachers at SMA Negeri 2 Bagan Sinembah. said that: "most students are afraid and even hate learning and studying mathematics, this is because mathematics is known to be difficult because of the characteristics of mathematical material that is abstract, logical, systematic, and full of symbols. and formulas that confuse students. This is in line with what Russeffendi (Muhtarom, et al., 2016: 21) stated that "the weakness of mathematics in Indonesian students is because mathematics lessons in school are feared and even hated by students". So many students say that the math teacher is a killer teacher. This happens because the lessons are difficult to understand plus the learning process carried out by the teacher is less varied. In addition, the experience of learning mathematics with the teacher is not pleasant during the learning process. The teacher still uses a one-way learning process, and students are passive in learning.

In addition, he also stated that "students have difficulty in translating or interpreting mathematical ideas contained in the problem and describing it in a visual form so that students cannot develop a mathematical model correctly to be able to solve the problem. Students are also difficult to understand what is known, what is asked and find solutions to the problem in the form of a story. And there are still many students who are not sure of their own answers, so when the teacher gives the opportunity for students to answer questions, they refuse and there are even students who depend on their friends' answers. Based on the explanation above, it can be seen that the mathematical ability, especially mathematical representation and self-efficacy of students at SMA Negeri 2 Bagan Sinembah is still low.

To find out more about students' representational abilities at SMA Negeri 2 Bagan Sinembah, the researchers also gave a diagnostic test of representational abilities adopted from the National Examination questions at the Junior High School level to 60 students (X1 and X3).

From the results obtained, students have not been able to, as can be seen use visual representations to solve problems, create geometric figures to clarify problems and facilitate settlement, solve problems by involving mathematical expressions, and write interpretations of data from representations. Thus, it is possible to draw the conclusion that the procedure for completing the answers provided by students at SMA Negeri 2 Bagan Sinembah took an initial ability test for mathematical representation in every way is still in the poor category.
Mathematical representation ability is one of the abilities that need to be considered because the ability to make mathematical representations facilitates and clarifies mathematical solutions, transforms abstract ideas into real concepts, for example with pictures, symbols, words, graphs, tables, and others (Hasratuddin, 2015: 125). According to Jones & Knuth (Handayani, 2018: 211) representation is a model or substitute form of a problem situation that is used to find a solution. Mathematics learning experts who are members of the NCTM set mathematical representation as a separate standard of ability that is important to be developed in the implementation of the school curriculum. NCTM (2000) "Students in the middle grades solve many problems by creating and using representations to organize and record their mathematical ideas-related thinking states".

Mathematics learning activities involve students practicing and communicating using a variety of representations, resulting in a richer learning environment (Mc. Coy, Baker & Little in Hasratuddin, 2015: 128). Furthermore, it is said that in the classroom learning of mathematics, representation does not have to be restricted to changing one form into another in a single direction; rather, it can be two-way and even multi-directional. Aspects that show students have mathematical representations are (1) making pictures to clarify problems and facilitate solutions. (2) solving problems by involving mathematical expressions, and (3) answering questions using words or written text.

However, based on the findings of research carried out by Rahmawati (Hanifah, 2015: 192), it is stated that the maximum mathematical representation ability of students has not been achieved due to students' lack of understanding of the concept as a whole. Seifi, et al. (2012: 2923) conducted an experiment to detect students' difficulties in solving math story problems from their teacher's perspective. The results show that most of the students' difficulties stem from the inability to represent and understand a problem, make plans and define the terms used.

One of the reasons for the lack of students' mathematical representation skills is due to the limited knowledge of teachers who do not develop students' representational power. This is consistent with the study by Hutagaol (2013:86), stating that although representation has been declared as one of the standard processes in the curriculum that must be achieved by students through learning mathematics, its implementation is not a simple matter. The limited knowledge of the teacher and the habits of students studying in the conventional way have not made it possible to develop optimal mathematical representation power. In line with that, Amri (Mandur, Sadra and Suparta, 2013: 3) found that teachers did not provide opportunities for students to present and use their mathematical representation skills, so students tended to follow the steps for solving problems made by their teachers. Furthermore, Surya & Syahputra (2017: 12) state that: Students are presented with routine problems during the classroom learning process that can be solved through straightforward analysis and mechanistic solutions. Nearly all instruction in mathematics is provided in school uses definitions, formulas, examples and ends with practice questions. Occasionally, evidence is found that solving mathematical problems is done using numbers or simple sketches.

Responding to the problems that exist in learning mathematics, especially related to students' mathematical representation abilities which ultimately lead to low student learning outcomes in learning mathematics, teachers must strive for learning by applying learning models that can provide opportunities and encourage students to practice students' representational abilities. In learning mathematics with a conventional approach, students' representational abilities are still very limited to short verbal answers to various questions posed by the teacher.
So it is necessary for teachers or researchers to choose a lesson that can change the paradigm. Where is a process of learning mathematics that gives students the opportunity to see and experience the usefulness of mathematics in real life.

Problem based learning learning model besides being able to improve students' representational abilities. Piaget (Arends, 2008: 47) that good pedagogy must involve offering various situations where children can experiment in the broadest sense, experimenting with various things to see what will happen, manipulating objects, manipulating symbols, asking questions, and looking for answers on their own, conciliating what was found at one time with what he found at another time, comparing his findings with those of other children.

Problem based learning learning model is one of the constructivist learning models that enable students to collaborate in solving problems. Problem based learning learning model requires active students to construct mathematical concepts and solve given problems, students can communicate in mathematical language well so as to foster student confidence in the given potential and improve students' abilities both in student representation abilities.

Based on the opinion above, mathematics learning is emphasized on the relationship between mathematical concepts and the experiences of students in everyday life. So that students will feel familiar and happy with the material they are learning and be able to understand the material through their activities. Then it can be used learning carried out by educators and learning processes based on real life, namely PBL.

The Missouri Mathematical Project (MMP) learning model is another learning model that is in line with constructivism theory in addition to the problem-based learning model. The Missouri Mathematics Project (MMP) learning model is a structured learning model that includes a mix of activities for teachers and students as well as practice questions for groups and individuals to develop ideas and expand mathematical concepts. Understudies in this MMP learning model are given the opportunity to work together to solve problems posed by the teacher about learning materials.

The first stage of MMP is a review. In this review stage the teacher reviews learning related to the learning to be taught, then enters the second stage, namely development. For this second stage the teacher delivers the material being taught by instilling new concepts and ideas. In the third stage, students are formed into several small groups which are then given the opportunity to work on assignments with their group members, and the teacher guides them. This third stage is called cooperative work (controlled exercise). In the group there was a group discussion, so that it was seen that there were student activities, namely asking each other questions, arguing, and convincing each other of answers. After that, class discussions between groups were carried out to ensure each other's group answers, and the teacher led the discussion which would also conclude the results of all groups, then entered the fourth stage, namely seat work (independent exercise) in the independent training stage the teacher gave a post-test to find out the results. the learning that has been done and in the last stage, namely homework (PR) the teacher gives homework (PR) to students so that students continue to study even at home. From the MMP steps, it can be seen that the function of this learning model is as a facilitator.

MMP is quite effective and efficient in accordance with the student-centered learning model (student-centered), which combines all components, including teacher skills and student activity, which will both have a significant impact on learning outcomes for students. In addition, it is hoped that the Missouri Mathematics Project Learning Model will enable
students to better represent mathematical concepts skills. As a result, it is hoped that student learning outcomes will improve and that students will continue to reap the benefits.

By using the MMP learning model in learning mathematics, it will certainly motivate students, that learning mathematics has enormous benefits and uses in their daily lives. As a result, MMP learning is anticipated to be a solution for creating a student learning paradigm rather than a teacher teaching paradigm, as is the case with conventional learning, which in turn may lead to an improvement in the mathematical abilities of students representation abilities. It also shows that there is a difference between the impact of the Missouri mathematics project the problem-based learning model and the learning model on students' ability to represent math.

In addition to learning factors, there are other factors that affect students' mathematical representation abilities, namely students' early mathematical abilities (KAM). KAM is divided into high, medium, and low groups. Furthermore, the learning model and students' initial mathematical abilities which are divided into high, medium and low ability groups are thought to have no interaction with students' mathematical representation abilities, as well as learning models and students' initial mathematical abilities which are divided into high, medium and low ability groups. does not have an interaction with students' mathematical representation abilities which in the end can show that it is the learning model that affects students' mathematical representation abilities.

For students who have moderate or low abilities, if the learning model used by the teacher is interesting, according to the cognitive level of students, it is very possible that students' understanding will be faster, and in the end can improve mathematical representation skills in mathematics. On the other hand, for students who have high abilities, the effect of learning models on mathematical representation abilities in mathematics is not too large. This happens because students who have high abilities understand mathematics faster, because they are used to learning that is disciplined, enthusiastic, and challenging even without using various interesting and ordinary learning models.

Given the preceding context, it is believed that it is necessary to determine whether Missouri mathematical projects and problem-based learning contribute differently to students' mathematical representation abilities. A research project with the title "The Differences Between Missouri Mathematics Project Models and Problem-Based Learning Models in the Mathematical Representation Skills of Class X SMA Students".

2 Research Method

This research is categorized into a quasi-experimental research. This study aims to see the difference in the mathematical representation ability of students who receive PBL and MMP learning, as well as to see the interaction between learning models and early mathematics abilities on students' mathematical representation abilities.

The population in this study were all students of class X SMA Negeri 1 Riau totaling 205 students which were divided into 7 classes with 4 classes majoring in science and 3 classes majoring in social studies. The sample in this study consisted of two classes, namely class X MIA 2 as the experimental class I with a total of 30 students and class X MIA 3 as the experimental class II with a total of 30 students.
Prior to being given treatment, students were given an initial mathematical ability test to determine the extent of students' readiness. After that, the experimental class I was treated by applying PBL learning and the experimental class II was treated by applying MMP learning. Then at the end of the meeting a final ability test (post-test) was conducted. The experimental design can be seen in table 1 below:

<table>
<thead>
<tr>
<th>Group</th>
<th>KAM</th>
<th>Treatment</th>
<th>Post-test</th>
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</thead>
<tbody>
<tr>
<td>Experiment I</td>
<td>$T_1$</td>
<td>$X_1$</td>
<td>$T_2$</td>
</tr>
<tr>
<td>Experiment II</td>
<td>$T_1$</td>
<td>$X_2$</td>
<td>$T_2$</td>
</tr>
</tbody>
</table>

Information:

- $T_1$: The KAM test is before being given treatment
- $T_2$: Post-test (final test) that is after being given treatment
- $X_1$: Treatment by applying PBL
- $X_2$: Treatment by applying MMP

The research procedure is the stages of activities with a set of data collection tools and learning tools. The stages are as follows: preliminary study, compiling learning tools and instruments, validating tools and instruments, conducting research, and data analysis. Figure 1 is a chart in this study that can be found below.
3 Research result

Analysis of the description of students' early mathematical ability

To obtain an overview of the KAM of students, the calculation of the average and standard deviation (standard deviation) is presented in Table 2, below:

Table 2. Description of Student KAM

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAM_Experiment_I</td>
<td>30</td>
<td>50</td>
<td>85</td>
<td>68.17</td>
<td>10.886</td>
</tr>
<tr>
<td>KAM_Experiment_II</td>
<td>30</td>
<td>50</td>
<td>85</td>
<td>66.67</td>
<td>10.114</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A description of the mathematical representation ability post-test results

A post-test of mathematical representation abilities was administered following the application of the learning model to each test class to assess the extent to which students' abilities in representing mathematical problems were enhanced following learning. Table 3 provides a description of the two classes' post-test results:

Table 3. Description of the Student's Post-Test Mathematical Ability Results

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRM_Experiment_I</td>
<td>30</td>
<td>62</td>
<td>92</td>
<td>78.57</td>
<td>7.605</td>
</tr>
<tr>
<td>KRM_Experiment_II</td>
<td>30</td>
<td>60</td>
<td>80</td>
<td>59.63</td>
<td>6.975</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data normality post-test assessment of students' capacity for mathematical representation
The goal of the normality test is to see if the post-test value data of students' mathematical representation skills in two classes are normally distributed. Table 4 displays the results of the Kolmogorov-Smirnov test performed on the data used in this study using the SPSS version 22.0 program tool:

**Table 4. Normality Test Results Post-Test Values of Students’ Mathematical Representation Ability**

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov(^a)</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Df</td>
</tr>
<tr>
<td>KRM_Experiment _I</td>
<td>.153</td>
<td>30</td>
</tr>
<tr>
<td>KRM_Experiment _II</td>
<td>.146</td>
<td>30</td>
</tr>
</tbody>
</table>

\(^a\) Lilliefors Significance Correction

**Test of homogeneity of post-test data students’ mathematical representation ability**

Testing the homogeneity of the post-test scores of students' mathematical representation ability test results in testing class I and class II aims to determine whether the data obtained from the post-test scores of students' mathematical representation ability test results come from a homogeneous population or not. The results of the homogeneity test in the two classes were analyzed using the Lavene test using the SPSS version 22.0 program tool as shown in Table 5 below:

**Table 5. Result of Homogeneity of Variance of Post-Test Values of Mathematical Representation Ability**

<table>
<thead>
<tr>
<th>Post-test</th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRM</td>
<td>.115</td>
<td>1</td>
<td>58</td>
<td>.736</td>
</tr>
</tbody>
</table>

**Two-way ANOVA statistical analysis students’ mathematical representation ability**

Using formulas and conditions that have been established, a Two-Way Analysis of Variance with F statistics is used to examine the hypothesis testing. Table 6 displays the results of the summation of the hypothesis testing analysis performed with SPSS version 22.0 program tools:
Table 6. Two-way ANOVA Test Results of Mathematical Representation Ability

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>6365.758*</td>
<td>5</td>
<td>1273.150</td>
<td>32.744</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>213932.652</td>
<td>1</td>
<td>213932.652</td>
<td>500.045</td>
<td>.000</td>
</tr>
<tr>
<td>KAM</td>
<td>964.430</td>
<td>2</td>
<td>482.215</td>
<td>11.630</td>
<td>.000</td>
</tr>
<tr>
<td>Learning</td>
<td>3798.231</td>
<td>1</td>
<td>3798.231</td>
<td>97.665</td>
<td>.000</td>
</tr>
<tr>
<td>KAM * Learning</td>
<td>21.108</td>
<td>2</td>
<td>10.554</td>
<td>.271</td>
<td>.763</td>
</tr>
<tr>
<td>Error</td>
<td>2969.649</td>
<td>54</td>
<td>55.315</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>294954.000</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>8485.400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .752 (Adjusted R Squared = .729)

4 Research discussion

Students are placed into one of three KAM groups based on their scores on the KAM test. Problems with the PBL and MMP learning models that concern students' capacity for mathematical representation can also be solved using KAM grouping. The study found that the KAM group in the first test class consisted of 8 high-capacity students, 17 tolerably fit students, and 5 low-capacity students. In the second test class, the KAM group consisted of 5 high-capacity students, 19 respectably proficient students, and 6 low-capacity students. The first test class had an average value of 68.17 and a general deviation of 10.866, while the second test class had an average value of 66.67 and

Because mathematical theories are arranged in a hierarchical fashion, students must first comprehend the fundamental ideas of the previous theory before moving on to the next one. This requires students to have basic mathematical skills. Students won't be able to move on to the next theory if they don't understand the main ideas behind it. Descriptive data analysis revealed that students whose treatment was based on the PBL model performed better in mathematical representation than those whose treatment was based on the MMP model. The first test class received an average post-test score of 78.57, while the second test class received an average post-test score of 59.63.

In light of the aforementioned clarification, students who utilized the PBL model had a higher numerical portrayal capacity than students who utilized the MMP model. Two-Way ANOVA was used to break down these results based on the learning factor. The value indicates that the value was dismissed, so it was dismissed and acknowledged. As a result, it is generally thought that students who used the PBL model had different numerical portrayal capacities than students who used the MMP model. This is in line with PBL studies involving MMP-applied students. As indicated by Nurfitriyanti et al. (2020), which is consistent with the study's findings that "there is a significant difference in mathematical representation abilities between prospective educator students who learn through the PBL model and the direct learning model." The results of the covariance analysis show that the direct learning model is inferior to the average PBL model.
This study alludes to the joint effort between early numerical capacities and learning in affecting understudies' numerical portrayal abilities. Inferential statistical analysis of the students' capacities for mathematical representation was carried out using the two-way ANOVA test for the KAM*Learning factor. Given that the results were obtained using, the value of is accepted. This suggests that the students' prior mathematical proficiency and the learning model do not interact. This is predictable with the discoveries of Eviyanti's (2018) study, which discovered that KAM and learning models meaningfully affected understudies' capacities to address math.

5 Conclusion

In view of the consequences of the information examination of this review, the ends are portrayed as follows: Students who use the Missouri mathematics project learning model and students who use the problem-based learning model have different capacities for mathematical representation. There is no connection between the learning model and the numerical portrayal capacity of the understudies' underlying numerical capacities. This indicates that students' abilities in mathematical representation are solely influenced by the provided learning model.

References

LKPD Development Using Open Ended Approach to Improve Students' Numerical Metacognition Ability

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Abstract. The research objectives: 1) Dissect on the improvement of students' numerical metacognition skills through LKPD with Open Ended learning; 2) Knowing the nature of LKPD with a quality Open Ended approach. The subjects of this study were students of class VIII SMP Bina Satria Mulia Medan, totaling 32 students. The research instrument was a test of students' numerical metacognition abilities. Data analysis was carried out using the Tessmer model of developmental assessment. In the results of experiment I and experiment II, there are: 1) LKPD that uses the Open Ended learning strategy to achieve indicators of validity, practicality and effectiveness; and 2) The test results of increasing the capacity of numerical metacognition using LKPD with Open Ended learning have been developed in terms of the typical N-gain value in the first experiment as much as 0.43 increased to 0.49 in the second experiment, meaning the "medium" category.

Keywords: LKPD Development, Tessmer model, Open Ended Approach, Numerical Metacognition.

1 Introduction

Math is a fundamental subject for students of all ages. According to Hasratuddin (2018), mathematics teaches people to think more systematically and analytically. (Cockcroft, 1982) makes the case that mathematics should be taught to students for the following reasons: (1) it is applicable to all aspects of life; (2) all fields of study require mathematical skills; (3) it possesses powerful, concise, and clear communication methods; (4) it can be used to present information in a variety of different ways; (5) it teaches logical thinking, thoroughness, and spatial awareness; and (6) it teaches students to be satisfied with their efforts to solve challenging problems. According to Cornelius (1982), who shares our sentiments, there are five reasons to study mathematics: (1) a method of thinking that is crystal clear and logical; (2) strategies for overcoming the challenges of day-to-day life; (3) strategies for discovering patterns of relationships and generalizing experiences; (4) strategies for fostering creative problem-solving; and (5) strategies for broadening one's cultural horizons.

"the contemporary aim of mathematics education is to master problem-solving ideas," as stated in Simamora, R. E., Saragih, S., and Hasratuddin (2018). The mathematics curriculum of the
future should emphasize critical thinking, aesthetics, objectivity, and openness. It is imperative that students improve their mathematical abilities as a result of the widespread application of mathematics. If they put in the effort, students are capable of achieving good results. (1) Having an understanding of mathematical concepts, being able to solve problems in a manner that is adaptable, accurate, efficient, and precise, and being able to explain the relationship between mathematical concepts and algorithms; (2) The ability to reason about patterns and the nature of generalization, to construct proofs or to explain mathematical operations of mathematical thoughts and statements; (3) The ability to solve problems, including the capacity to understand problems, design, mathematics, and other topics that are related. (5) An appreciation for the importance that mathematics plays in everyday life, including the characteristics of inquisitiveness, attentiveness, and excitement in the study of mathematics, as well as adaptability in one's approach to the resolution of problems. The government has made considerable efforts to enhance mathematics education on the basis of these goals and the centrality of mathematics to the human experience. This may be observed in the efforts that the government is making to enhance curricula, increase the teaching capacities of educators, and generate high-quality intelligence and human resources.

There are several factors contributing to Indonesia's poor educational system. The potential for learning has not been brought to its full potential, and neither the materials nor the approaches that have been utilized are efficient. The Graduate Competency Standards (SKL) and Content Standards have been incorporated into the KTSP (Permendiknas No. 22, 23, and 24) curriculum that was implemented in 2006. (SI). Both SKL and SI place an emphasis on students' level of competency. The curriculum of KTSP stipulates that teachers are responsible for managing and producing learning resources in addition to serving as learning facilitators. In accordance with the requirements outlined in Article 20 of Government Regulation 19 of 2005, educators are required to plan and execute high-quality instructional procedures, as well as evaluate students' acquired knowledge. To meet these requirements, there is a pressing need to improve the standard of teaching, as well as the infrastructure of educational institutions, the resources available to students, and the laws that govern the field.

In order for students to acquire mathematics, they need to have mathematical metacognition. The National Council of Teachers of Mathematics (NCTM, 2000) identified five aspects of mathematical ability: the ability to communicate mathematical ideas, the ability to reason mathematically, the ability to solve mathematical problems, the ability to connect mathematical ideas, and the ability to represent mathematical ideas. According to the authors of the study, metacognition places an emphasis on self-monitoring and learner responsibility (Marzano, 1998). To self-regulate, plan, direct, and assess your actions. Students that use metacognitive methods develop the ability to learn independently much more quickly. According to the research, children can improve their learning outcomes, become more autonomous learners, have an honest attitude, and recognize their mistakes if they engage in metacognition (Susantini, 2004).

Students at SMP Negeri 20 Medan were found to have a low level of mathematical metacognition, as shown by the results of the observations that were carried out at the school. This is seen when the researcher gives an initial test to students in class VIII-1, and the students write down what they know, but they do not write down the questions that are being asked because they are unable to synthesize the information in order to update the model. This can be seen because the students are unable to update the model. Students are less careful when calculating the solutions because they do not know the formula for the problem, which causes
them to be confused when they are completing the procedures. As a result of this confusion, students are less likely to get the correct answers. After they have finished responding to the questions, they do not reevaluate the results, nor do they draw any conclusions based on the information provided by the responses.

According to the student responses that were obtained, specifically from the 32 students who were given this question, when viewed from the guidelines for scoring mathematical metacognition abilities in planning aspects with written indicators that were known, asked correctly, and completely, there was only one person who write down what was known and asked, with two people who were correct but incomplete, five persons wrote down what they knew and were questioned, and one person who write down what they knew and were questioned.

According to the explanation that was provided earlier, each stage of the mathematical metacognition test that a student takes is classified because the majority of students achieve the lowest score possible on each indicator. Everyone in the class has a poor level of mathematical metacognition (59). According to (Arikunto, 2006), N88 is considered "high," 59N88 is considered "mid," and N59 is considered "low." The findings of mathematics assessments indicate that students' mathematical metacognition skills are not yet very advanced, so it is important for teachers to work on improving these skills. A questionnaire was used to evaluate the students' level of comprehension of the topic.

An approach to teaching and learning that is mundane or traditional is one of the factors that contributes to students' poor academic performance. According to the interview that the researcher had on June 23, 2021 with one of the math teachers at SMP Negeri 20 Medan, learning activities were carried out as usual, the teacher explained the topic, and students listened before completing practice problems. It is impossible to carry out educational activities in accordance with the RPP that is now in place; the most important thing is for pupils to comprehend the content and take in the instructor's expertise.

Teachers have a responsibility to make attempts to improve the field of mathematics learning in schools, particularly the mathematical metacognition of pupils, which contributes to subpar outcomes in students' mathematics learning. Enhanced Worksheet for the Students (LKPD). The Student Worksheet (LKPD) is a printed instructional resource in the form of sheets of paper that contain material, summaries, and directions for executing learning tasks that students are required to undertake in reference to Basic Competencies (KD). These sheets are printed on paper (Andi Prastowo, 2012). The Student Worksheet, also known as the Student Activity Sheet, has an impact on education and need to be in the possession of every educator.

Students are able to participate more actively and creatively in the learning process when they use student activity sheets, which also provide them with practice questions. Students can try learning on their own with the support of this. The activity sheet for students assists the instructor in facilitating the learning process, which can take a significant amount of time to explain. A approach for a teacher to get students ready for learning is by having them create student worksheets, often known as activity sheets. Student Worksheets, also known as Student Activity Sheets, provide assignments for students to do. These assignments are typically presented in the form of directions, steps to finish a task, and Basic Competencies (KD) that need to be attained. The process of teaching and learning benefits from careful lesson planning. This assertion is in agreement with (Hariyanto, 2013) "The success of an activity is primarily
dictated by its planning; if the planning is well-designed, the activity will be easier to carry out, lead, and regulate." [Citation needed]  

Students are required to engage in high-level thinking question practice in Indonesia in order to strengthen their higher-order thinking skills (Rahayu, et al., 2018). Creating activity sheets for kids and enhancing their mathematical thinking both require a suitable learning strategy. For this study, open-ended learning was utilized. (Alhadad, 2010) The objective evaluation of pupils' high-level mathematical ability is the first step in the open-ended method. Students are engaged with open-ended questions that can have several valid answers using this approach. According to (Firdaus, 2016), the Open Ended method encourages students to enhance their creative abilities as well as their ability to solve mathematical problems. Every student is responsible for finding solutions to challenges that are tailored to their individual skills and areas of interest. Math activities may be fun for children of all skill levels, not just those with stronger mathematical aptitudes. The purpose of this instructional strategy is to improve students' mathematical metacognition by providing them with more leeway in their problem-solving approaches. These requirements can be satisfied by open-ended mathematical inquiry. The problem presents itself in the Open Ended methodology as having numerous correct responses. According to Becker (Oktaviani et al., 2017), this method teaches students how to locate, recognize, and solve problems by utilizing a variety of different strategies. Students build their own knowledge through the process of problem-solving and drawing on existing information in this form of learning, which is particularly constructivist. According to research conducted by Purwanto (2011), teaching students about exponential function graphs using a technique called Open Ended helps students become more creative and enhances their mathematical metacognition. The Open Ended method encourages students to acquire knowledge by the participation in authentic activities and the observation of natural occurrences. The presentation of phenomena can be made more transparent through the use of problem-oriented learning or open-ended questions. Mathematical learning should start with open problems, which are issues that have several correct solutions and multiple paths to get there. According to the description given above, this issue is associated with the problems that result in students having a low level of mathematical metacognition ability. After that, there will be research done to find solutions to the problems that already exist by developing new educational materials. It was because of this that he decided to carry out a study with the working title "Development of HOTS-Based Student Activity Sheet with an Open Ended Approach to Improve Mathematical Metacognition of Students at 20 Medan Junior high school.".

2 Research methods

This research is for product development and testing. Tessmer development model is used to develop and verify the product. This model has two stages: preparation and prototype.

Class VIII-1 students at SMP Negeri 20 Medan in 2021/2022 participated in this study. This study developed an open-ended HOTS-based Student Activity Sheet for SMP class VIII. This class's students were studied.

Data Analysis of Learning Device Validity

Five education experts and practitioners provided this validation. The average value of each component will be calculated based on the professionals' opinions.
When using the open-ended learning approach, examine whether the learning tools require little or no revision. This can be determined by consulting experts. To examine the applicability of a learning device, give an assessment scale and validation sheet based on the open-ended learning model. Then you can form an opinion.

During the learning process, the application of various learning devices, and the provision of observation sheets, a trained observer watches the learning activity phases. This observer completes the learning implementation sheet. The assessment sheet for learning devices is formatted as a sequence of choices with a point value from one to five, with a score of five (very good), a score of four (good), a score of three (good enough), a score of two (not good), and a score of one (very good) all accessible (not good).

Data on student learning mastery, achievement of learning objectives, and student answers were utilized to analyze the effectiveness of the learning aids. Students' mastery of classical education basics is utilized to evaluate mathematical metacognition learning aids. The concept of minimum completeness is tested by considering that students are considered complete if their scores total 80. Class X KKM at SMA Negeri 1 Singkil is 80 points. A lecture is considered classical if 85% of test-takers score 80 or higher. It's a lesson necessity. Classical Completeness Percentage: 85% (PKK).

2.1 Data Collection Instruments and Techniques
Instruments for Assessing the Quality of Educational Resources
The learning device validation instrument is a sheet that is used to get the opinions of industry professionals on the level of quality offered by educational resources. Sheet for RPP Validation as well as Sheet for Student Activity This checkbox authorization form includes format, language, pictures, and content.

Instruments for Assessing One's Capability in Mathematical Metacognition
A structured description test is the assessment tool that is used for determining one's level of mathematical metacognition.

Student Response Instrument
The instrument that is utilized in the process of collecting responses from students is known as a student response questionnaire. The opinion or response of a student to the components and learning tools that were produced can be gathered through the use of a student response questionnaire. The methodology that is used to acquire data from student responses is carried questionnaires to students as the method that is used to carry out the methodology that is used in order to carry out the methodology that is used. The responses of students in this study are student perspectives on interest, feelings of pleasure, currentness, and interest, as well as the ease of understanding learning materials through learning tools built through the Open Ended learning model. This study was carried out in the United Kingdom. This study was conducted in the United States.

2.2 Learning Media Development Procedure
During this preliminary stage, you will be deciding where the research will be done and what it will focus on. The first step in applying this paradigm is to determine what the learning goals will be. The purpose of this exercise is to define the required competences in such a way that they may be mastered and applied by students once they have completed their education. This aim is established based on an analysis of how learning is implemented, on the results of the tests administered, and on the numerous learning challenges faced by pupils.

Self Evaluation
The process of development research enters its official phase after this stage, which marks the commencement of the stage. At this point, a preliminary analysis is carried out, which includes an analysis of students, with students in grades VIII-1 and VIII-3 serving as the target students, an analysis of the curriculum, which reveals the identification and systematic arrangement of concepts in the cube and block material to produce a concept map, and an analysis of the materials that are being utilized. The target students for this study are students in grades VIII-1 and VIII-3. Students in eighth grade, specifically grades eighth-1 and eighth-3, will be the focus of this research. will be created, and once it is done, it will be known as the HOTS-based Student Activity Sheet.

**Prototyping**

Experts (for the of expert evaluation) and students (on a one-to-one basis) are simultaneously presented with the outcomes of the design based on the prototype developed using the. The outcomes of both are incorporated into the revising process as material. The name for the product that emerged after making adjustments to the This is the second version of the prototype.

**Expert Review**

An examination of the product that had been designed was carried out during the stage of the expert review, along with assessment and evaluation by a panel of seven experts consisting of three mathematics education professors, two colleagues, and two mathematics study teachers. These experts examine each prototype with regard to the content, construction, and language of each version. After the information has been generated, it is subjected to revision utilizing the recommendations of specialists. At this stage in the process, Responses and suggestions from experts (validators) are written on the validation sheet as revision material and say if the design is valid. The validation sheet also indicates whether or not this design is valid.

**One-to-one**

A trial of the design was executed with the participation of six students who acted in the capacity of testers during the one-on-one stage. These students were separated into three groups based on the level of ability that each of them possessed: two of these students had low skills, two of these students had moderate abilities, and two of these students had high abilities. As a result of the findings obtained from this implementation, the design that has been developed has been modified.

**Small group**

The challenges that were encountered when The prototype's testing was used to create the second prototype. Revision was based on expert evaluation results. Next, the prototype was tested on nine students with poor, intermediate, and high abilities. These test, which were gained via its execution, are then utilized in the process of changing the trial in order to get it ready for the field test phase of the experiment. The findings of the research conducted on these things make up what is known as the third prototype. This arises as a result of the questions being altered as a reaction to the suggestions or observations made by the students in the smaller group.

**Field test**

The design of the second prototype is revised based on the feedback received from testing as well as any suggestions that were made second prototype Research participants tested the revision's results. This trial is a field test. Having been put through a field test are required to have satisfied the quality requirements in order to pass the test.

**Validation/Expert assessment (Expert Appraisal)**
In the course of this endeavor, specialists in their respective professions carry out evaluations. The process of getting recommendations for enhancement Evaluation of design-stage learning tools is referred to as expert validation. All of the components that make up the aforementioned teaching aids were created during the design phase of the project.

**Trial of Research Instruments**

A test of the students’ metacognitive abilities with regard to mathematical concepts served as the research instrument that was used in this investigation. Before the research instrument could be used in the actual study, it was first put through its paces with a group of students who were not included in the sample. In addition to that, assessments of both validity and reliability were carried out. At this point in the process, one of our primary goals will be to construct a research instrument that is not only dependable but also usable in subsequent field tests. Building a reliable research instrument is one of our primary focuses at the moment.

**Field Trial**

Trials in the field were carried out in order to gather direct feedback on the learning tools that were being created before the production of the final tools. Learning aids that were supposed to improve students’ metacognitive abilities and arithmetic skills were put through their paces in schools around the country to see whether or not they were both useful and successful.

**Stage of Dissemination**

At SMP Negeri 20 Medan's discussion forum for mathematics subject teachers, this activity was carried out in a constrained fashion. As a consequence of this stage's work, all of the mathematics subject instructors at SMP Negeri 20 Medan have been advised to suggest their students use this apparatus as an alternative method of learning about cubes and blocks.

### 3 Result

#### 3.1 Validation of learning tools by using open ended learning tools by using developed tools

Throughout the entirety of this investigation, a mathematical metacognition ability test served in the capacity of a research instrument. A group of students who were not a part of the sample were used to conduct an initial test of the study instrument before it was put to use. After that, an analysis was carried out to determine the validity and reliability of the research instrument. The goal of this project is to develop a research instrument that is not only trustworthy but also flexible enough to be utilized in a variety of contexts. The following is a summary of the results of the validity and reliability test performed on the instrument:

We used a technique called product moment person correlation to try to establish whether or not the queries were genuine. To be more specific, we accomplished this by establishing a connection between the score on each item and the score overall. This allowed us to more accurately evaluate the data. The results of the mathematical metacognition ability tests that were given to the students are summarized in Table 1 which can be found below.

<table>
<thead>
<tr>
<th>Test Items</th>
<th>Test Score</th>
<th>t-score</th>
<th>Table Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.9169</td>
<td>9.746</td>
<td>0.444</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.8661</td>
<td>7.351</td>
<td>0.444</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.9382</td>
<td>11.501</td>
<td>0.444</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>0.865</td>
<td>7.313</td>
<td>0.444</td>
<td>Valid</td>
</tr>
</tbody>
</table>

According to the findings of the validation carried out by specialists and practitioners in the field, it falls inside the valid category. In order to make the instructional tool usable, but with
some minor adjustments necessitated by the recommendations made by the specialists. The compilation of the outcomes of the validation efforts made by the five validators is presented in the table 2 that can be seen below:

### Table 2. Learning tool validation results

<table>
<thead>
<tr>
<th>No.</th>
<th>Rated object</th>
<th>Average Value of Total Validity ($V_i$)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning Implementation Plan</td>
<td>4.320</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>Student Activity Sheet</td>
<td>4.20</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Effectiveness of Student Activity Sheet Achieved by the Application of Metacognition Capability Using a Strategy for Learning That Allows for Open-ended Exploration

Student Activity Sheets and other open-ended HOTS-based test instruments can be utilized to improve learning. Student Activity Sheet and HOTS-based test instruments must meet the effectiveness criteria: (1) learning mastery (if it has a minimum absorption capacity of 75%, while classical completeness is achieved if 80% of students pass); (2) learning objectives mastery (a minimum of 75% of the formulated learning objectives can be achieved by a minimum of 65% of students); and (3) classical completeness (if 80% of students pass). Following is a discussion of each indicator for measuring Student Activity Sheet and HOTS-based test instruments utilizing Open Ended trial. I. On the metacognition test, nine pupils scored exceptionally high before and 17 after. Posttest: 10 kids meet high criteria, vs 8 before. Both assessments measure mathematical metacognition. 11 pupils had intermediate math metacognition pre-test, 5 post-test. The pretest fails four mathematicians. Posttest fails no students. Pre- and post-test data show no pupils have low mathematical metacognition. 16 pupils (50%) passed the pre-test; 24 (75%) passed the post-test. According to effectiveness standards, classical completeness must be 75%, hence the first trial's classical mastery test results failed.

If student activity sheets and open-ended HOTS-based assessments increase learning, employ them. The student activity sheet and HOTS-based test instruments must meet the effectiveness criteria: (1) learning mastery (if it has a minimum absorption capacity of 75%, while classical completeness is achieved if 80% of students pass); (2) learning objectives mastery (a minimum of 75% of the formulated learning objectives can be achieved by a minimum of 65% of students); and (3) classical completeness (if 80% of students pass). The Open Ended trial technique II is used to measure the effectiveness of the student activity sheet and HOTS-based test instrument. 13 students finished the pretest (40.62%) and 23 completed the posttest (76.66%). This signifies pupils' second classical mastery test scores met all requirements. Learning objectives were met in the second field experiment's post-test.

Learning time using the student activity sheet in trial II open-ended learning is the same as normal up to this point, six meetings with basic competencies. (2) Problem-solving with open-ended cubes and blocks. The second trial learning time has been met because minimal learning takes as long as standard learning. According to the second trial's data, the created educational resources were successful.

### 3.2 Improving students' metacognitive ability

The analysis of increasing students' mathematical metacognition in the first trial will be seen through the N-Gain from the pretest and posttest. Table shows N-Gain outcomes for mathematical metacognition:
Table 3. Summary of N-Gain results of mathematical metacognition ability trial I

<table>
<thead>
<tr>
<th>N-Gain</th>
<th>Interpretation</th>
<th>Total students</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g \leq 0.3$</td>
<td>Low</td>
<td>10</td>
</tr>
<tr>
<td>$0.3 &lt; g \leq 0.7$</td>
<td>Medium</td>
<td>19</td>
</tr>
<tr>
<td>$g &gt; 0.7$</td>
<td>High</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 3 shows three students with high N-Gain scores. 19 students improved in the medium category (0.3 $g$ 0.7 N-Gain) and 10 improved in the low category ($g < 0.3$). First experiment "middle" averaged 0.43. Mathematical metacognition markers are 0.619, 0.373, and 0.266. Evaluation has the lowest N-Gain (0.266), whereas planning has the highest (0.619).

The second trial's pre- and post-test results will be used to calculate the N-Gain, which will be used to analyze whether students' abilities increased. Table 4 summarizes N-mathematical Gain's metacognition:

Table 4. Summary of N-Gain results of experimental mathematical metacognitive ability II

<table>
<thead>
<tr>
<th>N-Gain</th>
<th>Interpretation</th>
<th>Total students</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g \leq 0.3$</td>
<td>Low</td>
<td>10</td>
</tr>
<tr>
<td>$0.3 &lt; g \leq 0.7$</td>
<td>Medium</td>
<td>17</td>
</tr>
<tr>
<td>$g &gt; 0.7$</td>
<td>High</td>
<td>5</td>
</tr>
</tbody>
</table>

3.3 Improved mathematical metacognition ability

Posttest study found that metacognitive abilities improved in both treatments. Mathematical metacognitive skills improve between pre- and post-tests. The first trial averaged 62.89 in mathematical metacognition, then 77.93. This is the math metacognition analysis. In the second experiment, students' math metacognition scores rose 57.94 points to 76.76. Mathematical metacognition improved between trials I and II. Combining the exercise sheet and Open Ended approach boosts math metacognition.

The Ministry of National Education recommends contextual learning to help pupils understand subject matter (Sofnidar, 2017). (Social, personal, cultural) This helps pupils transmit their knowledge and abilities.

Problem-based learning encourages student participation so they can apply learned knowledge to family, community, or other situations. A learning technique like this helps kids develop mathematical thinking abilities, intellectual discipline, and curiosity.

When employing the Open Ended technique, students must reason about what they know to gain knowledge. If kids aren't taught to think, math will be seen as material that follows procedures and imitates instances without understanding them. Open-ended math can boost metacognition. The Open Ended approach can improve students' mathematical metacognition, according to Lestari, Selvia, and Layliyah (2019). Open-ended learning helps improve junior high pupils' mathematical metacognition and habits of mind, according to Zakiah Nur Eva (2014). Studying Malaysian pupils. This increased mathematical metacognition through easy-to-use Learning Implementation Plans for teachers and students, easy-to-implement Open Ended stages, and easy-to-understand student worksheets.

4 Conclusion
Open-ended HOTS worksheets boost arithmetic metacognition. The RPP's total validity is 4.320, and the LKPD's is 4.20. 2) Based on implementation findings, the HOTS-based LKPD with an open-ended approach seems practicable. First of 2.752 ("Possibly Implemented") failed research success criteria. After adjustments, the second trial's learning implementation observation score was 3.73. (category "Well Implemented"). 3) HOTS-based worksheets with an open-ended approach to promote mathematical metacognition, including classical learning completeness. First trial metacognitive abilities were 50% (16 students) (26 students). Mathematical metacognition learning objectives weren't reached in the first trial. 79%, 88%, 80.4%, and 76% attained learning objectives in the second experiment after many changes (complete). First, 90.85% of students reacted positively, then 92.744% did. Trials I and II raised students' math metacognitive ability by 0.04. Trial II (0.47), which begins with planning, chooses the right strategy, and analyzes learning and errors, has a higher average value than trial I (0.43). understanding.

References


Development of Learning Devices Based on Problem Based Learning Models in Improving Student’s Concept Understanding Ability in 1 Sintahuis Junior High School

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Abstract. The research aims to: (1) describe the validity, practicality, and effectiveness of learning tools developed through a problem-based model for seventh grade students of junior high school 1 Sintahuis; (2) Analyzing the improvement of students' conceptual understanding ability after using the developed device. This research uses the learning device development model of Thiagarajan, Semmel and Semmel, namely the 4-D model (Four D Model). This research was carried out in class VIII A in the odd semester of the 2021/2022 academic year Middle School. The results showed that (1) the problem-based learning model learning tools in improving students' mathematical concept understanding skills that were developed had met the valid, practical, and effective criteria; (2) Increasing the ability to understand mathematical concepts by using a problem-based model developed from the average N-gain value in the first and second trials.

Keywords: Learning development, problem based learning, Concept understanding ability

1 Introduction

Mathematics is one of the subjects taught at every level of education, from early childhood education to university level. Mathematics as one of the basic sciences, both its applied aspects and its reasoning aspects, has an important role in efforts to master science and technology. For this reason, school mathematics needs to function as a vehicle to develop intelligence, abilities, skills and shape students' personalities. Because in the process of learning mathematics there is a thought process, because in thinking humans make connections between parts of information that have been recorded in their minds as meaning. From this understanding, an opinion is formed which in the end can be drawn a conclusion. Along with the development of science and technology, the development of mathematics education has shifted. Sinaga (2007) says that:

Mathematics is an essential science as the basis for lifelong work in the era of globalization. Therefore, it is necessary to master mathematics at a certain level for all students so that later in life it is possible to get a decent job because in the era of globalization there is no job without mathematics. In fact, the quality of education is still low and must be improved, this is supported
by the results of the World Competitiveness Year Book survey where Indonesia is ranked 37th out of 60 countries (IMD_WCY, 2015). Similar conditions can also be seen from the results of a study conducted by PISA (Program For International Student Assessment, where the results of the 2012 PISA study, Indonesia is ranked 64th out of 65 participating countries with an average score of 375, while the international average score is 375). 500 (OECD, 2014). On the other hand, there are still many teachers who still adhere to the old paradigm known as the transfer of knowledge in mathematics learning today. This paradigm assumes that students are objects or learning targets, so the teacher forces students more with formulas. - mathematical formulas or procedures and does not provide opportunities for students to use their understanding in solving student problems. Teachers are more focused on solving the demands of the mathematics learning curriculum and tend to be less effective in reflecting on the learning process and student learning outcomes, so this has a major influence on the low level of students' conceptual understanding ability in completing students' math problem.

This is in line with what was stated by NCTM (2000), the standard of abilities that must be achieved in learning mathematics include: (1) problem solving (problem solving); (2) Reasoning and proof (reasoning and proof); (3) communication (communication); (4) connecting ideas (connections); and (5) Representation. Students who have the ability to understand will understand the mathematical concepts they are learning, can provide patterns, solve problems, draw conclusions from concepts understood and provide conclusions as a result of clear thinking.

Referring to one of the standard processes, namely the ability to understand concepts is a very important ability for students to have because arithmetic is also closely related to mathematical characteristics. This phenomenon is also expressed by Ruseffendi (1991) that the largest part of mathematics that students learn in school is not obtained through mathematical exploration, but through notification. The situation in the field also shows that learning with the old paradigm makes students passive, causing a decrease in students' mathematical understanding. Students are not accustomed to thinking first to build their own knowledge so it is difficult to understand a concept. Students are accustomed to receiving learning from the teacher and only understand the forms of sample questions given by the teacher on the blackboard. Therefore, students' understanding of a concept is very important in learning mathematics because if students are directly involved in the formation of the concepts being taught, then students can easily solve mathematical problems in various forms according to the concepts that have been given.

However, in reality students' low conceptual understanding can be seen from the results of the researchers' initial research observations by providing questions that measure the ability to understand concepts in the Two Variable Linear Equation System material. to students of SMP Negeri 1 Sitahuis. Based on the test questions given, one of the indicators that students are expected to achieve is the ability to understand students' concepts. According to Wardhani (2008) it is explained that the indicators of understanding students' mathematical concepts are being able to "Restate a concept, Classify objects according to certain properties according to the concept, Give examples of concepts, Present concepts in.}
2 Research methods

Types of research

This type of Development Research uses the Thiagarajan, Semmel and Semmel learning device development model, namely the 4-D model (Four D Model). Thus, the product of this research is a problem-based learning model learning device and the required instrument. The learning tools developed are lesson plans, teacher books, student books, student activity sheets and the necessary instruments, namely the concept understanding ability test.

Research subject

The subjects in this study were class VIII A students of SMP Negeri 1 Sitahuis for the academic year 2021/2022, while the object in this study was a learning device based on the Problem Based Learning model on the material of the Two Variable Linear Equation System and the ability to understand concepts.

2.1 Data analysis

Data Analysis of Learning Device Validity

To see the validity of the learning tools used descriptive statistical analysis and based on the opinions of five experts in the field of mathematics education. Based on the expert opinion, the average value for each aspect will be determined, so that the average value of the total aspects is obtained.

Data Analysis of Practicality of Learning Devices

To get practicality data by using the implementation of learning devices. This instrument is used to obtain data on the implementation of learning devices. The implementation of the learning device was observed by two observers who had been trained so that they could operate the observation sheet on the implementation of the learning device correctly. The implementation is in the form of 2 (two) choices, namely yes and no. If you choose yes then there are 5 (five) choices, namely: (1: very appropriate); (2: appropriate); (3: quite appropriate); (4: not suitable); and (5: very inappropriate).

Data Analysis of Learning Device Effectiveness

The effectiveness of learning tools related to the ability to understand concepts is determined based on the achievement of classical student learning mastery. The data obtained from the posttest results of students' conceptual understanding abilities at the end of each lesson were analyzed to determine the percentage of students who have been able to understand the concept. Completeness of individual student learning is done by calculating the score of each student. Based on the 2013 Curriculum, a student is said to be complete if he gets a score of 71 with a B predicate. While learning completeness per class or the percentage of classical completeness (PKK) is obtained by calculating the percentage of students who complete individually. A class is said to have completed its learning if the PKK 85%.

Data Analysis Improving Concept Understanding Ability

To analyze the increase in students' understanding of mathematical concepts, data were obtained from the results of the students' pre-test and post-test. Increasing students' understanding of mathematical concepts can be obtained from normalized gain index data, With the criteria of Normalized Gain Index (g) shown in the following table:
Table 1. Normalized Gain Score Criteria

<table>
<thead>
<tr>
<th>Score Gain</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g &gt; 0.7$</td>
<td>High</td>
</tr>
<tr>
<td>$0.3 &lt; g \leq 0.7$</td>
<td>Medium</td>
</tr>
<tr>
<td>$g \leq 0.3$</td>
<td>Low</td>
</tr>
</tbody>
</table>

2.2 Learning Media Development Procedure

In developing this mathematics learning media, the 4-D (Four-D) development model is used. According to Thiagarajan (1974), the 4D research and development model consists of 4 main stages, namely define, design, develop, and disseminate. According to Trianto (2013) the 4D development model can be adapted into 4D, namely definition, design, development, and deployment. The application of the main steps in the study is not only based on the original version but is adjusted to the characteristics of the subject and the place of origin of the examinee.

a) Define Stage

The purpose of this stage is to determine and define learning requirements by analyzing the objectives and limitations of the material. The activities carried out at the definition stage include 5 (five) main steps, namely (a) early-late analysis, (b) student analysis, (c) concept analysis, (d) task analysis, (e) specification of learning objectives.

b) Design Phase

The purpose of this stage is to design learning tools, so that prototypes (examples of learning tools) are obtained for cube and block material that refers to Problem Based Learning. Activities at this stage are test preparation, media selection, format selection and initial design of learning devices.

c) Development Stage

The following details the steps taken at the development stage, namely:

Validation/Expert assessment (Expert Appraisal)

Validasi atau penilaian ahli merupakan teknik untuk mendapatkan saran perbaikan as well as an assessment of the learning tools that have been produced at the design stage. In this step, draft 1 is evaluated by experts in the field. The experts referred to in this case are competent validators which include State University of Medan mathematics education lecturers and high school mathematics teachers. The results of expert validation are used as the basis for revising and perfecting learning tools. Furthermore, the results are revised according to the input given by the reviewer which then produces Draft II.

Research Instrument Trial

The research instrument used in this study was a test of the ability to understand concepts. Before using the research instrument, the research instrument was first tested in the class outside the sample, then tested for validity and reliability.

Field Trial

Field trials were carried out to obtain direct input to the learning tools that had been prepared so as to produce the final tools. The learning tools were tested at SMP Negeri 1 Sitahuis to see the practicality and effectiveness of the designed learning tools. The practicality of learning devices
is observed by using an observation sheet on the implementation of learning devices. The criteria used to decide that a learning device has an adequate degree of implementation are at least in the high category (3 ≤ P < 4) or very high (4 ≤ P ≤ 5) and the instrument is said to be good if it has a reliability coefficient of 0.75 or 75%. Meanwhile, the effectiveness of the use of learning tools is measured by classical student learning mastery, namely at least 85% of students who take part in learning are able to achieve a minimum score of 75 on the ability to understand concepts.

d) Stage of Dissemination

The development of learning tools reaches the final stage if a positive assessment has been obtained from experts and through development tests. Learning tools are then packaged and distributed. The distribution of learning tools in this study was limited to class VIII of SMP Negeri 1 Sitahuis. At this stage, the effectiveness of learning tools that have been effective at the development stage are re-tested.

3 Result

Validation of Learning Devices by Using Problem Based Learning Tools by Using Developed

This assessment is given to experts/practitioners at the same time as providing a device validation sheet. The results of giving the device validation sheet to the validator related to the response of the developed device can be seen in Table 2. below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Rated object</th>
<th>Average value of total validity</th>
<th>Validation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Learning Implementation Plan</td>
<td>4.72</td>
<td>Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Teacher's Book</td>
<td>4.83</td>
<td>Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Student Book</td>
<td>4.76</td>
<td>Valid</td>
</tr>
<tr>
<td>4.</td>
<td>Student Worksheet</td>
<td>4.78</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Based on Table 2. above, the average total validity of each learning device is in the interval: 4 Va < 5. Based on the validity criteria, it can be said that the learning tools developed are valid.

Practicality of Learning Devices by Using Problem Based Learning Devices by Using Developed

The implementation of problem-based learning-based learning tools was measured using an observation sheet on the implementation of problem-based learning-based learning tools. The implementation of the learning tools used is reviewed at each meeting. The implementation of all learning tools used in the study was observed by observers who are teachers in the field of mathematics studies. The recapitulation of observations related to the implementation of learning can be seen in Table 3. and Table 4. below:
Table 3. Recapitulation of Observation Results on the Implementation of Learning Devices in Trial I

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspects Observed and Assessed</th>
<th>Meeting</th>
<th>Average</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>1</td>
<td>Implementation of the Learning Implementation Plan</td>
<td>3.80</td>
<td>4.00</td>
<td>4.20</td>
</tr>
<tr>
<td>2</td>
<td>Implementation of Student Worksheets</td>
<td>3.80</td>
<td>4.00</td>
<td>3.80</td>
</tr>
<tr>
<td>3</td>
<td>Implementation and Teacher's Book</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>Implementation and Student Book</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>Average Execution</td>
<td>3.90</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>Percentage of Execution</td>
<td>78%</td>
<td>80%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Based on Table 3, it is found that the average implementation of the learning tools developed in Trial I at the first meeting was 78%, for the second meeting it was 80%, for the third meeting it was 80% and for the fourth meeting it was 82%. Furthermore, the average value of the total implementation of learning tools from the four meetings is 80%.

However, on the implementation indicators, if it is reviewed based on each meeting, the first meeting has not reached the specified implementation criteria. This still needs to be re-examined and revised so that the implementation of the tools at each meeting and in each device as a whole meets the criteria for good implementation.

Furthermore, in the second trial, another observation of the implementation of all learning devices was carried out. Observation of the implementation of the previously revised learning device which was observed by 2 (two) observers. The recapitulation of observations related to the implementation of learning can be seen in Table 4. below:

Table 4. Recapitulation of Observation Results of Device Implementation

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspects Observed and Assessed</th>
<th>Meeting</th>
<th>Average</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>1</td>
<td>Implementation of the Learning Implementation Plan</td>
<td>4.20</td>
<td>4.60</td>
<td>4.60</td>
</tr>
<tr>
<td>2</td>
<td>Implementation of Student Worksheets</td>
<td>4.20</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>3</td>
<td>Teacher's Book Implementation</td>
<td>4.00</td>
<td>4.50</td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>Implementation and Student Book</td>
<td>4.20</td>
<td>4.00</td>
<td>4.20</td>
</tr>
<tr>
<td></td>
<td>Average Execution</td>
<td>4.15</td>
<td>4.27</td>
<td>4.20</td>
</tr>
<tr>
<td></td>
<td>Percentage of Execution</td>
<td>83%</td>
<td>85%</td>
<td>84%</td>
</tr>
</tbody>
</table>
Based on Table 4, it is found that the average implementation of the learning tools developed in Trial II at the first meeting was 83%, for the second meeting it was 85%, for the third meeting it was 84% and for the fourth meeting it was 86%. Furthermore, the average value of the total implementation of learning tools from the four meetings was 84.65%.

Based on Table 4, it can be seen that the average percentage in the four meetings meets the criteria for implementing learning tools in the very good category. As for the implementation of each device, the average percentage of implementation of the Learning Implementation Plan, Student Worksheet, Teacher's Book, and Student's Book has also met the implementation criteria in the very good category. This certainly has an impact on the overall implementation of learning tools for 4 (four) meetings which have an average implementation of 84.65% in the good category. In accordance with the reference in Chapter III regarding the implementation of the learning device, it is said to be successful if the implementation score is met in the 80 < k < 90 percentage range in the "good" category. Thus, in Trial II, the implementation of learning using the developed learning tools was achieved.

From the results of the description above related to the implementation of learning tools, learning tools developed based on problem based learning can be said to be practical.

**Effectiveness of Learning Devices by Using Problem Based Learning Tools by Using Developed**

Description of the effectiveness of learning media assisted by Macromedia Flash is said to be effective if the level of students' mathematical reasoning abilities is at least 85% of the total number of students or a minimum score of 75.

Furthermore, the results of classical mastery of students' mathematical concept understanding abilities in the first try can be seen in Table 5. below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Ability to understand mathematical concepts</th>
<th>The number of students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td></td>
<td>14</td>
<td>70%</td>
</tr>
<tr>
<td>Not Complete</td>
<td></td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>Amount</td>
<td></td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on the data in Table 5, it can be seen that the classical completeness of the results of the students' mathematical concept understanding ability in the first trial was 70% or as many as 14 students. In accordance with the criteria for mastery of classical student learning outcomes, namely at least 85% of students who take the mathematical concept understanding ability test are able to achieve a score of 75. Thus, the posttest results of students' mathematical concept understanding ability do not meet classical mastery because they only get 70% completeness percentage. So it can be concluded that in Trial I the application of problem-based learning tools developed did not meet the criteria for achieving classical completeness.

Furthermore, the results of classical mastery of students' mathematical concept understanding abilities in the second trial can be seen in Table 6. below:
Table 6. Classical Completeness Level of Concept Understanding Ability

<table>
<thead>
<tr>
<th>Category</th>
<th>Ability To Understand Mathematical Concepts</th>
<th>The number of students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td></td>
<td>17</td>
<td>85%</td>
</tr>
<tr>
<td>Not Complete</td>
<td></td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Amount</td>
<td></td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on the data in Table 6, it can be seen that the classical completeness of the results of the students' mathematical concept understanding ability in the second trial was 85% or as many as 17 students. In accordance with the criteria for mastery of classical student learning outcomes, namely at least 85% of students who take the mathematical concept understanding ability test are able to achieve a score of 75. Thus, the posttest results of students' mathematical concept understanding ability have met classical mastery because they obtained a percentage of completeness of 85%. So it can be concluded that in Trial II the application of problem-based learning tools developed has met the criteria for achieving classical completeness. So, based on the results of the second trial, it can be concluded that the learning tools based on problem based learning have met the quality of effective learning tools.

Improving Students' Concept Understanding Ability

Based on the results of the pretest and posttest in the first trial, a summary of the results of N-Gain was obtained based on the improvement categories that have been set in Table 7 below.

Table 7. Summary of N-Gain Results of Concept Understanding Ability

<table>
<thead>
<tr>
<th>Range</th>
<th>Upgrade Category</th>
<th>Total Students</th>
<th>Percentase</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ≥ 0.7</td>
<td>High</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>0.3 ≤ N &lt; 0.7</td>
<td>Medium</td>
<td>15</td>
<td>75%</td>
</tr>
<tr>
<td>N &lt; 0.3</td>
<td>Low</td>
<td>4</td>
<td>20%</td>
</tr>
</tbody>
</table>

Based on Table 7, above, it can be seen that 1 student got an N-Gain score in the range > 0.7. For students who have increased their ability to understand mathematical concepts in the "Medium" category or get an N-Gain score of 0.3 < g 0.7, there are 15 students and 4 students who score N-Gain g 0.3 with "Low" category. The average gain in the first trial was 0.40, which is in the medium category. So, it can be concluded that there is an increase in students' ability to understand mathematical concepts after applying learning using problem-based learning tools in the first trial.

Based on the results of the pretest and posttest in the second trial, a summary of the results of N-Gain was obtained based on the improvement categories that have been set in Table 8.
Table 8. Summary of N-Gain Results on Comprehension Ability Test

<table>
<thead>
<tr>
<th>Range</th>
<th>Upgrade Category</th>
<th>Total Students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ≥ 0.7</td>
<td>High</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>0.3 ≤ N &lt; 0.7</td>
<td>Medium</td>
<td>13</td>
<td>65%</td>
</tr>
<tr>
<td>N &lt; 0.3</td>
<td>Low</td>
<td>1</td>
<td>5%</td>
</tr>
</tbody>
</table>

Based on Table 8, above, it can be seen that 6 students obtained N-Gain scores in the range > 0.7 or experienced an increase in students' understanding of mathematical concepts in the "High" category. For students who experienced an increase in their ability to understand mathematical concepts in the "Medium" category or get an N-Gain value of 0.3 < g 0.7, there were 13 students and 1 student who obtained an N-Gain g value of 0.3 in the "Low" category. The average N-gain in the second trial was 0.58 which was in the medium category, so it can be concluded that there was an increase in students' ability to understand mathematical concepts after applying learning using problem-based learning tools in the second trial.

Based on Tables 6, 7, if viewed based on the N-Gain calculation to see the increase in students' ability to understand mathematical concepts in the first try and second try it increased from 0.40 to 0.58, meaning that it was in the "medium" category. This shows that the ability to understand students' mathematical concepts by using learning tools developed based on problem-based learning has increased in the first trial to the second trial.

4 Discussion

The criteria for an effective device will also be seen from the achievement of student learning mastery through tests aimed at seeing how students' mathematical concept understanding abilities are. This criterion is met if more or equal to 85% of students are declared to have completed the KKM 75. Data analysis on students' mathematical concept understanding ability in the first test posttest of students' mathematical concept understanding abilities showed that there were 14 students out of 20 students completed or 70%. If referring to the criteria in CHAPTER III, the ability to understand mathematical concepts in the first trial did not meet the specified criteria.

In trial 2, the posttest of the ability to understand mathematical concepts showed that there were 17 out of 20 students who completed or 85%. Based on this, it can be concluded that the students' ability to understand mathematical concepts has met the predetermined criteria. This is because the quality of learning tools has been improved based on the weaknesses found in the first trial. This is in line with research conducted by Sianturi, Tety and Frida (2018) which states that the ability to understand mathematical concepts of students who take part in learning with the Problem model Based Learning is higher than students who follow conventional learning. This shows that the Problem Based Learning model has an effect on the ability to understand students' mathematical concepts. In addition, it is also supported by research conducted by Nainggolan (2018), entitled "Development of Mathematics Learning Devices Through Problem-Based Learning to Improve Concept Understanding Ability of Class X Students of SMK YPK Medan" concluded that the group of students using the model was higher than the group of students using the model with groups of students who use the conventional model.
Therefore, in this study it can be concluded that the problem-based learning tools developed can improve students' mathematical concept understanding abilities.

5 Conclusion

Learning tools based on problem-based learning in improving students' ability to understand mathematical concepts developed have met valid criteria, namely 1) RPP validation results validated by a team of experts with a total average of 4.72 with valid categories, 2) activity sheet validation results problem-based mathematics students with a total average of 4.78 with a valid category, 3) teacher book validation with a total average of 4.83 with a valid category, and 4) student book validation with a total average of 4.76 with a category valid and 5) validation of students' mathematical concept understanding test, where the expert team stated that it was valid.

Learning tools based on problem-based learning in improving students' ability to understand mathematical concepts meet practical criteria, namely 1) The response of a team of experts or validators stating that learning tools can be used with minor revisions (2) the implementation of problem-based learning tools used has an average 80% implementation with good category in trial I and 84.65% with good category in trial II.

References

Development of Interactive Learning Media Based on Open Ended Problem Approach Assisted by Visual Basic With Excel to Improve Creative Thinking Ability of Students at Al Manar Private Junior High School

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Abstract. This study aims to: (1) describe the validity, practicality and effectiveness of interactive learning media based on an open ended problem approach assisted by visual basic with excel to improve creative thinking skills in Al Manar Private Junior High School (2) Describe the improvement of students creative thinking skills based on an open-ended problem-assisted visual basic approach that was developed. This type of research includes development research using the Tesmer model. The research was carried out in T.A 2021/2022 for class VII students. The results showed: (1) Mathematics learning media based on an open-ended problem approach assisted by visual basic with excel to improve students creative thinking skills that were developed already met the valid, practical and effective criteria. (2) Increasing students creative thinking skills using learning media developed on rectangular and square material seen from the average results increased from 75.80 to 82.60.

Keywords: Creative Thinking Skills, Open Ended Problem Approach, Visual Basic.

1 Introduction

In achieving the success of the learning process, it is expected that a teacher can prepare learning materials that will be taught to students, one of the learning materials that can be prepared is teaching aids/practicum that will be used. Creative and innovative learning teachers can create learning media. The use of learning media is one of the determining factors in the success of the learning process. By using learning media, information related to learning materials will be conveyed easily, and the use of creative and innovative learning media can facilitate and improve learning efficiency so that learning objectives can be achieved.

According to Oemar (Purnamasari, Nugraheni, and Dyani, 2017: 64) Hamalik, learning is the combination of human elements, materials, facilities, equipment and processes that interact to achieve learning goals. Trinto (2009:17) argues that learning is a two-way interaction between teacher and student, focused and direct communication (communication) between the two of them toward a predetermined goal. ) is said to take place. Ministry of National Education
“Law No. 20 of 2003 on National Education and Education, Article 1 Section 20, learning is the process of interaction between students and educators and learning resources in a learning environment”. From these expert opinions, we conclude that learning is a two-way interaction between teachers and learners, and that communication (transmission) between learning, materials, and education takes place between her two groups.

Lestari and Mokhammad (Guntur, Aliyyatunnisa, Kartono, 2020: 386) states that the ability to think creatively is the ability to generate new ideas and ideas in the form of ways to solve problems. On the other hand, Martins (Kertayasa, 2019: 46) Creative thinking is the ability to come up with new ideas and methods.

The ability to think creatively must be acquired and honed by all students. In addition to the demands of the curriculum as well as the demands of the times. Schools today need to reach a creative level, not just develop cognitively competent students. The importance of creativity is also evident in areas where there are social media applications that require creativity, and even a promising new profession is content creator. From the above discussion, it is clear that the world of education should pay more attention to creative thinking abilities.

If you have creative thinking skills are not properly developed, mathematics becomes nothing more than a material that imitates examples and all kinds of procedures without knowing their meaning. Students are born without We are concerned that students lack the autonomy to deal with everyday problems.

Poor creative thinking skills when learning mathematics also mean that students are not used to coming up with their own ideas. Therefore, learning is only teacher-centered, teachers tend to abandon different learning models, students cannot find their own learning concepts, and most students end up doing learning activities in the form of memorization. I'm used to it, without the development of creative thinking skills.

We certainly do not expect this situation to come together. This means that we need to find precise solutions to solve problems within the global of education that relate to the creative thinking skills of both students. Possible solutions include motivational training for teachers and students, provision of scholarships for outstanding students, encouragement of teacher participation in government programs such as driving instructors, and use of appropriate learning models and learning media. included. Thinking ability.

From the above solution offerings, researchers are interested in solving problems by using different learning models and incorporating new learning media for schools. This solution does not require much cost and can be applied to more materials.

The following reason is based on the observations of Al Manar private secondary school researchers, who We received information that teachers did not consider aspects of subject characteristics when developing learning media. School researchers observed that the learning media used did not appear to be able to further arouse Student interest in problem solving. Because most of the questions were in the form of long story questions with no images or colors might arouse the student interest. Reading. Haggarty and Keynes state that improving mathematics Teaching and learning in the classroom requires efforts to improve understanding of teachers, students, and materials used in learning and interacting. (Muchayat, 2011:201). between them. For this reason, teachers should be able to create and develop these learning media.
Learning media are used as benchmarks for professional teachers to evaluate each teacher's performance. Teachers who can determine for themselves the extent to which the designed learning media can be used in the classroom. Through learning media, teachers can improve their professionalism. In addition to using learning media as a benchmark to measure the professionalism of teachers, learning media should be tailored to the needs of students so that they can easily understand the topics given by the teacher. There is.

Excellent learning media are available for professional teachers according to the requirements of their professional qualifications. Therefore, all teachers in the educational environment believe that learning is interactive, stimulating, fun, challenging, motivates active participation, and has ample space for individual initiative, creativity, and independence. As such, we have a duty to edit and create learning media in a systematic and structured manner. Depending on the student's talents, interests, physical and mental development.

When using learning media, teachers must choose appropriate and innovative learning methods. When learning mathematics, teachers have made a lot of efforts to improve the learning process. One mathematics learning method that can be used to develop good learning media is to use an A free-form problem approach learning method. One of the benefits of learning a free-form problem approach is that it provides students with the opportunity to discover, identify, and solve knowledge/experience problems in a variety of ways. This enables students to use media to solve their learning problems.

Classroom learning requires teachers to create and develop learning experiences that encourage student activity and should avoid lecture-based learning methods. Also, to facilitate the development of student learning activities and experiences, a supportive medium is needed to motivate students to learn.

According to Irvian and Oktaviana (2017:64), Visual Basic is a program that can be used to quickly and easily create Microsoft Windows-based applications. Visual Basic provides tools for building simple to complex applications for personal or government use on large systems. Rohaeti (2019:60) says Visual Basic for Excel allows you to develop math programs that understand numbers, arithmetic, and geometry. Existing learning media will become multimedia that can improve students' thinking patterns, allowing students to solve existing problems in a variety of ways/techniques. Learning that helps students engage in the use of learning media. Also, having a visual foundation can increase students' motivation to learn. Therefore, the development of learning-based learning media through an open-ended problem approach can be viewed as harmoniously combined with basic visual aids.

This approach can be seen as an attempt it improves the quality of math learning, enhances creative thinking skills and resilience, and is an open-ended approach to problems.

According to Shimada and Becker (Oktaviani and Tari, 2017:134), an open-ended problem approach is one that gives students the opportunity to explore different strategies and methods that may be suitable for solving problems. Based on the expert opinion above, an open-ended problem-solving approach should be based on the freedom and ability of each individual student to develop knowledge in a variety of ways. Teachers can also encourage students to think creatively by asking application questions along the lines of everyday life and translating them into math form.
The purpose of this development is to create a new product that is a paid improvement of an existing product. The reason for product improvement is believed to be inconsistent with its ability to meet the expected learning goals of improving students' creative thinking.

Open-ended learning researchers are learners who help students Participate in the use of learning media. open-ended approach to problems supported by a visual foundation may Enhance students' creative thinking and resilience to learning. Therefore, the Developing Learning Based on Learning media through an open-ended problem approach can be viewed as harmoniously combined with basic visual aids.

Based on the explanation above, there is a positive association between the ability to think creatively and mathematics in general. The ability to think creatively influences learning in the classroom. An open learning approach also helps students engage with their use of learning media. Teachers can also use learning media to explore the effectiveness and practicality of approaches used to develop learning media with visual underpinnings that are likely to motivate students to learn. Development of learning media is based on open problems supported by a visual foundation using Excel is considered harmonious in improving students' creative thinking skills. Therefore, the authors title the study ‘Developing an interactive learning medium based on an open-ended problem approach, supported by Visual Basic using Excel, to enhance the creative thinking skills of Al Manar Private students'. I am interested in middle school”.

2 Research method
Based on the problem and set research objectives, the research type used in this study is development research. The formative assessment model Tessmer Development Model (Jurnadi and Zulkardi, 2017) is used as the development model. In this study, it was developed in the form of a mathematics learning medium based on a free-form problem approach supported by Visual Basic using Excel with four pages of material.

Research subjects and objects
The All subjects in this study were Al Manar private secondary school students in grades 2021/2022 subjects were in grades VII-A (25 students) and VII-B (25 student). of test I. On the other hand, the purpose of this study is a visual basic mathematics learning medium using Excel in squares, used to improve students' creative thinking and mathematics abilities.

Data analysis
- Student analysis
The student analysis in this study focused on class VII-A students as subject exam i and VII-B students as subject exam II. It aims to provide information on the number and characteristics of students in Class VII. increase.

- Curriculum analysis
Curriculum evaluation on this examine is an analysis of the gaining knowledge of materials targeted at Al Manar private secondary school for this course that is, Visual Basic Assist 4-page materials using Class VII Excel, and concept analysis is related to analysis of student
- Material analysis

The purpose of the Material Analysis of Material Analysis activity is to identify, refine, and systematically collate the key material that students will study, based on a curriculum analysis. This analysis helps identify key materials used to guide the development of learning media.

- Media analysis

The media analysis in this research is a media problem faced by junior high school teachers, one of which is the difficulty of learning media production. They usually don't have the time, have difficulty explaining the material, and have difficulty choosing pedagogies to create learning media. On the other hand, the problem of junior high school students is that the contents of the teaching materials are difficult to understand. and teachers have a hard time creating learning media, especially her four-page teaching materials for her VII junior high school, even semester. To overcome the teacher-student problem, Al Manar Private Secondary School conducted a study on developing learning media using Visual Basic and Excel in a four-page material math subject.

The development an open-ended problem-based learning medium supported by Visual Basic and Excel used in this study is a modified formative evaluation Tessmer development model. The study consists of his two phases, a preliminary evaluation and a formative evaluation (prototyping), which include expert evaluation, one-on-one small group and field testing. Further details on the development of formative evaluative tessenger learning media are presented below. This has his two stages in Figure 1.

![Figure 1 Tessmer's research flow](image)

- Research instruments
In this development study, the following research tools will be used to evaluate the developed learning media.

- Questionnaire
  The questionnaires used in this study were: (1) a questionnaire for subject matter experts (2) a questionnaire for learning media experts (3) a questionnaire for math teachers to measure the practicality of learning media.

- Creative thinking test
  This test of creative thinking ability is administered to measure the effectiveness of the learning media developed and to ascertain students' creative thinking ability. The Creative Thinking Test is conducted in an essay format.

3 Research result

Trial I and II (Field Test)

After a small group test, several students with varying abilities are graded in very high, high, medium, low and very low categories. Of the several modifications made in the small group tests, the equipment developed was modified again and tested again for its effectiveness when all equipment was declared valid, viable and effective. After that, Prototype III (third) is generated. The research object under test (field test). Experiment I subjects were conducted in her VII-A class with a maximum of 25 students, while Experiment II was conducted with a maximum of 25 students in class VII-B.

Description of the validity of developing visual basic assisted learning media with excel

Learning media must be valid based on expert/practitioner evaluation of the learning media in which it is developed. An analysis of the adequacy of mathematics learning media using Excel compatible with Visual Basic, developed from the two perspectives of learning media experts/practitioners and mathematics subject experts/practitioners. The evaluation of learning media experts and learning material experts was previously described during the development stage of validation results using validators. In Experiment I, the result was that the developed learning media was declared effective with an average score of 2.98 between learning media experts and learning media experts. In Experiment II, the learning media developed were declared to have a learning media expert mean score of 3.00 and a learning media expert mean score of 2.85. See Tables 1 and 2:

<table>
<thead>
<tr>
<th>Table 1. Results of learning media validation by trial experts I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Validator</strong></td>
</tr>
<tr>
<td>Learning Media Expert</td>
</tr>
<tr>
<td>Mathematics Subject Matter Expert</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2. Results of learning media validation by trial experts II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Validator</strong></td>
</tr>
<tr>
<td>Learning Media Expert</td>
</tr>
<tr>
<td>Mathematics Subject Matter Expert</td>
</tr>
</tbody>
</table>
Description of the Practicality of Developing Visual Basic Assisted Learning Media With Excel

**Description of practicality based on teacher assessment**

Learning media was validated or determined to be highly relevant based on the results of testing learning media developed with an open-problem approach supported by Visual Basic and Excel.

Teacher evaluations of Probelernen I, which developed Visual Basic-enabled learning media in Excel, are positive. Based on an average score of 2.67. This value is then related to the actual criteria. From this we can conclude that the first practicality criterion, which can be used with minor modifications, is met. It is also positive given teachers' evaluation of Trial II learning with Excel on Visual Basic enabled learning media.

Based on an average score of 2.95. This value is then related to the actual criteria. From this we can conclude that the first practicality criterion, which can be used with minor modifications, is met.

**Description of practicality based on student responses**

The reaction of students to Trial Learning I, which uses Visual Assisted Learning Media developed by Excel, is positive. Based on an average score of 2.75. This value is then said to be within practical standards.

Based on student reaction to learning in Experiment II using the Visually Aided Learning Media developed by Excel, it can be said to be positive. This gives an average score of 3.26. This value is then said to be within practical standards.

Based on student responses to Trial Learning II, the basic visual media used in Excel is the result of improved media as a result of suggestions and criticisms. From the results of the student questionnaire, we can see that student response values increase from Trial I to Trial II. The increase in Trial I was 0.51, while the increase in Trial II was influenced by media improvements with suggestions and criticisms.

**Description of practicality of student activities (LKPD)**

LKPD data are included to confirm the extent of the role of visually assisted learning media with Excel designed in the learning process to improve students' creative thinking skills. A total of 25 students, he divides into 5 groups, each group consisting of 5 of her. LKPD will be provided to each group at her 3 meetings. Her LKPD given to her students includes activities aligned with indicators and learning objectives to enhance students' creative thinking. The results of her LKPD analysis for Experiment I are shown in Table 3:

<table>
<thead>
<tr>
<th>Top Rated</th>
<th>1ST MEETING</th>
<th>2ND MEETING</th>
<th>3RD MEETING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest Value</td>
<td>44</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>Average</td>
<td>63.6</td>
<td>71.4</td>
<td>76.4</td>
</tr>
<tr>
<td>Group Completion</td>
<td>2 GROUPS (40%)</td>
<td>2 GROUPS (80%)</td>
<td>3 GROUPS (60%)</td>
</tr>
</tbody>
</table>
A description of the LKPD analysis in Study II (Field Test II) is shown in Table 4:

### Table 4. LKPD assessment in field test II

<table>
<thead>
<tr>
<th>Top Rated</th>
<th>1ST MEETING</th>
<th>2ND MEETING</th>
<th>3RD MEETING</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>94</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Lowest Value</td>
<td>69</td>
<td>63</td>
<td>69</td>
</tr>
<tr>
<td>Average</td>
<td>78.5</td>
<td>78.5</td>
<td>81.5</td>
</tr>
<tr>
<td>Group Completion</td>
<td>2 GROUPS (60%)</td>
<td>2 GROUPS (80%)</td>
<td>3 GROUPS (80%)</td>
</tr>
</tbody>
</table>

Description of The Effectiveness of Developing Visual Basic Assisted Learning Media With Excel

Effectiveness of learning media development is demonstrated by measures of goal attainment (a) Classical creative thinking of at least 85% of the total number of students participating in learning with Visual Basic media using Excel level of ability. Students with good creative thinking skills have a minimum score of 62.75, or at least a B grade, or 2.51 when converted to a standard 4 grade; is the same as.

Completeness of Students' Creative Thinking Ability Value

Determining criteria for the effectiveness of the use of Visual Basic learning media with Excel developed in the teaching and learning process can be based on the integrity of the value of the student's creative thinking ability. Table 5 shows a description of the students' creative thinking ability values in Experiment I (Field Test I). Further afield:
A description of the student's creative thinking ability values in Experiment II (Field Test II) is shown in Table 6:

<table>
<thead>
<tr>
<th>Range of Values</th>
<th>Letter</th>
<th>Post-Test</th>
<th>Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Many Students</td>
<td>Average</td>
</tr>
<tr>
<td>96.25 - 100</td>
<td>A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>87.75 - 96.24</td>
<td>A-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>79.50 - 87.50</td>
<td>B-</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>71.25 - 79.49</td>
<td>B</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>62.75 - 71.24</td>
<td>B-</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>54.50 - 62.74</td>
<td>C-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>46.25 - 54.49</td>
<td>C</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>37.75 - 46.24</td>
<td>C-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>29.50 - 37.74</td>
<td>D-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&lt; 29.50</td>
<td>D</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Highest 85.00</th>
<th>Lowest 65.00</th>
<th>Highest 95.00</th>
<th>Lowest 70.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>73.40</td>
<td>-</td>
<td>82.60</td>
<td>-</td>
</tr>
</tbody>
</table>

To determine improvements in creative thinking ability, data were obtained from pre- and post-trial spatial ability results of the acetia pad test. Improvements in student spatial ability can be obtained from the normalized Victory Index data as follows:

\[
N - Gain = \frac{\text{Posttest} - \text{Pretest}}{\text{Short Ideal} - \text{Pretest}} \quad \text{(Hake, 1999)}
\]

The normalized gain index criteria \((g)\) are:

- \(g > 0.7\) : High
- \(0.3 < g \leq 0.7\) : Medium
- \(g \leq 0.3\) : Low

On trial I, we got a pre-test mean of 63.40 and a post-test mean of 75.80, so the N-Gain value was:
On the other hand, Experiment II had a pre-test mean of 73.40 and a post-test mean of 82.60, so the N gain values were:

\[
N - \text{Gain} = \frac{\text{Posttest} - \text{Pretest}}{\text{Ideal score} - \text{Pretest}} = \frac{75.60 - 63.40}{100 - 63.40} = \frac{12.20}{36.60} = 0.33
\]

\[
N - \text{Gain} = \frac{\text{Posttest} - \text{Pretest}}{\text{Ideal score} - \text{Pretest}} = \frac{82.60 - 73.40}{100 - 73.40} = \frac{9.20}{26.60} = 0.34
\]

Based on the normalized gain index (g), scores increased at low criteria (g ≤ 0.3) in trial I and moderate criteria (0.3 ≤ g ≤ 0.7) in trial II.

4 Research discussion

Development The results of the data analysis for Learning Media Experiment I and Experiment II show the following: (1) Visual Basic-enabled mathematics learning media effectively developed in Excel, (2) Visual Basic-enabled mathematics learning media practically developed in Excel, (3) Visual Basic-enabled mathematics learning media with excel which is developed effectively, (4) students’ creative thinking ability improves through the development of mathematics.

Validity of Visual Basic Assisted Mathematics Learning Media Development With Excel

Based on the results of testing Visual Basic enabled math learning media developed in Excel, the developed math learning media was declared valid or found to have sufficient validity. The practicality of developing Visual Basic assisted math learning.

Practicality of Developing Visual Basic Assisted Mathematics Learning Media with Excel

Media with Excel The feasibility of media development in this study was confirmed using three aspects: teacher questionnaire, student response questionnaire and LKPD results. Based on the results of testing Visual Basic-enabled math learning media developed in Excel, the developed math learning media was declared to be practical or found to have sufficient validity.

The Effectiveness of Developing Visual Basic Assisted Mathematics Learning Media With Excel

Developed Vehicle is effective If the vehicle is in the effective category, results can be seen in Trial I and Trial II. Effective mediums are seen as a result of perfecting the value of a student’s creative thinking skills.

Completeness of Creative Thinking Ability Values

The integrity of the value of creative thinking ability Based on Trial I and Trial II, we analyzed the test data results and found that the students' creative thinking ability met the criteria for a classical degree. This is because the materials developed and the math learning
problems and student activity sheets were adapted to the conditions of the student's learning environment. By using media in the learning process in the classroom, students will have a better understanding of all the shapes of the rectangle and students will be able to use these media to produce results from their worksheets. Allow students to use media directly.

5 Conclusion

Based on the analysis and discussion results of this study, several conclusions were drawn, including:

Mathematics learning media based on an open-ended problem approach supported by a visual foundation using Excel were placed in the "effective" category as determined by validation results from UNIMED Math Tutors and Math Teacher Validators. Media expert media validation scores averaged 2.98 in Trial I and 3.00 in Trial II for valid categories. Subject matter expert validation scores averaged 2.81 and valid categories averaged 2.85. Furthermore, the overall RPP validation was categorically valid with an average of 3.25 in Trial I and an average of 3.32 in Trial II. LKPD efficacy was 3.31 on average and 3.37 with category valid.

A mathematics learning medium based on a free-form problem approach underpinned by a visual foundation with Excel was developed, and as a result of teacher and student responses, fulfilled the practical application category. Teacher responses averaged 2.67 for test I and 2.95 for test II, categorized as good. Student responses were found to be in the category "Good" with an average of 2.75 for Experiment I and an average of 3.26 for Experiment II. In addition, complete a group worksheet (LKPD) for students at each meeting achieving 50% or more of the group.

Mathematics learning media, developed with a free-form problem approach using Visual Basic and Excel, met efficacy categories determined from pre- and post-test student learning test results. Classical student performance of 12% (3 students) in Experiment I and 48% (12 students) in Experiment II was achieved, based on student pretest results. And the final grades of the students who took the posttest in the Classic were 64% (16 students) on Trial I and 88% (22 students) on Trial II.

A Visual Basic-supported approach using Excel for a 4-page document based on a normalized return index. We found that there was a score increase of 0.33 for moderate criteria in study I and a score increase of 0.34 for moderate criteria in study II.

References


Analysis of Mathematical Problem Solving Ability
Through Application of Think Aloud Pair
Problem Solving Learning Model in State
Junior High School Al Manar

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Abstract. This research has two purposes. 1) Applying a verbal problem-solving model to Al Manar Middle School students in pairs to determine the students' problem-solving abilities. 2) Determine the student's difficulty in completing the math problem-solving ability test. This test teaches students to apply problem-solving learning by thinking aloud in pairs. The study described here is of a descriptive qualitative nature. Class VII children participated in a study conducted during T.A. 2021/2022. As a result, we found the following: 1) Intermediate and high-achieving students had the highest level of mathematics problem-solving ability, followed by low-ability students' mathematics problem-solving ability. 2) Degree of Difficulty of Tasks Students have no problem with tasks classified as high level. Students who fall into the middle category have difficulty understanding basic concepts and become confused when trying to solve problems. Students fall into the bad category if they struggle on all indicators of their problem-solving skills.

Keywords: Problem Solving, Think Aloud Pair Problem Solving.

1 Introduction

The teaching of mathematics is one component of the overall education system that plays a significant role. Given the significance of mathematics, it is a requirement that students study mathematics as part of the national curriculum. Students are required to study mathematics. After completing mathematics coursework in school, students are not only expected to be able to comprehend the material that was covered, but they are also expected to have the mathematical skills necessary to solve problems that are relevant to real-world situations. Therefore, during the process of learning, activities designed to foster learning are geared toward the development of these skills and abilities.

The data collected on the ground indicate that overall academic achievement among students, particularly in the area of mathematics, remains dismal. Indonesia received an average score
of 397, placing it 45th out of 50 countries that participated in the international tests TIMSS and PISA in 2015. TIMSS placed Indonesia in this position. In addition, based on the data provided by PISA, in 2012 Indonesia was ranked 64th out of 65 nations, with an average score of 375. This placed Indonesia in the middle of the pack. The most recent PISA statistics from 2015 reveals that Indonesia has a score of 386, placing it 61st out of 69 nations in the rankings. The conclusion that can be drawn from the findings of TIMSS and PISA is that Indonesia performed worse than expected when asked to solve problems with the same characteristics as those found in TIMSS and PISA.

It is stated in the curriculum that one of the abilities that students are expected to have in order to understand mathematics is the capacity to solve issues or often solve problems. This is one of the abilities that is considered essential (Depdiknas, 2013). According to Clark, who is quoted in Minarni 2018:29, "the focus of mathematics learning is the process of mathematical problem solving." It requires the learning of mathematical principles as well as the application of mathematical abilities to a diverse array of issues, indicating that the process of solving mathematical problems lies at the heart of mathematical education. In order to solve these mathematical issues, you will need to acquire the necessary knowledge and use your mathematical talents and concepts in a wide variety of contexts, such as problems that are not routine, problems with open-ended solutions, and questions that are based in the real world. Students are expected to take an active part in the learning process throughout the curriculum for the year 2013. According to Sinambela (2017: 18), "the curriculum is not just a concept, but how a teacher can create good learning strategies that are in accordance with educational standards and can cover three aspects, namely affective aspects, cognitive aspects, and psychomotor aspects. Problem-solving abilities are required in order to accomplish the cognitive component. It is expected of students that they will be able to apply the talents discussed here to the solution of mathematical problems, in addition to the students' other abilities. The features of a question are called a problem if the question is closely related to a question that challenges the mind and the problem is not immediately known how to solve it. In other words, a problem is a question that has the characteristics of a question. When we are trying to solve problems, we need to think about how we may solve the problem in stages, so that we can reach conclusions that are reliable and accurate.

The statement "mathematical problem solving is one of the important goals in learning mathematics, even the process of solving mathematical problems is at the center of mathematics" is a quote from Branca (Soemarmo and Hendriana, 2014: 23) that demonstrates the significance of having problem-solving skills. In keeping with this idea, Wandari (2017: 6) asserts that "the ability to solve problems is one of the abilities that must be possessed by students" because "this ability is very useful for students when studying mathematics and in everyday life" (students will find it helpful to have this ability when solving problems in both the classroom and in real life. According to Sadiq (2014: 105), there are four actions that must be followed in order to fix the problem. These phases are as follows: "(1) Fully grasping the nature of the issue at hand; (2) Formulating a strategy for addressing the issue; (3) Carrying out the strategy; and (4) Analyzing or confirming the findings."

The capacity of students to solve problems is currently at a relatively low level, and the low level of students' ability to solve mathematical problems is backed by the findings of various
earlier scholars. According to Caprioara (2015: 1862), "Studies conducted on students with significant experience in solving mathematical problems have shown that their results are quite low," and this is the case even if the problem that needs to be solved does not present a particularly high level of difficulty for that level. This indicates that research carried out on students who have had past expertise in the material aspects of solving mathematical problems has revealed fairly low results, despite the fact that the problems to be solved do not provide a particularly high level of difficulty.

According to Saragih (2014:124), "In the problem-solving, it is often seen that students are only concerned with the final result without knowing how the process if the answer is correct or not." [Citation needed] This frequently leads to the kids providing answers that are inaccurate. This means that when it comes to issue solving, it is common to find that pupils are just concerned with the final result, without making an effort to comprehend whether or not the response process is accurate. The conclusion that "the student's answer is erroneous" frequently emerges as the consequence of this situation. In their study conducted at SMPN 3 Bonegunu, Kadir et al. (2018:3) came to the conclusion that "Factors causing low mathematical problem solving skills are the lack of training in matters relating to mathematical problem solving abilities and the fact that teachers have not used strategies and learning models that can improve students' abilities." kids' ability to solve mathematical problems.

Students at Al Manar Private Junior High School have trouble solving problems, which is one indication that the school's students have a low problem-solving skill. This finding was gleaned from the findings of first observations and interviews done at the school. The instructor discovered that the students were not accustomed to working through the stages of problem solving when they solved difficulties. The method of carrying out calculations, as well as checking both the process and the results of computations, has shown to be the source of the majority of the challenges encountered. The following assertion is supported by the outcomes of the questions that were asked and answered during the test that was administered at Al Manar Private Junior High School's class VII-1, which was comprised of 25 students. The test assessed the students' capacity to solve problems.

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Low levels of student problem solving, students who do not understand the problem, and students whose plans for completing the task are not guided, which means that the calculating process has not provided the correct answer. Students also do not check the final responses
that have been received, despite the fact that if this were done, it would be feasible for students to review the answers that have been produced. Students do not verify the final answers.

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One of the many possible educational approaches we could use to help with these two skills is called "Thinking Aloud Pair Problem Solving" (TAPPS). This instructional approach is meant to align with the characteristics of mathematics and the requirements of the current curriculum. The constructivist learning model is another approach to education that aspires to have these characteristics. Various models of learning are available for our use. One of the factors that goes into determining students' learning activities and outcomes is the use of various learning models.

Instructional Use Only Think Aloud Pair Problem Solving (TAPPS) is an abbreviation for a course that aims to improve one's ability to solve mathematical problems by working together with a partner. "the Think Aloud Pair Problem Solving (TAPPS) learning model is one type of cooperative learning model that trains students to learn actively in solving problems," writes Wartono (2017: 693). One such cooperative learning model that teaches students to work together to find solutions to problems is the Think Aloud Pair Problem Solving (TAPPS) Learning Model. Teaching Strategy Based on Think-Aloud, Problem-Solving (TAPPS) This is made possible by utilizing the TAPPS (Think Aloud Pair Problem Solving) Learning Strategy. There is a paradigm called Think Aloud Pair Problem Solving (TAPPS) that teachers can use to get their students more involved in class and help them learn from their teachers and each other.Teachers can use this paradigm to motivate students and guide students to actively connect using TAPPS. This is a model that teachers can utilize. Learning through the Think Aloud Pair Problem Solving (TAPPS) method. The instructor leads the class through a series
of problem-solving problems, each of which requires the students to make use of the cognitive frameworks that they have acquired up until this point in the lesson.

Enhancing students' problem-solving abilities in mathematics while taking into account the diverse personal circumstances of individuals, as well as the varying circumstances of their educational institutions and learning environments. In addition to this, it can provide training for teachers so that they are better able to instruct students in the art of problem solving. This can be accomplished by presenting students with issues that they need to solve or by employing a number of learning strategies.

"Analysis of Students' Mathematical Problem Solving Ability Through the Application of Think Aloud Pair Problem Solving (TAPPS) Learning Models in Al Manar Private Junior High School Students."

2 Research Method

Types of research

In this study, descriptive qualitative research was used as the research method. According to Denzin and Lincoln quoted in Moleong (2017):5, "Qualitative research is research that makes use of the natural environment for the purpose of interpreting what happens, and is carried out using many existing methods."

Research Subjects and Objects

Twenty students in the seventh grade at Al Manar Private Junior High School participated as the study's subjects. During the even semester of the 2021/2022 school year, these students received a learning treatment known as Think Pair Problem Solving (TAPPS). After that, on the basis of the results of the mathematical problem-solving ability test that was administered to students who had filled in the appropriate sections of the questionnaire, those students were selected as interview subjects.

2.1 Data analysis

The pupils' abilities as study subjects were investigated in greater depth through the use of field observations. The research instrument that was set up was modified according to the capabilities that were derived from the findings of the field observations. Learning tools and mathematical problem-solving ability instruments make up the collection of instruments that have been compiled. Capacity for Analyzing and Solving Mathematical Problems The configuration of the instruments is done so that a comprehensive image of the students' capacity to comprehend mathematical concepts can be obtained. While the learning tools are organized in such a way as to prepare pupils to understand mathematical concepts and learn on their own, the learning tools themselves are independent learners. Validation of the instruments' and learning tools' accuracy is performed in order to make certain that the prepared instruments and learning tools are in accordance with the capabilities that were designed as a consequence of observations made in the field. The purpose of education based on the Think Aloud Pair Problem Solving (TAPPS) model is to accustom students of research fields to the habit of absorbing mathematical ideas and putting those ideas to use in the process of solving mathematical problems. After every single one of the instructional activities based on the Think Aloud Pair Problem Solving (TAPPS) model has been finished, the next
stage is to carry out the execution of this specific activity. The exercises and questionnaire were completed in an open and forthright fashion. The corrected worksheets were analyzed according to the Miles and Huberman model, which included the following steps: data collection, data reduction, data presentation, data presentation, conclusions, and verification (verification). Interviews with students who participated in the study were conducted after analysis of their responses to a test measuring their aptitude for solving mathematical problems provided a starting point for the research. Triangulation and other operations were carried out after the test was finished, and then the data was analyzed. Both quantitative and qualitative descriptions of the data were analyzed to produce the study's findings and draw conclusions. The results of this investigation are presented in the form of a narrative account of how the research questions were answered. The findings of the research will be analyzed, and conclusions will be derived from the discussion and presentation of the data. The following is a chart that is included in this research and is designated as Figure 1.
Figure 1. Research design
Research Instruments

A written examination is the instrument that is used to examine one's ability to solve mathematical problems. After the Think Aloud Pair Problem Solving (TAPPS) paradigm has been deployed, students will be required to complete this test. This examination is organized with reference to indicators of a candidate's capacity to solve mathematical problems. The majority of the questions on this assessment are in the form of four-item essays.

3 Results

Description of Students' Mathematical Problem Solving Ability

The value of the students' problem-solving ability test results acquired from 20 individuals was statistically classified as being spread throughout three criteria, namely low, medium, and high. Table 1 displays the mathematical problem-solving abilities of pupils according to their respective distributions.

<table>
<thead>
<tr>
<th>No</th>
<th>Value Interval</th>
<th>Total Students</th>
<th>Percentage</th>
<th>Rating Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ≤ KPMM &lt; 65</td>
<td>3</td>
<td>15%</td>
<td>Low</td>
</tr>
<tr>
<td>2</td>
<td>65 ≤ KPMM &lt; 80</td>
<td>9</td>
<td>45%</td>
<td>Medium</td>
</tr>
<tr>
<td>3</td>
<td>80 ≤ KPMM &lt; 100</td>
<td>8</td>
<td>40%</td>
<td>High</td>
</tr>
</tbody>
</table>

According to the data shown in Table 1, there are as many as three kids who fall into the low group of student problem solving abilities (15 percent). There were 9 pupils who fell into the middle category, which accounts for 55 percent of the total, and there were 8 kids who fell into the high category (40 percent). It is possible to draw the following conclusion from the description of this distribution: the pupils' ability to solve mathematical problems falls, for the most part, into the medium category.

4 Discussion

After applying the think aloud pair problem solving learning model, the primary objective of this investigation is an investigation of the method by which students' mathematical problem-solving abilities develop.

Many strategies have been established by educators with the goal of enhancing the processes by which students solve mathematical problems. These strategies have been developed both via the use of instructional materials and through the educators' own unique ideas. A cooperative learning model of think aloud pair problem solving is used in this investigation. This model is very helpful for students to prepare solutions in order for them to be able to
tackle problems that are related to mathematical problem solving. All of these focus on the efforts that students are making to master certain learning objectives or competencies.

The Think-Aloud-Pair Problem Solving Learning Model is an Excellent Tool for Assisting Students in Improving Their Capabilities in the Area of Problem Solving. Think-Aloud-Pair is an Acronym for Think-Aloud-Pair Problem Solving Learning Model. Maula (2014: 19) found that students in the TAPPS model had a higher problem-solving ability on average than students in the TAPPS model, despite the fact that the findings of his research indicate that the average problem-solving ability of students in the TAPPS model is higher than the average problem-solving ability of students in the TAPPS model. The study was titled Learning Effectiveness of the Worksheet Assisted TAPPS Model on Problem-Solving Ability in Circle Material. Because of this, the percentage of students who have mastered their learning in accordance with the expository learning standard is lower than the number of students who have completed their learning in accordance with the TAPPS model.

It was found that students' problem-solving abilities were getting better after the Think aloud pair problem solving learning model was applied during the learning process that was carried out for four meetings in class VII of Al Manar Private Junior High School. This was discovered during the learning process that was carried out for four meetings. When compared to earlier learning, which solely consisted of lectures or explanations of various theories, conventional learning, such as the kind described above, was still applied. According to the problem-solving abilities of the 20 students were ranked as follows: the "high" category had as many as 40 percent of the students, which totaled 8 students; the "medium" category had as many as 45 percent of the students, which totaled 9 students; and the "low" category had as many as 15 percent of the students, which totaled 3 students.

Students who fall into the moderate category aptitude-wise dominate this category, as measured by their level of proficiency in the ability to solve mathematical problems. In addition, there are a total of 8 students who have a high level of ability to solve problems, while there are a total of 3 students who have a low level of capacity to solve problems. In addition, the outcomes of the students' answers related to the answers to the students' mathematical problem solving tests given overall are not very encouraging. This is due to the fact that pupils are not yet accustomed to engaging in activities that involve problem-solving questions.

5 Conclusion

The ability of the students to solve mathematical problems using the think-aloud pair problem solving approach is predominantly held by students with moderate abilities, but the average value of the students falls into the category of students with medium abilities. This indicates that students were successful in completing the mathematical problem-solving abilities test that was given to them.

Difficulty in the ability to solve mathematical problems in problem-based learning, as will be shown in the following: a. Students that fell into the high category did not report experiencing any major challenges. b. Students who fall under the medium category have difficulties understanding concepts, which leads to confusion when trying to solve problems. c. Students who fall within this category struggle with all of the many indicators of their capacity to solve
problems. The students are unable to apply the solution approach, which means that they are unable to find a solution to the problem.

References

The Development of Contextual Learning Model Based on School and Family Collaboration in Culturing Serfisona Content Characters at TK Santa Melania Sarudik

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Abstract. This study aims to describe the development, impact, and development factors of contextual learning based on school and family collaboration in inculcating characters with Serfisona content in students in Santa Melania Kindergarten. This research is included of development research or research and development (R&D). Sources of research data are principals, teachers, parents and students. Data collection techniques using observation, interviews and documentation. The results showed that the implementation of the contextual model was carried out through a learning process collaboration between schools and parents combined with the use of guidebook media. The implementation of contextual strategies has an impact on improving the quality of learning, increasing students' appreciation of the character of Serfisona, especially discipline and responsibility. The implementation of contextual strategies is influenced by several factors, namely facilities and infrastructure, teacher academic competence and qualifications, teacher activity in teacher deliberation activities, and parental activity in inculcating character at home.

Keywords: Contextual, Serfisona Character, Collaboration between School and Parents

1 Introduction

The Law Number 20 of 2003 concerning the National Education System of Indonesia states that national education functions to develop capabilities and shape the character and civilization of a dignified nation in the context of the intellectual life of the nation. [1] Education aims to develop the potential of students to become human beings who believe and fear God Almighty, have noble character, are knowledgeable, capable, creative, independent, and become democratic and responsible citizens. Education is a process of changing one's attitudes and behavior in an effort to mature humans through the learning process [2].

The government of Indonesia through the Minister of Education implements character education at the level of early childhood education (PAUD) to higher education. Character education is realized starting from the curriculum to building a culture in schools. “This character education is something urgent to do right now. The target: all schools will have to use it,” said Minister of National Education (Mendiknas) Mohammad Nuh on the sidelines of
the commemoration of National Education Day (Hardiknas), at the office of the Ministry of National Education [3].

In realizing the goals of character education, the government began to focus on character building education by creating a cultured nation through strengthening human noble values. In Presidential Regulation (Perpres) Number 87 of 2017 concerning Strengthening Character Education, it is stated that Strengthening Character Education, hereinafter referred to as PPK, is an educational movement under the responsibility of teachers to foster student character through coaching, namely heart, taste, thought and exercise involvement. and cooperation between education units, families, and communities as part of the National Movement for Mental Revolution (GNRM). As the times develop, it will produce many big challenges for educational units of various types and forms of solutions [4].

In an effort to understand character in the learning process, it is necessary to apply real learning models in everyday life, one of which is the Contextual Learning Model. Contextual or popular learning model called Contextual Teaching and Learning (CTL) is an alternative in overcoming the problem of application in the learning process. CTL offers a learning process through the connectivity between learning materials and the realities of students' lives. The practice of CTL implies a more active, critical, concrete, and dialectical learning process towards social reality [5].

CTL contains seven important components, namely: Constructivism, Inquiry, Questioning, Learning Community, Modeling, Reflection, and Authentic Assessment. This CTL model can be applied to character education by adapting various themes to practical steps in the classroom. CTL can then be transformed by a teacher according to the character of the learning material that will be taught to students. One thing that is most important to understand is that it is not how many methods and approaches a teacher has in learning, but what is equally important is the extent to which a teacher's creativity is to design and find learning innovations that are fun for students, encourage motivation, and interest. study. The use of CTL learning strategies is very relevant to be applied because it seeks to bridge the concepts learned by students with the realities faced by students. Thus, the CTL model is very strategically applied in the learning process so that the understanding of the Serfisona character learned by students is understood and lived easily because it is associated with the realities of everyday life[6] and [7].

Santa Melania Sarudik Kindergarten is one of the institutions that makes a real contribution to national education, both at the concept level and school administration, by implementing a value and character-based curriculum management, through character education learning in the nuances of love which is used as a habitus as expected applied in Santa Melania Sarudik. The real contribution is to develop an education system that "Builds the Character of Compassionate Love" (Latin: Misericordiae Aedificat Personam; or abbreviated as: serfisona) which has four core values, namely: 1) Compassion, 2) Modest and Humble, 3) Brotherhood and United, and 4) Serve. Of the four pillars of character, there are 19 characters that want to be studied, namely the character of responsibility and discipline.

Based on the results of interviews and observations conducted by researchers at Santa Melania Sarudik Kindergarten, information was obtained that so far they have implemented the instilling of Serfisona character values into students in school activities such as doing 5S (smile, greeting, greeting, politeness, courtesy) like teachers. welcomes students every
morning at the school gates when new children arrive, gathers fasts during Lent and pays attention to friends in need when experiencing adversity. However, the character values taught at school are not fully implemented in the family, because schools and families are still running independently so that the results of the character cultivation are less successful, where lately researchers have seen that there are still students who are often late to school, bullying friends, do not want to share with friends and do not want to complete the assigned task. Apart from that, researchers also obtained information that educationCharacters in early childhood at Santa Melania Kindergarten have not been integrated in every lesson. It can be seen from the learning outcomes of students who have not been given appreciation by the teacher in every character activity carried out by students during the learning process.

Therefore, there is a need for new innovations that are appropriate and can improve the application of character values at school and at home, especially discipline and responsibility. The form of innovation carried out is a research and development research entitled "Development of a Contextual Learning Model Based on School and Family Collaboration in Cultivating Characters with Serfisona Content at Santa Melania Sarudik Kindergarten".

2 Research method

2.1 Types of research

This type of research is research and development (Research and Development). According to [8] development research is defined as a systematic study to design, develop and evaluate programs, processes and learning outcomes that must meet internal consistency and effectiveness criteria.

2.2 Research Subject

The subjects of this study were teachers, parents and students of Group B aged 5-6 years of Santa Melania Sarudik Kindergarten in the 2021/2022 academic year totaling 20 children. In order for the data to be more accurate, the authors made Group B kindergarten teachers, principals as informants in the study.

2.3 Place and Time of Research

The place where this research was carried out was Santa Melania Sarudik Kindergarten, precisely in Group B in April to May 2022.

2.4 Data Collection Techniques and Instruments

1. Types of data collection

   a. Observation. The objects that were observed were the duties of the head of the kindergarten, the duties of the teacher and the duties of the family.

   b. Interview. The researcher conducted an interview technique with the aim of extracting in-depth information or character education for parents. In the interview, the researcher acts as an interviewer and the informant can be seen from the character activity carried out by students during the learning process. Researchers also obtained information that educationCharacters in early childhood at Santa Melania Sarudik Kindergarten have not been integrated in every lesson. It can be seen from the learning outcomes of students who have not been given appreciation by the teacher in every character activity carried out by students during the learning process.

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well as a leader in the interview process. While respondents are interviewees who are asked for information by researchers.

c. Documentation. researchers collect documents that are obtained in the field. The documented objects are the Annual Program, Semester Program, Weekly Learning Implementation Plans, Daily Learning Implementation Plans and Assessments.

2.5 Data Analysis Technique

1. Eligibility of serfisona magazine

Product feasibility analysis to see the validity of Serfisona magazine by expert validators was developed using a Likert scale.

2. Effectiveness of serfisona magazine

The effectiveness of this serfisona magazine was carried out by conducting direct learning in group B of TK Santa Melania Sarudik. Where the first learning was carried out by researchers without using serfisona magazines. That is, the learning takes place conventionally. Furthermore, the next learning is carried out using a serfisona magazine that has been prepared by the researcher.

3 Results and discussion

3.1 Development of CTL Model Based on School and Family Collaboration

Details of the stages and activities carried out in developing this learning model can be seen in the Table 1.

Table 1 Stages and Activities of SerfisonaPaper Development

<table>
<thead>
<tr>
<th>No</th>
<th>Development Stage</th>
<th>Description of activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analysis Stage</td>
<td>Finding the basic problems in instilling the character of Serfisona, especially the character of discipline and responsibility, namely: There needs to be a learning model development Don't have a serfisona magazine yet so new innovations are needed There needs to be collaboration so that the character of students' discipline and responsibility can be implemented in schools and families.</td>
</tr>
<tr>
<td>2</td>
<td>Design Stage</td>
<td>Designing serfisona magazine Designing learning scenarios and teaching and learning activities with a school and family collaboration pattern School collaboration with family includes monitoring in the form of assignments to students which in Serfisona magazine contains the character of discipline and responsibility</td>
</tr>
<tr>
<td>3</td>
<td>Development Stage</td>
<td>Produce and revise serfisona magazines Selecting the best assignment activities that will be used to achieve the objectives of implementing the Serfisona character. Using the pattern of school and family collaboration in Group B aged 5-6 years at Santa Melania Sarudik Kindergarten</td>
</tr>
<tr>
<td>4</td>
<td>Implementation Stage</td>
<td>Conducting Guidance on students in growing the character of</td>
</tr>
</tbody>
</table>
3.2 Development of School and Family Collaboration in Instilling Discipline and Responsibility for Serfisona Content

a. The Family Environment

The success of children's education is determined by the child's educational environment which includes the family environment, school environment, and community environment. The first educational environment that children are familiar with is the family. From the family, the child first gets education, guidance, upbringing, habituation, and training. Parents' attitudes and behavior are always seen, assessed, and imitated by their children. Parents as educators in the family play an important role in shaping the character of a child. This conclusion relates to the researches conducted by Marini and Masrukhi [9] and Mifti and Ririn [10].

b. The School Environment

The second educational environment for children is school. Character education in elementary schools is fundamental because it remembers the importance of character cultivation, especially for elementary school age children. This is where the teacher has a very big role because the teacher is one of the parties responsible for the foundation made in shaping the character of students. The teacher is a person who is admired and imitated and becomes a source of inspiration and motivation for his students. The attitude and behavior of a teacher will leave an imprint on the students, so that the speech, character, and personality of a good teacher will become an example for students. This conclusion is related with researches conducted by Heppy. et.al. [11] and Khaironi [12].

c. The Collaboration of Teacher and Parents

The collaboration of teachers and parents in shaping the child's character is very important. Because teachers and parents are both responsible for educating children. Parents are responsible for educating their children at home, while teachers are responsible for educating at school. For this reason, it is very necessary to have good cooperation between teachers and parents so that reciprocal relationships are fostered in order to shape the character of students in accordance with shared expectations, namely creating a generation of character. This conclusion is supported the results of research conducted by Rantawati [13] and Gaddafi [14].

3.3 The CTL Implementation

From the teacher's perspective at ST. Melania's Kindergarten, the character building carried out by teachers in schools in the implementation of CTL learning is based on operational standards of school management and classroom operational standards. In all places, especially institutions, there are applicable rules called operational rules or standards. The results of an interview with Ms. Manalu as a senior teacher at TK ST. Melania concluded approach CTL and the formation of the character of students in learning at Santa Melania Sarudik Kindergarten
Very good because it is directly related to the actual situation in the material presented and in integrated activities with character, especially discipline and responsibility, besides that there is collaboration with parents and there is a guide book in the form of Serfisona that supports smooth the learning process and in their daily lives.

The effectiveness of CTL learning in collaboration with parents and providing professional content is very effective, because in CTL learning students are accustomed to carrying out discipline and responsibilities such as greeting before entering class, washing hands, placing things in their place, the habit of discipline and responsibility of the child is manifested in daily life at school and at home, by learning CTL and collaborating with parents, the habituation and caring character of compassion and affection that arise from these habits, besides that the effectiveness of CTL learning with Serfisona content is stated in several school activities such as: worship morning routine, Talent development such as dancing, coloring, drawing and marching. This result supported the research results conducted by Santika [15], Watini [16], Zahroh and Na’imah [17].

4 Conclusions and suggestions

4.1 Conclusion

The process of developing a CTL model based on school and family collaboration in inculcating the character values of Serfisona, especially the values of discipline and responsibility at Santa Melania Sarudik Kindergarten, refers to ADDIE development starting from analysis, design, development, implementation to evaluation. At the analysis stage, the process of finding basic problems in instilling the character of Serfisona, especially the character of discipline and responsibility, namely: there needs to be the development of learning models, do not have a Serfisona magazine so that new innovations are needed and there needs to be collaboration so that the character of student discipline and responsibility can be implemented in schools and family, for the design stage the development process is carried out by designing the Serfisona magazine design, designing learning scenarios and teaching and learning activities with a school and family collaboration pattern,

The validity of the Serfisona content developed with the CTL model based on the collaboration of schools and parents in inculcating the character of discipline and responsibility in Santa Melania Sarudik Kindergarten refers to several expert validators, namely, validation of media experts, validation of material experts, and validation of linguists. As for the Validation of Language Quality for CTL Learning Model Development, the percentage score obtained is then matched with the category of learning quality validity. If the percentage shows 91.66% much greater than 61% then the learning is valid as well as media quality validation in the CTL learning model development obtained a percentage of 76.66% and so on the validity of the quality of the content of the learning model development material obtained the validation percentage of 100% without revision,

To find out the data on the effectiveness of the development of the CTL model based on school and family collaboration in inculcating the character values of Serfisona, especially the value of discipline and responsibility in Santa Melania Sarudik Kindergarten, it was carried out by observation, interviews and documentation. Based on observations about the
Assessment of the Effectiveness of the Contextual Teaching and Learning (CTL) Learning Model, it clearly shows that of the 15 indicators which are the elaboration of 5 aspects of the CTL learning model, the effectiveness value is 3.73 (very good), in addition to observations about the Assessment of the implementation of Contextual Teaching and Learning. Learning (CTL) conducted by kindergarten group teachers also showed an effectiveness value of 3.71. (very good), apart from observation,

4.2 Suggestion

Suggestions that can be proposed by researcher are as follows.

a) CTL learning in collaboration with parents should be maintained properly and continuously

b) Schools should provide more learning training so that teachers are more creative in developing the interests and talents of students.

c) Evaluation of the implementation of learning, facilities and media remains the school's concern

References

Development of Higher Order Thinking Skills (HOTS) 
Objective Tests on Lingkungan Sahabat Kita Theme in Grade V Elementary School

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Abstract. The study aims to develop Higher Order Thinking Skills (HOTS) instrument test in Lingkungan Sahabat Kita theme to standard qualifications of good test based in validity, reliability, difficulty index, discrimination index and distractor effectiveness. The resulting product is HOTS objective test instrument include cognitive dimension in Anderson and Krathwohl’s taxonomy. The Type of research is development research using the ADDIE model. The data analysis technique used is qualitative and quantitative. The result of qualitative test analysis show that quality of the test was good with percentage of validity is 98.53%. The result of quantitative test analysis of 50 items obtained 38 items was valid with reliability in 0.917, the average discrimination index and effectiveness of distractor in the good category. The difficulty index in the medium category. Based on these results was concluded that the objective HOTS test developed on Lingkungan Sahabat Kita theme has good standard test qualifications and can be used as an instrument for learning outcomes on that theme.

Keywords: Higher Order Thinking Skills (HOTS), Water Cycle, Objective test, Lingkungan Sahabat Kita Theme.

1 Introduction

An educator in the learning process is not only responsible for transferring knowledge and achieving learning targets. Teachers are also required to be able to develop assessments, process evaluations and learning outcomes as guidelines for improving the learning process in the future.

The principle of assessment is used as a tool to improve the quality of the learning process and the ability of students. The assessment is carried out with an instrument that is in accordance with the abilities to be measured, both knowledge, attitudes and skills of students. Knowledge assessment is carried out to determine the level of student’s ability with the material being studied [1] which includes memorization, understanding and application (Low Order Thinking Skills / LOTS) analysis, evaluation and creating (High Order Thinking Skills/HOTS) [2],[3].
HOTS is a very important skill to apply because students need to be equipped with skills in thinking and managing information to solve real-life problems. This is in line with [4]; [5] which explains that the application of HOTS in learning will cause students to get used to analyzing and being creative in solving problems found in everyday life.

Therefore, students need to be trained and faced with questions that require unusual thinking processes. But in reality, the test instrument used by the teacher is still limited to measuring the level of knowledge so that it does not develop students' thinking skills. [6]; [7] who explained that test questions in schools tend to only test students' level of knowledge (C1) and understanding (C2). The evaluation questions used did not identify students' higher-order thinking skills [8] so students were not trained to solve HOTS-based questions. [9] explained that an effective test must be able to develop higher-order thinking skills.

Based on the results of field studies, information was obtained that the application of HOTS in test questions was still considered difficult for teachers to implement. Teachers are still not fully able to develop HOTS-based test questions. So that the test questions used are still taken from books and developed by themselves which are adapted to the material that has been taught. Only 20% of the questions made by the teacher use operational verbs in the HOTS category but the questions are not classified as HOTS. In addition, there is no further analysis of the test questions related to the quality that meets the standards. [10] explains that in learning teachers tend to be less in-depth in reviewing the material and have not involved students in the process of thinking independently. So it has an impact on the ability of students to solve the problems they face.

[11] states that the ability of teachers in preparing test questions is not good. Only 30% of teachers can compile test questions and the rest take questions from the internet. [12] also state that the test questions obtained by teachers from the internet are not of good quality because to get a good and accurate test instrument takes a lot of qualitative and quantitative testing so it will take quite a long time. The preparation of the HOTS-based test instrument can be done in the form of a written test. The test is used to test students' abilities based on higher-order cognitive thinking processes developed by [13] namely analyzing (C4), evaluating (C5), and creating (C6).

Natural Sciences (IPA) is one of the basic competencies contained in thematic learning in elementary schools. Science learning aims to develop knowledge, attitude, and skill competencies through a series of logical and systematic observation processes to understand various phenomena that occur in nature. [14]; [15] explained that science learning aims to encourage students to be able to analyze material through critical, logical, and rational thinking processes. The nature of science which is a product, process, and scientific attitude facilitates students to be creative, active, and have high-level thinking skills.

The preparation of the right test instrument can affect the quality of the assessment. So according to [16] the preparation of test questions instruments must refer to the guidelines for preparing a good test which include validity, reliability, objectivity, practicality, and economy. Test items must also be developed based on basic competencies and indicators of competency achievement. [8] explained that the realization of an appropriate assessment cannot be separated from the quality of the instruments used to measure students' HOTS abilities.

The development of HOTS objective test instruments developed by researchers used the
ADDIE design. ADDIE is an educational product development concept so its application makes learning student-centered, innovative, authentic, and inspiring [17].

[18] developed the HOTS class IV questions on the theme of always saving energy which consisted of multiple choice questions and essay questions. [19] have developed a HOTS assessment in class V on theme 6 (temperature and heat material) which consists of basic competencies in science, social studies, SBdP, Civics, and Indonesian in the form of essay questions. The results obtained are the test developed to have good quality.

2 Research method

This research is development research. The development product is an instrument assessment to train students’ thinking skills. Development type is using ADDIE model. 5 development steps which consist of 1) Analyze, 2) Design, 3) Development, 4) Implementation and 5) Evaluation. The steps of the development test instrument with the ADDIE model are shown in the following figure 1.

![ADDIE Model Diagram](image)

**Figure 1. Steps of ADDIE Model**

The instrument used in this study includes the HOTS test instrument and item validation sheet. The test item validity sheet is used to examine the test items qualitatively which contains statements regarding material, construction, and language aspects. Then, an instrument test
that has been arranged is used to do a small group trial. A small group trial was done in SDN 060877 Medan with 30 samples. Then, test results analyzed to known validity, reliability, discrimination index, and difficulty level are arranged into the initial product which is used to field tryout. Field try-out was done in MIN 3 Medan with a total of samples 94. The result of the field tryout is used to assess the instrument which has been developed as an assessment for training students in HOTS.

3 Result and discussion

A. Analyze

The results of the teacher need analysis based on interviews obtained information that the assessment of student learning outcomes was carried out with multiple choice and essay tests which were still in the cognitive realm C1 to C3. The teacher also revealed that the HOTS questions are still difficult to develop but the HOTS questions are needed to help develop students’ thinking skills. The results of the basic competency analysis based on several related studies show that the development of HOTS objective questions in elementary schools is still rarely developed. Based on the results of the literature study, information was obtained that the development of HOTS questions was based on basic competencies that included operational verbs on the dimensions of the HOTS cognitive process.

B. Design

The design of the HOTS objective test instrument is to create a grid of questions that refer to indicators of achievement of learning competencies. The design of the Higher Order Thinking Skills (HOTS) test instrument which was developed in the form of multiple-choice, complex multiple-choice and true-false objective questions, consisted of 50 questions equipped with question indicators and answer keys. Based on indicators developed from basic science competencies on the theme 8 Environments of Our Friends.

C. Development

Instrument validation is done so the product developed was valid and suitable for use. The experts who asked to rate the instrument in this study were Prof. Dr. Sumarno, M.Pd., Dr. Ely Djulia, M.Pd., Dr. Hasruddin, M.Pd., Dr. Wisman Hadi, M.Hum., and senior teacher Maulidayani, M.Pd. The experts assess material, construction and language aspects. In addition, the expert also assessed the suitability of the basic competencies with the indicators on the questions. The results of the suitability of basic competencies with indicators can be seen in Table 1.

Table 1. The results of the suitability basic competencies with indicators

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Experts</th>
<th>Score</th>
<th>Validity value</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>students are able to identify the benefits of water for humans, animals, and plants</td>
<td>A B C D E</td>
<td>16</td>
<td>80% Good</td>
<td></td>
</tr>
<tr>
<td>students are able to assess the process of the water cycle at each stage.</td>
<td>A B C D E</td>
<td>18</td>
<td>90% Excellent</td>
<td></td>
</tr>
<tr>
<td>students are able to describe the occurrence of the water cycle.</td>
<td>A B C D E</td>
<td>18</td>
<td>90% Excellent</td>
<td></td>
</tr>
</tbody>
</table>
students are able to identify the factors that affect the water cycle | 3 1 4 3 2 13 | 65% | Good
students are able to distinguish between groundwater and surface water | 1 3 3 3 3 13 | 65% | Good
students are able to determine the factors that affect the availability of clean water | 4 4 2 4 4 18 | 90% | Excellent
students are able to plan simple designs related to the impact of the water cycle on life. | 4 4 4 4 4 20 | 100% | Excellent
students are able to identify the impact of the water cycle on life. | 4 4 4 4 4 20 | 100% | Excellent
students are able to investigate the factors that affect water quality. | 4 1 4 4 4 17 | 85% | Excellent
students are able to analyze the effect of water quality on human life. | 3 3 3 3 2 14 | 70% | Good
students are able to identify sources of clean water availability | 4 3 3 4 4 18 | 90% | Excellent
students are able to criticize behavior that does not maintain the availability of clean water | 4 4 4 4 2 18 | 90% | Excellent
students are able to develop ideas about ways to maintain the availability of clean water | 3 3 3 3 3 15 | 75% | Good
students are able to identify the benefits of clean water | 2 4 4 4 4 18 | 90% | Excellent

Total | 218 | 77.8% | Good

Table 1 shows the average percentage of the HOTS instrument indicators rating is 77.8% or ‘good’. The suitability of the indicator with the item is calculated by the CVR index. The results of the analysis of the suitability of the indicators with the items can be seen in Table 2.

<table>
<thead>
<tr>
<th>Category</th>
<th>Item number</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2,3,6,7,8,9,10,11,12,13,18,19,20,22,23,25,26,27,28,29,30,32,34,35,36,37,38,39,40,41,42,43,44,45,47,48,49,50</td>
<td>38</td>
</tr>
<tr>
<td>Revise</td>
<td>1,4,5,14,15,16,17,21,24,31,33,46</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Table 2 shows 38 items valid and 12 items that need to revise. Based on Table 1 and Table 2, the experts agree that the HOTS objective test questions developed by researchers are following the indicators and basic competencies to be measured. A total of 12 items were suggested by experts to be improved because there were still aspects of the material, construction, and language that were not appropriate.

D. Implementation

1) Trial Small Group. Small group trials were carried out after the questions suggested by the experts were correct. The small group trial was carried out in class V SDN 060877 Medan with 30 students. Empiric analysis of quantitative data includes validity, reliability, level of difficulty, and discrimination power. Analysis results of 50 items, it is known that the valid are 41 items (82%) and the invalid 9 items (18%). The reliability coefficient obtained is 0.923. The results of the calculation of the difficulty level of the HOTS objective test items are generally in the medium category. In detail, the calculation results in the small group trial were obtained 9 items (18%) which were in the difficult
category, 40 items (80%) were in the medium category, and 1 item (2%) was in the easy category. In detail, the discrimination power of 17 items is in the very good category, 20 items are in a good category, 8 items are in enough category, and 5 items are in the poor category. Analysis results of the small group trial can be seen in Figure 2 and Figure 3.

![Figure 2. Analysis result small group trial graphic](image)

![Figure 3. Empiric result small group trial](image)

2) Large Group Trial. The large group trial was carried out in class V MIN 3 Medan with a total of 94 students using 41 questions from the results of analysis and revision in small groups. Empiric analysis of quantitative data includes validity, reliability, level of difficulty, and discrimination power. Analysis results of 41 items, it is known that the valid are 38 items (92.6%) and invalid are 3 items (7.4%). The reliability coefficient obtained is 0.917. The results of the calculation of the difficulty level of the HOTS objective test items are generally in the medium category. In detail, the calculation results in the large group trial were obtained 39 items (95.1%) were in the medium category and 2 items (4.9%) were in the easy category. In detail, the discrimination power of 21 items is in the very good category, 11 items are in a good category, 6 items are in enough category, and 3 items are in the poor category. Analysis results of the large group trial can be seen in Figure 4 and Figure 5.
E. Evaluation

HOTS objective items that match the characteristics of the items must meet the requirements of validity, reliability, level of difficulty, and distinguishing power in the good category. The results of the small group trial obtained questions that match the characteristics of good items 41 items of 50 items tested. The results of the large group trial were obtained 38 items by the characteristics of good questions and stored in the question bank of the Higher Order Thinking Skills (HOTS) Objective Test on the Environmental Our Friends Theme in Elementary School.

Discussion

This research is the development objective test of Higher Order Thinking Skills (HOTS) on the Environmental Our Friends Theme in class V Elementary School. Development of HOTS objective instrument test through five stages namely Analyze, Design, Development, Implementation, and Evaluation.

The results of the analysis of the HOTS objective test items have a validity score of 98.53% including the very high category. The validity criteria were obtained from the results of the instrument experts' assessments on aspects of the material, construction, and language in line with research [20]; [21]. The instrument is valid if the results of the expert assessment are calculated using the Content Validity Ratio (CVR) formula that meets the specified critical value limit [22]. Based on the results of small group trials, the items developed in the valid
category were 41 items (82%) and 9 items (18%) were in the invalid category. In the large group trial, there were 38 items (92.6%) valid questions and 3 items (7.4%) invalid items. The validity of the two test groups is included in the very high category because more than 80% of the questions are valid.

Small group trials obtained a reliability of 0.930. In the large group trial, the reliability was 0.918. This result is included in the category of "very high" reliability and is in line with research [22]. According to [23] the value of the reliability coefficient ranging from the medium to a high category means that the test instrument is reliable in testing students' higher-order thinking skills even though it is used at different times the results will be the same or close to the same.

Good items are questions whose level of difficulty is in the medium category or not too easy and not too difficult [24]. Furthermore [12] explains that questions that are too easy do not stimulate students to optimize their ability to solve problems. Problems that are too difficult will make students despair and do not want to solve them because they are beyond their abilities. The results of data analysis in the small group trial obtained 9 items (18%) including the difficult category, 40 items (80%) including the medium category, and 1 item (2%) including the easy category. Difficult questions will be corrected by looking at the language aspect and the effectiveness of the distractors. The results of the large group trial data analysis obtained 39 items (95.1%) including the medium category and 2 items (4.9%) including the easy category. Based on these results, the average difficulty level of the developed objective test items is 0.48, which is in the medium category. These results are in line with research [25] which obtained an average HOTS objective test difficulty level of 0.43 and research [21] obtained an average HOTS test difficulty level of 0.33 in the medium category.

[16] explains that items with good discriminating power mean being able to distinguish between the upper and lower groups. A good test of discriminatory power has a correlation coefficient \( \geq 0.20 \). The discriminatory power of the items in this study was on average 0.61, this means that the distinguishing power of the HOTS objective test on the theme of Our Friendship Environment in elementary school is in a good category. This result is in line with research [21] with an average discriminating power coefficient of 0.42 and research [25] with an average discriminating power coefficient of 0.35 in the category good.

4 Conclusion

The HOTS objective test instrument on the theme of our friend's environment in elementary school was declared valid with a validity score of 98.53%. The results of the analysis of the characteristics of the items obtained 38 (92.7%) good items and 3 items (7.3%) bad items and discarded. item has a reliability of 0.917. The difficulty level of the items obtained was 39 items (95.1%) in the medium category and 2 items (4.9%) which was in the easy category. the discrimination power of 21 items is in the very good category, 11 items are in a good category, 6 items are in enough category, and 3 items are in the poor category. Based on these results was concluded that the objective HOTS test developed on the Environmental Our Friends theme has good standard test qualifications and can be used as an instrument for learning outcomes on that theme.
References


Development of Mathematical Comics Media based on Realistic Mathematic Approach to Improve Problem Solving Skills of VII Garde Students of Middle School

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Abstract. The aim of this study is to increasing problem solving skills of middle school seventh grade students. The study was designed as research and development method 4-D models by Thiagarajan semmel & semmel (1984), media comics based on mathematical realistics, the study conducted during the pandemic 2020-2021 academic year. The data were obtained from problem solving skills test, students questionnaire. According to the findings, it was found that there are developments in students average score test, students reported that using media comics mathematics is positive and fun. These results show that media comics mathematics increase problem solving student skills.

Keywords: “Comi Media, Problem Solving Skill Student”.

1 Introduction

In education, mathematics is a science that is an important role in life. Mathematics is needed by all scientific disciplines as well as in real life because it can increase and hone the power of human thought, because the power of thought has a major contribution to the development of the character of students at school. Characters that appear in students are expected to help students instill competencies or abilities in students that are useful for the present and the future.

In fact of the pandemic, this is currently the era of the COVID-19 virus pandemic, in Indonesia itself the covid-19 pandemic entered Indonesia in 2020. The World Health Organization has decided that COVID-19 is a pandemic situation, and the Indonesian authorities suddenly closed schools and moved to learning online.

Transition to online class, that to support learning, the use of mathematical comics media can help students to learn mathematics, book media as learning media is a tool that serves to deliver learning notes or as a bridge for delivering notes to students, as a result , the way of communication between students and the base. goes well. In this case, the learning book media will run optimally if the learning notes are informed that they are built in a real and interesting way (Masjudin, 2020).
2 Subject of Study

Lester (Hasratuddin, 2015) states that a problem is someone who will solve the problem, but does not yet have a direct handling method that can be applied to solve the problem. Polya (Hasratuddin, 2015) said the forms and methods of solving problems that were categorized into problem solving in stages were: 1) understanding the problem; 2) devising a plan; 3) carrying out the plan; 4) looking back.

Arsyad (2014) said that the media originated from the Latin medius which literally means middle, intermediary or introduction. So in broad terms, media can be referred to as people, modules, or events that create an atmosphere and situation that allows students to understand insights, skills and actions.

Sudjana (at all, 2013) comics are a form of cartoon images that reveal characters and act out a story in a sequence of pictures to provide entertainment to the readers. In this study, it is thought that development media comic mathematics to increase problem solving skills of middle school seventh grade.

3 Method

In this study, a research & development method design in 4-D models (wich is define, design, develop, and disseminate) used was applied. The 4-D models is defined by Thiagarajan semmel & semmel (1984). In order to determine the effect of the use media comics on students success, an achievement test with 5 questions on the social arithmetics wich is in the field of mathematical relaistics learning was developed. The achievement test of 5 essay question and was developed by researches and obtained by experts. With the reliability score as .642 (Cronbsch's alpha = .642) validity which is Correlation product-moment refers to the basis of decision making if r count > r table then the question is valid or vice versa if r count < r table then the question is invalid. Then determine whether the question is valid or not seen from the significance if sig < 0.05 then the question is valid, if sig > 0.05 then the question is invalid . . Achievement test was applied in the form of pretest and posttest, before and after the topic of social arithmetics. The pre-test and post-test method provides clues about the effect of use media comics on problem solving skills students with an application by comparing the data before and after it (Creswell2019). In order to determine the effective media comic mathematics used on students a problem solving skills scoring key was developed by (Hasratuddin , 2015). In this context, to determine media comics though effectively when the scoring key funded by the scores are evaluated, it is found that there is moderate agreement in the dimensions of “ 1) achievement of learning objectives;2) students classicity score ;3) 80 % students respond positive ; 4) Ideal of the time.”

4 Result and Discussion

The achievement test developed by researchers was used to measure the effect of media comics on problem solving skills students. The students were 7 th grades, the lesson mathematics and the topic was “social arithmetics.” The achievement test thought before and after the use of media comics, and the results were compared. N-Gain score test was applied to compare the pre-test and post-test scores of the student
Table 1. Validity

<table>
<thead>
<tr>
<th>Correlations</th>
<th>QUESTION 1</th>
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<th>QUESTION 5</th>
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<td>.483 **</td>
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<td>.522</td>
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<td>.725 **</td>
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<td>Pearson Correlation</td>
<td>.210</td>
<td>.483 **</td>
<td>.725 **</td>
<td>.433 *</td>
<td>.793 **</td>
<td>.788 **</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.210</td>
<td>.083</td>
<td>.000</td>
<td>.019</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 1 The result showed validity of the achievement test, it was found that there was a validity of 5 achievement test to increase problem solving skills student from the first implementation to the last. That's found first theme, second, four and five ** correlation is significant at the 0.01 level (2-tailed) and the third theme show * correlation is significant at the 0.05 level (2-tailed). This finding shows that achievement test is validity.

Table 2. Reliability Statistics

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.642</td>
<td>5</td>
</tr>
</tbody>
</table>
The results showed that reliability scores the achievement test of 5 essay questions and was developed by researchers and obtained by experts. With the reliability score as .642 (Cronbach's alpha = .642), this result showed the achievement was reliable to use.

Table 3. Analyze the Increase The Problem Solving Skills of Students of Middle School Seventh Grade

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Implementation I</th>
<th>Percentage</th>
<th>Implementation II</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>8</td>
<td>30.8%</td>
<td>5</td>
<td>17.85%</td>
</tr>
<tr>
<td>2</td>
<td>medium</td>
<td>16</td>
<td>61.5%</td>
<td>21</td>
<td>75%</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>2</td>
<td>7.7%</td>
<td>2</td>
<td>7.15%</td>
</tr>
</tbody>
</table>

The results showed that effectively of using media comic mathematics increase problem solving student skills, students problem solving skills category low 8 students, medium 16 students, and high 2 students, this result from Implementation I, and at the second Implementation students problem solving skills category low 5 students, medium 21 students, and high 2 students. Based on Table 3 above, it can be seen that the students it can be seen that there are 2 students who get N-Gain scores in the range > 0.7 or the number of students who have increased mathematical problem solving abilities with the "high" category are 2 (7.7%) students, students who have increased problem solving abilities mathematics problems scored in the range of 0.3 ≤ 0.7 in the "medium" category there were 16 students, while students who experienced an increase in problem solving abilities in the g <0.3 range were included in the "low" category there were 8 (30.8%) students.

In the second Implementation II students who got an N-Gain score in the range > 0.7 was 2 (7.15%) or there were students who experienced an increase in their mathematical problem solving ability in the "high" category. For students who experienced an increase in their mathematical problem solving ability, they scored in the range of 0.3 ≤ 0.7 in the "medium" category, there were 21 (75%) students. Meanwhile, students who experienced an increase in problem-solving abilities in the range of g <0.3 were included in the "low" category, there were 5 (17.85%) students.
Fig. 1. Comparison First Test and Second Test

Table 4. Findings of Media comics effectively to increase the problem solving skill of students of middle school seventh grade

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Implementation I</th>
<th>Implementation II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>1</td>
<td>student scores</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Percentage</td>
<td>57.69%</td>
<td>76.92%</td>
</tr>
<tr>
<td>3</td>
<td>Category</td>
<td>Unachieved</td>
<td>Achieved</td>
</tr>
</tbody>
</table>

Table 4 The result show classicality student scores at the first Implementation is unachieved, this result percentage 85% students unachieved, and the second Implementation show classicality students score was achieved, because the percents show 85% students reached. The value of Implemention I was not achieved to the criteria for effectiveness, this was because the results of classical mastery in Implementation I had not been achieved, namely the average value of classical mastery of students in the posttest of students in trial I had not reached 80% KKM score 75. While the posttest value of Implementation II has met the effective criteria, because the percentage of classical completeness of students reached 96.42%. This means that the criteria for the effectiveness of the mathematical comic media have been met or achieved.
Table 5. Student Response To Media Comics Mathematics

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Implementation I</th>
<th>Implementation II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student response</td>
<td>87%</td>
<td>90%</td>
</tr>
<tr>
<td>2</td>
<td>Description</td>
<td>Positive response</td>
<td>Positive response</td>
</tr>
</tbody>
</table>

Table 5 The result shows Implementation I it can be seen that the analysis of student responses by referring to the decision making that has been described in chapter III, the results of the first trial showed a student response of 87% with a positive student response category, then in the second trial the student response was 90% with a positive response category.

Table 5 The result shows Implementation I it can be seen that the analysis of student responses by referring to the decision making that has been described in chapter III, the results of the first trial showed a student response of 87% with a positive student response category, then in the second trial the student response was 90% with a positive response category.
Ideal of the time in the first Implementation and the second Implementation are ideal category, this result show the duration of the time using media comic mathematics while a learning had the same duration with conventional learning, so the result shows the Ideal of the time had funded effectively category.

**Table 7. Achievements of the learning objectives**

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Percentage</th>
<th>category</th>
<th>Percentage</th>
<th>category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding problems</td>
<td>95%</td>
<td>99%</td>
<td>highly</td>
<td>99%</td>
<td>highly</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Devising a plan</td>
<td>77%</td>
<td>83%</td>
<td>medium</td>
<td>High</td>
<td>83%</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Carrying out the plan</td>
<td>73%</td>
<td>84%</td>
<td>medium</td>
<td>High</td>
<td>84%</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>Looking back</td>
<td>81%</td>
<td>92%</td>
<td>high</td>
<td>achieved</td>
<td>92%</td>
<td>highly</td>
</tr>
<tr>
<td></td>
<td>average</td>
<td>81.5%</td>
<td>89.5%</td>
<td>achieved</td>
<td>achieved</td>
<td>89.5%</td>
<td>achieved</td>
</tr>
</tbody>
</table>

Table 7 the result shows that the average percentage of pretest on indicators of students' mathematical problem solving ability in understanding problems reaches 95.36% in the very high category, while the average percentage of indicators planning completion is 77.17% in the medium category, then the indicator of solving the problem reached 72.90% in the medium category and the indicator re-examined 80.74% in the high category.
Comic media mathematics could mean for students if the comic media mathematics could bring up characteristics approach realistic in activity learning. Traffers (in Wijaya, 2012: 12) states that there are 5 characteristics approach realistic that is spelled out as the following: 1) the use of context (the use of context); 2) The use of the model (the use of the model); 3) Use of Student Contribution Results (the use of student contribution), 4) Interactivity (interactivity); and 5) Intertwining.

Table 8. Characteristics of Comic Media Mathematics based on Approach Realistic

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Pretest Percentage</th>
<th>Pretest Category</th>
<th>Posttest Percentage</th>
<th>Posttest Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding problems</td>
<td>95%</td>
<td>highly</td>
<td>99%</td>
<td>highly</td>
</tr>
<tr>
<td>2</td>
<td>Devising a plan</td>
<td>77%</td>
<td>medium</td>
<td>83%</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Carrying out the plan</td>
<td>73%</td>
<td>medium</td>
<td>84%</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>Looking back</td>
<td>81%</td>
<td>high</td>
<td>92%</td>
<td>highly</td>
</tr>
</tbody>
</table>

Results test try eight have produced comic media mathematics based approach valid realistic and effective, then step he continued is To do Step deployment.

The increasing of problem solving skills of middle school seventh grade students was obtained. When the N-Gain score result obtained from pre-test and post-test students score, and to determine the effective of use media comics obtained from 1) achievement of learning objective; 2) classicity student scores; 3) 80% students response; 4) Ideal times of students.

It was found that there was a significant increase in the scores of the media comic mathematics created by study group pretest and posttest. According to the result, it is seen that the using of media comic mathematics while learning, increased the student problem solving skills. Another
important result of the study is that there is a significant difference classicality scores between Implementation I and Implementation II, this shows effectively media comics mathematics. And the last result founded students response in the first Implementation and the second Implementation more than 80%, so these show the students response are positive.

As the result of this research, it was concluded that media comics mathematics increase problem solving skills of the middle school seventh grade students. In this context, it is is thought that students will be active learners where they can improve their academic performance.

5 Conclusion

As a result of this research, it was concluded that using media comic mathematics affective to increasing problem solving skills of students. Thus, it is possible to make the following recommendations: for the teachers who are practitioners in classrooms should be trained on this subject. Using media comic can developed students problem solving skills, should be prepared on the student textbooks. Since is it thought that problem solving student skills with media comic mathematics effective at other grade levels and lessons, it will be useful to try in various education levels and lessons. In order to increase achievement, the use of materials in education is recommended.

References

Development of Geogebra Assisted Problem Based Learning Tools to Improve Critical Thinking Skills for SMP Negeri 1 Stabat

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Abstract. The aim of the research are to: 1) produce valid criteria, practical criteria and effective criteria on PBL tools for students of SMP N 1 Stabat; 2) Analyze the increase in the mathematical critical thinking skills (TKBM) of Junior High School Student N1 Stabat after being taught using the Geogebra-assisted Problem Based Learning (PBL) tool; This research is included in development research using the Thiagarajan 4D learning device development model. This research was conducted at Junior High School 1 Stabat. The results of the study show that: 1) the geogebra-assisted problem-based learning tool in improving TKBM that has been developed meets valid, practical and effective criteria; 2) The improvement of TKBM.

Keywords: the development of problem-based learning tools, geogebra, critical thinking skills

1. Introductions

Education in the digital era is growing rapidly. Mathematics learning must be able to keep up with these changes. Mathematics learning refers to learning to think at a higher level, namely critical thinking. This thinking ability must be systematic, critical, logical, creative and innovative. Learning mathematics is very important so teachers must be able to teach mathematics well.

In this era of all-technology, students are required not only to be smart academically. But students must also be able to use technology to support achievements in the field of education. Many things have changed, one of which is the way teachers teach. Now teachers not only have to teach but also have to be able to collaborate with technology in teaching. This is in line with the ease of internet access for modern education.

Mathematics is a compulsory subject taught at the junior high school level. Mathematics lessons are difficult for students. This can be seen from the very low math skills, based on the results of the 2018 PISA survey, the survey results show that students in Indonesia are ranked 75 out of 80 participating countries. Factors that make it difficult for students to learn can come from...
within and outside. According to Aunurrahman (2011) Students’ learning is influenced by two factors, they are internal and external. Internal factors are genetics and IQ. While external factors include the environment, teachers, learning methods and nutrition.

The external factor that greatly influences student success is the teacher. The teacher is a determinant of the success of an education in schools. The teacher's ability to teach greatly influences the achievement of learning objectives. According to Aripin (2017), teachers must be able to utilize technology during learning so that learning objectives can be achieved properly.

When the teacher wants to teach in class, the teacher should have prepared the learning tools needed according to the curriculum, such as lesson plans and worksheets. Planned learning and having validated measurement tools will make learning activities run well and smoothly. Thus, we can get optimal results in the learning process. Therefore, the quality of education in Indonesia will increase in line with the achievement of these learning objectives.

The developed learning tools must have valid criteria, practical criteria and effective criteria. According to Nieveen (2007) quality learning has 3 criteria, namely valid, practical and effective. Tati (2019) validation is carried out by a team of experts and practitioners. Students can learn and learn in the joy class. So the teacher must make a room that is very comfortable for learning.

When external factors such as teachers, the environment and these devices are implemented properly, it will directly make learning outcomes better.

Good learning is a defense that goes according to plan according to the RPP. So that the implementation of learning and learning outcomes can be evaluated properly according to aspects to be achieved in learning. The achievement of learning objectives cannot be separated from the teacher’s role in learning.

According to Arikunto (2017) learning mathematics is very important, therefore teachers must be able to prepare learning tools that can facilitate students in learning mathematics. Teachers can use learning models that suit the needs of students. Nugroho (2017) stated that mathematics is important, so teachers can create tools that apply students to think logically so that later it can be useful for the future. Learning mathematics must be in the context of relevant problems so that students can think logically and creatively in finding solutions. Ironically, learning mathematics at school does not involve students in thinking much. Students consider mathematics a difficult subject so learning mathematics tends to be boring. Teachers also do not create an interactive learning atmosphere for students. So that students tend to be passive in learning in class.

Therefore, we must make a change in learning mathematics. One way is to develop learning tools that suit the needs of students to improve student learning outcomes. Learning Media which can be developed includes: BG, BS, RPP and LKS.

Syahputra and Surya (2017) state that standard reference in learning in class, teachers can use textbooks that are appropriate to learning. According to Trianto (2017:227) argues that The development of a textbook must valid and effective criteria. On reality is, we found some draw on the teaching book at SMP Negeri 1 Stabat. Text books can’t construct students' knowledge learning. Mathematics is learning that emphasizes students to be active in solving mathematical problems according to their abilities. Mathematics should be taught by training students'
thinking skills. So that students are accustomed to thinking and acting logically in solving problems.

Critical thinking skills that students will have role in the life of students in the future. Chukwuyenum (2017: 1) argues that one of the skills that can be used in problem solving is critical thinking. Critical thinking consist of logical reasoning, interpreting, analyzing and evaluating information.

The results obtained that critical thinking skills are still low. Seen from 30 students of class VII SMP Negeri 1 Stabat who are given quadrilateral material. There are 5 students can answer correctly as much (16.7%) and students answered the questions incorrectly 25 students (83.3%).

We can choose the PBL learning model to maximize students' critical thinking skills. Sinaga and Ani (2019) said that PBL Model is a learning model that can provide active learning conditions to students. Student can use their mind to creative thinking.

In this all-digital era, information technology is widely used during learning mathematics. Kusumah (2003) put forward various benefits of computer programs in learning mathematics. According to him, computer programs are ideal for use in learning high-precision mathematical concepts, and solving graphs accurately. Furthermore, Kusumah (2003) also argued that learning innovations with the help of computers are very good to be integrated into learning mathematical concepts, especially those involving geometric transformations, calculus, statistics, and function graphs.

A very good computer software in assisting students in learning geometry is Geogebra. Markus Hohenwarter (2008) developed the Geogebra software in 2001 to make it easier to learn geometry and algebra.

From the explanation above, researchers are interested in developing problem-based learning tools assisted by Geogebra software to improve mathematical critical thinking skills.

2 Research methods

Types of research

The research is a development research with a development model Thiagarajan 4D to produce the valid tool, the practical tool and effective tools.

Research Subjects and Objects

The Subject are students in class VII-A and VII-B of SMP Negeri 1 Stabat, there are 30 student in the class. The objects of this research are 1) problem-based learning, 2) quadrilateral material and 3) critical thinking skills.

2.1 Data analysis

Analysis of learning device validity data

The validation results were obtained from a team of experts in their fields. There are five experts and practitioners who have the ability to validate the devices that have been made.
Analysis of the practicality of learning devices

For practical criteria, the problem-based learning model developed must have the criteria of "slight revision" or "no revision". The results were obtained from the expert team by providing an assessment of the learning device on the device validation sheet.

Data analysis of the effectiveness of learning devices.

A learning device that can be said to be effective when the device has the following three criteria: 1) the device has classical student learning completeness, (2) the device has achieved learning objectives based on problem-based learning models, and (3) when the learning process takes place, students have a good response to learning that applies the PBL learning model.

Data Collection Instruments and Techniques

Validation Instrument of Learning Device

Based on the expert's assessment, the learning device validation instruments are in the form of RPP validation sheets, we have to create the teacher’s books, also the student’s books, and the student activity sheets. This validation sheet contains the components that are assessed including: format, language, illustration, and content.

Test Instrument of Mathematical Critical Thinking Ability

The instrument for testing mathematical critical thinking skills developed in this study is in the form of a structured essay test written based on the indicators and learning objectives to be achieved.

2.3 Instructional Media Development Procedures

Define Stage

At this early stage, we write down, define and define student learning needs by analyzing learning objectives and learning material limitations. At this stage an initial and final analysis is also carried out, we also carry out student analysis, besides that we also have to analyze concepts, then we also determine task analysis, and finally we also have to determine the specifications of learning objectives.

Design Phase

In the next stage, namely concept analysis, we will obtain the appropriate test. The test is a test of students' mathematical critical thinking skills. The KBKM test is made based on predetermined indicators. In addition, the selection of appropriate media to support problem-based learning is in the form of geogebra applications. The geogebra application is used to visualize quadrilateral learning material to make it more attractive and easily understood by students. With the geogebra application, quadrilateral material can be presented clearly. This application has also been adapted to the instruments and tests contained in the test.

So, in this phase we get the initial draft (draft 1). In this initial draft there is a selection of formats, teacher books and student books. In draft 1, all content has been adapted to the principles, characteristics and steps of the problem-based learning model.

Development Stage

The next stage is development.

The steps in the development stage, namely:
Validation/Expert Appraisal
The instruments that we have prepared will be validated by a team of experts in their field. They evaluate the instrument that has been adjusted based on indicators. The results of the evaluation are in the form of suggestions for improvement as well as an assessment of all materials that have been developed at the design stage. After being repaired according to the direction of the expert team, a valid instrument will be produced and ready to be tested in the field.

Trials of Research Instruments
Before being tested in the field, the research instrument was in the form of students' mathematical critical thinking tests which had been validated by a team of experts, the tests which had been validated were tried out in classes outside the sample. The results of the trial were then tested for validity instrument and reliability instrument. It will produce a research instrument with a valid category and the instrument may be used after being tested.

Field Trials
Learning tools that have been developed based on PBL. Then the device is tested. The result is that the device has practical criteria and effective criteria. So that an increase in students' mathematical critical thinking skills will be achieved in accordance with the indicators to be achieved.

Dissemination Stage
When the resulting device has gone through evaluation and has been tested properly and is valid. Then the next stage is Deployment. The dissemination of learning tools that have been tested is limited to all mathematics teachers at SMP N1 Stabat. Teachers can use this device to teach in class. The resulting device is one of the learning alternatives on quadrilateral material.

3. Results
The Validation of Learning Device
The research instrument that has been developed is a TKBM test. The test is then carried out in class outside the sample. After being tested, the results are evaluated. Then tested the validity instrument and reliability instrument of the test. The results of the calculating instrument by correlating the item score with the total score, the test results of the student's TKBM test instrument using the person product moment correlation formula in Table 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>$r_{xy}$</th>
<th>$t_{count}$</th>
<th>$t_{table}$</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.91</td>
<td>9.79</td>
<td>2.08</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.92</td>
<td>10.58</td>
<td>2.08</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.87</td>
<td>7.67</td>
<td>2.08</td>
<td>Valid</td>
</tr>
</tbody>
</table>

We can see the results in Table 1, the TKBM test given to students after being analyzed with a significance level of 5%, degree of difficulty (dk = 28), obtained $t_{table} = 2.08$. Based on the test criteria, $t_{count} > t_{table}$, we can use the TKBM test that we have tested in the field because it meets the "valid" criteria.
After the test validation was carried out, the next stage was an assessment from a team of experts and practitioners on the practicality of problem-based learning devices. The results of the assessment by the team have been described in Table 2.

Table 2. The Result of Learning device validation

<table>
<thead>
<tr>
<th>Validators</th>
<th>Instrument</th>
<th>RPP</th>
<th>LKPD</th>
<th>BS</th>
<th>BG</th>
<th>TKBKM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validators-1</td>
<td>TR</td>
<td>RK</td>
<td>TR</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
</tr>
<tr>
<td>Validators-2</td>
<td>TR</td>
<td>TR</td>
<td>RK</td>
<td>TR</td>
<td>RK</td>
<td>TR</td>
</tr>
<tr>
<td>Validators-3</td>
<td>TR</td>
<td>RR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
</tr>
<tr>
<td>Validators-4</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
</tr>
<tr>
<td>Validators-5</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>RK</td>
</tr>
</tbody>
</table>

Based on table 2, according to practicality criteria and experts state that learning tools can be used with “minor revisions” and “no revisions”.

3.1 The effectiveness of learning tools

The PBL tools that are developed must have a positive effect on learning outcomes and an increase in mathematical abilities, and also have a significant effect on learning mathematics in schools. The development of these learning tools must also meet the effectiveness criteria that have been determined, there are 3 effective criteria, namely: (1) students who take part in learning that applies a problem-based learning model must have classical student mastery of at least 85%, (2) learning objectives based on predetermined indicators reach a minimum of 75%, (3) the positive response of research subjects to learning that applies the learning model has a minimum score of 80%, and (4) the learning time is not more than the usual learning time or at least the same as regular learning.

Sall of these things have not been fulfilled in trial I, so it was tested II.

In trial II, the geogebra-assisted problem-based learning that was tested met the criteria for achieving classical completeness. This can be seen from the data obtained, namely as much as 61.9% of the pretest results of TKBKM with a post-test of 84.8% and the test of TKBKM achieved a score of 80. In addition, the learning objectives in trial II were achieved with the criterion of 75%. Here we get the maximum score for each item on indicator 1, indicator 2 and indicator 3, the results are 92.71%, 82.81% and 78.47% respectively. as we already know that the post-test results of the tested TKBKM have been achieved for all indicators. In line with that, the results of achieving learning time in the trial II of VI meetings were relatively the same and had no significant difference. After the results of the second trial data analysis carried out. We can conclude that the problem-based learning tool developed in this study meets the criteria for being effective.

Improving Students' Critical Thinking Ability

The increase in pretest and post-test results after being analyzed based on the N-gain formula which was carried out in the study. The results of increasing TKBKM in the first trial were obtained in the following table:

Table 3. Summary of the results of the N-Gain test of TKBKM I

<table>
<thead>
<tr>
<th>Reach</th>
<th>Category</th>
<th>Total students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ≥ 0.7</td>
<td>Tall</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>0.3 ≤ N ≥ 0.7</td>
<td>Medium</td>
<td>16</td>
<td>80%</td>
</tr>
</tbody>
</table>
From the results shown in table 3 after implementing problem-based learning in the trial I, there was an increase in TKBM. From these results it is known that the N-gain results obtained in the trial I had a score of 0.51 in the "medium" category.

In the analysis results of the increase in N-gain in trial II, namely Table 4, following this:

<table>
<thead>
<tr>
<th>Reach</th>
<th>Category</th>
<th>Total students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ≥ 0.7</td>
<td>Tall</td>
<td>8</td>
<td>40 %</td>
</tr>
<tr>
<td>0.3 ≤ N ≥ 0.7</td>
<td>Medium</td>
<td>11</td>
<td>55 %</td>
</tr>
<tr>
<td>N &lt; 0.3</td>
<td>Low</td>
<td>1</td>
<td>5 %</td>
</tr>
</tbody>
</table>

From the results shown in table 4 after implementing problem-based learning in the trial I, there was an increase in TKBM. From these results it is known that the N-gain results obtained in the trial I had a score of 0.62 in the "medium" category.

Here we can conclude that the n-gain results in experiment I and experiment II have increased.

4. Discussion

In this digital era, learning mathematics must continue to innovate in accordance with the demands of the times. Innovative learning in accordance with the times to improve the quality of learning. Students not only have to be smart, but students also have to have competent abilities on every problem that exists. The role of the teacher in improving to solve problems that are relevant to life is an urgent necessity today. Students are trained to use their minds and minds to think critically and logically in problem solving.

The teacher as a facilitator in the development of students' thinking must also have the learning methods and models needed by students. Through problem-based learning that is developed, it is expected that students will find it easier to solve the problems they face carefully, systematically and logically. Researchers hope that the problem-based learning model applied to Junior High School Student Stabat N1 will be able to have a positive impact on the development of students' critical thinking in solving mathematical problems. Learning mathematics in problem-oriented schools requires students to think critically and this is in line with the opinion of experts such as Piaget who emphasize students' cognitive development.

Vygotsky explained that students who do tasks that have not been studied can develop a mindset in the zone of proximal development. The more often students do these tasks, the mindset of students will develop well. For this reason, it is necessary to develop learning tools that can improve and develop students' mindsets. The development of the device uses a 4D model. The instruments developed are RPP, worksheets, BG, BS and tests that have been adapted to quadrilateral material.

From the results of the analysis, the assessment has been carried out by a team of experts. Then the results obtained in the form of device validation on each component have met the "valid" criteria. For practicality, we can find out through the expert team's response. They provide assessments and suggestions for these learning devices. The result is a learning tool that can be used with "minor revision" or "no revisions". In terms of effectiveness, learning tools must meet
3 indicators of effectiveness, namely 1) classically, learning completeness must be achieved in trial II, 2) learning objectives are achieved with a minimum score of 75% and 3) during learning, student responses are categorized as good, namely having a score at least 80%.

Nieeven (2007) argues that student achievement and effectiveness must refer to the curriculum set by the government. The government has set standards for the education system so that the results will be measurable and universal. This is in line with the increase in TKBM which were analyzed in trials I and II. Increasing the ability of these students to be taken into consideration in further research.

From the research results of Hasratuddin, et al (2014) the following conclusions were obtained: (1) TKBM will increase higher in students who are given PBL than those who are given direct learning; (2) learning with TKBM towards increasing students' mathematical critical thinking skills has no interaction; (3) the IL of students who are given PBL will increase and be better than those who are given direct learning; (4) learning with TKBM towards increasing student learning independence has no interaction. Nur (2016) in a study entitled "Utilization of Geogebra in Mathematics Learning".

So I concluded that the PBL tools developed by this study could later improve TKBM.

5. Conclusion

The researcher has conducted analysis and obtained the results which can be concluded as follows: 1) the development of PBL tools assisted by geogebra has met valid criteria, practical criteria and effective criteria. On valid criteria, the conclusions obtained are the results of the validation scores of RPP (4.64), worksheets (4.64), teacher books (4.64), student books (4.63), tests of critical thinking skills declared valid by a team of experts. On practical criteria, based on the responses of the expert team, it was stated that the device could be used with “minor revision” or “no revisions”. On the criteria for effectiveness, we can see from the achievement of classical mastery of at least 80%, the achievement of learning objectives of at least 80% and the student response to learning by 80%. 2) from the N-gain results, there is an increase in TKBM in trials I and trials II.

Reference


Development Of Flash-Based Learning Media to Improve Mathematics Problem Solving Ability in Stabat Putra Jaya Junior High School

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Abstract. Research to: (1) describe the validity, practicality, and effectiveness of flash-based learning media that have been developed; (2) Produce valid flash-based learning media development products to improve mathematical problem solving abilities. This research is a development research. The development model used is the ADDIE model. From the results of this development obtained: (1) The learning media developed are valid, practical and effective, (2) Practically developed learning media is seen from the responses of experts who state that the learning media can be used with little or no revision. The learning media used developed effectively, seen from the classical student learning completeness has been achieved, positive student responses to the components of learning media and learning activities are developed; and the teacher's ability to manage learning got an average score which was in the good category.

Keywords: Development of learning media, multimedia flash, mathematical problem solving ability,

1. Introduction

The field of mathematics plays an important role in the development of science and technology as well as in the daily life of society (IPTEK). The ability to think differently is directly related to progress and development. In this scenario, we have to show that we can think systematically, critically, rationally, creatively and innovatively. Mathematics is one of the subjects that help students improve and develop their thinking skills.

First, the true meaning of the problem at hand is broken down before moving on to a discussion of how well one can solve the problem. To achieve their professional goals, educators can choose relevant and efficient learning models from a variety of options. Learning models can be considered as patterns of behavior that are expected to be associated with learning. The general pattern of learning describes the process through which educators establish and maintain a learning state or environmental system. Learning patterns are used to characterize student actions.

The abbreviation PBM stands for problem-based learning, which was developed from the phrase problem-based learning (PBI). John Dewey is credited with popularizing the problem-based learning approach. Learning through PBL is an interactive, student-centered experience (Tan, 2004:7). Students are able to empower, hone, test, and improve their thinking skills through the process of working on PBL group projects methodically. Istarani said that she agreed with the statement that "Problem-based learning focuses on student challenges" (2012:32).
According to Padmavathy and Mareesh (2013), problem-based learning (PBM) refers to an educational setting where difficulties serve as a catalyst for learning. Learning begins with a problem to be solved, and in order for students to overcome that challenge, they need new knowledge.

According to Sinaga and Ani (2019), the Problem-Based Learning Model has the potential to stimulate active learning among students. Students apply the scientific method in order to solve a problem, increase knowledge, and improve their ability to solve problems. Arends (2008:45) asserts that project-based learning requires students to generate and explain real-world phenomena, as well as their own understanding of these phenomena.

Given the importance of mathematics and its role in science and technology as well as international competition, the quality of mathematics education in all fields, types and levels of education needs to be further improved. The government has made efforts to improve the quality of mathematics education today. One of them is to improve the curriculum at the education unit level by creating a 2013 curriculum that meets the requirements. This is reflected in the fact that the previous students' progress.

According to the results of a PISA survey conducted on junior high school students in 2018, Indonesian students were ranked 75th out of 80 countries that took part in the survey. Mathematical, reading, and scientific skills are evaluated during the PISA process. Mathematics measures a person's ability to recognize, understand, and apply the basic mathematical concepts needed to function properly in everyday life. The average score in mathematics in Indonesia is 379, which is the rank in Indonesia. This is slightly below the PISA average of 489. It is also much lower than the average score of Malaysia at 59th place with an average score of 440 and Singapore at 2nd place. The results showed that Indonesian high school students had not yet achieved a satisfactory level of mathematics learning. Mathematics teaching does not always go according to plan for all given learning activities. Teachers are one of the factors that determine how well the school education system works. Therefore, it is very important to have competent enough educators who effectively carry out the learning process and carry out the main tasks of education, teaching, coaching, evaluating and developing students. Teachers must have professional talents to support their performance in order to carry out their duties effectively. According to Aripin (2017), 21st century professional educators must be able to help students acquire skills, which are outlined in the 21st Century Partnership Learning Framework. This is a need imposed on professional teachers in the 21st century. This is related to the teacher's ability to develop learning methods, strategies and models, as well as the teacher's ability to use information technology and media in the learning process. The teacher's ability is related to the student's learning ability.

According to Sinambela (2017: 18), "the curriculum is not just a concept, but how a teacher can create good learning strategies that are in accordance with educational standards and can cover three aspects, namely affective aspects, cognitive aspects, and psychomotor aspects. Problem-solving abilities are required in order to accomplish the cognitive component. It is expected of students that they will be able to apply the talents discussed here to the solution of mathematical problems, in addition to the students' other abilities. The features of a question are called a problem if the question is closely related to a question that challenges the mind and the problem is not immediately known how to solve it. In other words, a problem is a question that has the characteristics of a question. When we are trying to solve problems, we need to think about how we may solve the problem in stages, so that we can reach conclusions that are reliable and accurate.

The statement "mathematical problem solving is one of the important goals in learning mathematics, even the process of solving mathematical problems is at the center of
"mathematics" is a quote from Branca (Soemarmo and Hendriana, 2014: 23) that demonstrates the significance of having problem-solving skills. In keeping with this idea, Wandari (2017: 6) asserts that "the ability to solve problems is one of the abilities that must be possessed by students" because "this ability is very useful for students when studying mathematics and in everyday life" (students will find it helpful to have this ability when solving problems in both the classroom and in real life. According to Sadiq (2014: 105), there are four actions that must be followed in order to fix the problem. These phases are as follows: "(1) Fully grasping the nature of the issue at hand; (2) Formulating a strategy for addressing the issue; (3) Carrying out the strategy; and (4) Analyzing or confirming the findings."

The capacity of students to solve problems is currently at a relatively low level, and the low level of students' ability to solve mathematical problems is backed by the findings of various earlier scholars. According to Caprioara (2015: 1862), "Studies conducted on students with significant experience in solving mathematical problems have shown that their results are quite low," and this is the case even if the problem that needs to be solved does not present a particularly high level of difficulty for that level. This indicates that research carried out on students who have had past expertise in the material aspects of solving mathematical problems has revealed fairly low results, despite the fact that the problems to be solved do not provide a particularly high level of difficulty.

According to Saragih (2014:124), "In the problem-solving, it is often seen that students are only concerned with the final result without knowing how the process if the answer is correct or not." [Citation needed] This frequently leads to the kids providing answers that are inaccurate. This means that when it comes to issue solving, it is common to find that pupils are just concerned with the final result, without making an effort to comprehend whether or not the response process is accurate. The conclusion that "the student's answer is erroneous" frequently emerges as the consequence of this situation. In their study conducted at SMPN 3 Bonegunu, Kadir et al. (2018:3) came to the conclusion that "Factors causing low mathematical problem solving skills are the lack of training in matters relating to mathematical problem solving abilities and the fact that teachers have not used strategies and learning models that can improve students' abilities."

Someone who has a high level of self-efficacy will never stop trying new things and will always be ready to face challenges. "Individuals who have high self-efficacy will be very easy to face challenges," said Bandura (quoted in Zubaidah, 2013, page 35), and "individuals do not feel doubt because they have full confidence in their abilities." According to Bandura and Locke (quoted in Fajri, 2016: 183), "The level of self-efficacy of students reflects the confidence they have in their ability to find solutions to various mathematical challenges. Students who have unpleasant feelings about their own efficacy can avoid challenges, perform tasks in a lackluster manner, concentrate on obstacles, and make preparations for unfavorable outcomes.

Make learning fun and meaningful. A holistic learning pattern describes the process by which educators build and maintain a learning state or environmental system. Learning patterns are used to characterize student behavior. The acronym PBM stands for Problem-based Learning and evolved from the expression Problem-Based Learning (PBL). John Dewey is known for popularizing the problem-based approach to learning. Learning with PBL is a student-centered, interactive experience (Tan, 2004:7). Students can strengthen, refine, test, and refine their thinking skills through the process of systematically working on PBL group projects. Istarani said he agreed that "problem-based learning focuses on the student's task" (2012:32). Ideal for use with technology-based learning media such as worksheets/materials/modules, interactive learning, or other effective, practical, and effective learning media.

Shabrina Amalia
(2019) uses these effective, practical and effective learning media to reduce student boredom. Her research shows that it is possible, as the learning process is traditionally a personal learning process for most teachers. The face-to-face method (lectures) leads to boredom and boredom of the students, which lowers their motivation. Teachers are responsible for stimulating interest, motivation and interest in their students and changing perceptions of mathematics so that mathematics learning goals are adequately achieved. One way is to use Adobe Flash software or FlashMedia macros to develop learning media, such as Flash-based interactive media.

However, the reality is that the standard of education in Indonesia is still relatively poor. According to Shoimin (2014:65), various efforts have been made to improve various aspects related to the quality of education in order to better prepare students to take over as the nation's successors in building the nation. These efforts are focused on improving the curriculum, educational objectives, implementation of learning, and evaluation. When there are new curriculum devices or curriculum improvements that are being implemented, there are also efforts related to improving the objectives and curriculum being carried out (Depdiknas.2006:120). It is important to play an important role in the overall quality of the educational process to contribute to this effort. According to Joyce (2011:233):

"Because the effectiveness of the education process is very dependent on the teacher who acts as the spearhead of implementation, one of the components that play an important role in maintaining the quality of the education process is the teacher. In addition, one of the components that play an important role in the implementation of the educational process is the teacher. Therefore, efforts to improve the quality of education should initially focus on improving the competence of educators. One of the skills that teachers need to have is the ability to design learning strategies that are in accordance with the objectives or components to be achieved, because this is one of the abilities required of them. This is because not all goals can be achieved with one strategy."

The word independence has a very relative meaning. Basically the word independent means independent from others and free to do it yourself. The term often applies to different meanings and degrees of independence. Students learn certain topics or subjects by reading books or watching or listening to audiovisual media programs (audiovisual) without the help of others or with limited assistance. This means that independent learning is a process of consultation, decision and adaptation. It mainly consists of knowledge, beliefs and learning skills. It is also viewed as a process in which students activate and maintain systematically oriented cognitive, behavioral, and impactful goals. Rafika, Israwati and Bachtiar (2017) say that teachers can create independent learning by encouraging students to be interested in what is being taught to support their learning activities through motivation and topic planning.

In a broad sense, learning autonomy means that individuals take the lead in diagnosing learning needs, developing learning goals, identifying learning resources, and choosing a learning strategy approach, with or without the help of others. Represents the process of determining and evaluating learning outcomes achieved. This means that the independent learning atmosphere provides choices, constructive criticism, and guidance in learning activities.

According to what Hasratuddin said in his article (2015:23): Mathematics is a science as well as intuition that can strengthen a belief or faith; Therefore, mathematics is very important and useful in everyday life and in supporting the development of human resources. This is due to the fact that mathematics is both a science and an intuition. In addition, mathematics contains thinking tools that can help develop logical, systematic, objective, critical, and rational thinking patterns. Because this pattern of thinking is so capable of shaping personality, it is very important for everyone to gain ground in mathematics. According to the explanation given by
the Directorate General of GTK Kemdikbud (in Purba 2017:2), “things that need to be developed in learning mathematics are 1) mastery of mathematical concepts; 2) problem solving ability; 3) the ability to reason and communicate; 4) the ability to think creatively and innovatively.” The questions used in TIMSS and PISA were developed with reference to mathematical ability, which distinguishes them from other questions used in this study. "Abilities that must be achieved in learning mathematics include: (1) problem solving skills, (2) reasoning skills, (3) communication skills, (4) connection skills, and (5) representation skills," said (2000). 4) National Council of Mathematics Teachers (NCTM). According to Sadiq (2014: 105), to solve problems effectively, four steps are needed that must be completed in the appropriate order. This includes (1) having an understanding of the problem, (2) having a plan for a solution, (3) having the plan implemented, and (4) interpreting the results or examining them.

The development of learning media is very important. By using learning media, it will be like that. It is common knowledge that students' problem-solving abilities play an important role in the level of success they achieve when learning mathematics. Furthermore, those who specialize in the field of mathematics education recommend that students' problem-solving abilities continue to be developed and improved. This is based on the description that has been given earlier in this paragraph.

Many factors play a role in learning problems that cause students to fail academically, including factors related to students, teachers, learning processes and curriculum. Looking at the curriculum 1975, 1984, 1994, KBK, KTSP, 2013, the purpose of learning mathematics is so that students can apply the mathematics they have learned at school in their daily lives, or to other students.

This appendix contains the skills or abilities that students need to learn mathematics. Understanding mathematical concepts and their relationships, generalizing based on phenomena/data, or analyzing problem solving components that exist both in the context of mathematics and outside mathematics. National Council of Mathematics Teachers. Instructors found that students were not accustomed to working through the stages of problem solving when they were solving problems. The process of carrying out calculations, as well as checking both the process and the results of these calculations, is the time most often experienced by people.

This involves students in the process of finding solutions to problems and instructing or introducing students by responding to questions in class that require problem solving. According to Mataka (2014:164-174), "to improve students' problem-solving skills, teachers need effective teaching strategies". This was revealed in a study. Teachers have access to a variety of pedagogical approaches, strategies, and instructional models. Throughout the entire 2013 academic program, students are expected to actively participate in the learning process. According to Problem solving skills are needed to achieve the cognitive component. Students are expected to be able to apply the skills discussed here to mathematical problem solving, in addition to other students' abilities. In other words, a problem is a question that has the characteristics of a question. When we try to solve a problem, we need to think about how we can solve the problem step by step, so that we can reach reliable and accurate conclusions. Students have a great chance to be proficient in this ability if they are also proficient in affective abilities, one of which is self-efficacy.

Someone who has a high level of self-efficacy will never stop trying new things and will always be ready to face challenges. "Individuals who have high self-efficacy will be very easy to face challenges," said Bandura (quoted in Zubaidah, 2013, page 35), and "individuals do not feel doubt because they have full confidence in their abilities." According to Bandura and Locke (quoted in Fajri, 2016: 183), "The level of self-efficacy of students reflects the confidence they
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"Development of Flash-Based Learning Media to Improve Mathematical Problem Solving Ability and Independent Learning of Students at SMP Putra Jaya Stabat". was to investigate these questions.

2. **Research methods**

**Research type**

This study develops a learning medium. ADDIE (analysis, design, development, implementation, evaluation) type of development is used to build and validate general products. Research theme and purpose.

**Research Subjects and Objects**

The subjects of this study are students in Class VIIIA and VIIIB SMP Putra Jaya Stabat T.A 2021/2022 and the purpose of this study is to develop a Flash-based learning medium based on the problem-based learning model of the SPLDV material, mathematical problem solving was. Student skills and learning independence. The method developed in this study is limited to Flash-based learning media.

2.1 **Data analysis**

**Data analysis Flash-based learning media validation data analysis**

This review is based on the opinions of her five experts and practitioners in the field of education. Calculate the average value of each aspect based on the report, and calculate the average value of the overall aspect. Data analysis on the practicality of Flash-based learning media

Experts say problem-based learning methods can be used with little or no validation. To assess the usefulness of Flash-based learning media, validate the sheet using rating scales and problem-based learning. Use Flash-based learning media and provide observation sheets during study. Observations by previously directed observers to the learning process to ensure proper implementation. Observation sheets of Flash-based learning media were rated from 1 to 5: 5
(very good), 4 (good), 3 (fair), 2 (poor), 1 (poor). Data analysis on the effectiveness of Flash-based learning media

Data on student proficiency, learning goal achievement, and student response were used to test the effectiveness of Flash-based learning media. Effectiveness of Flash-based learning media in improving math problem-solving skills. A student's score of 75 is the minimum degree of completion. KKM Class VIII SMP Putrajayastabath he is 75 years old. A lesson is considered Classic if at least 75% of the candidates scored 75 or above. Data collection tools and techniques

Validation of Learning Media Validation of Flash-based learning media. Learning Media Approval Form. This sheet evaluates format, language, images, and content. A test vehicle for mathematical problem-solving ability is a structured written test. Student reaction means. The Student Answer Questionnaire gathers student feedback on suggested Flash-based learning elements and media. Distribution of questionnaires on learning independence to students aided in data collection. The survey asked students about their interest, enjoyment, timeliness, and ease of understanding problem-based learning methods.

2.2 Learning Media Development Procedure

Analysis phase
In the analysis phase, the purpose and limitations of the material are analyzed to determine learning needs. This step includes a preliminary analysis, an analysis of the materials used, and an analysis of the curriculum from multiple sources used by the school, which will be incorporated into Flash-based learning media. design stage

The basis of content creation is the editing of templates that will later be used in Flash-based learning media and the elements and content that will later be displayed in the used Flash media. Flash media is selected for the presentation. Media selections using Adobe Flash applications or Macromedi Flash are conceptual and appropriate visual media. The format of content displayed in Flash media, such as images, animations, and sounds, is later deployed in the product. this is draft I

Development stage
Development is his third step in the ADDIE system design model. Development steps include activities for creating, purchasing, and modifying learning media. In other words, it includes the activities of selecting and determining appropriate methods, media and learning strategies to use in delivering program materials and content. Implementation stage

Implementing or delivering learning materials is the fourth step in the ADDIE learning system design model. The main purpose of this step is to guide the participant towards a goal or skill, solve problems to fill the gaps in the learning outcomes they face, and welcome the participant to the end of the learning program. Skills in the form of problem-solving skills and mathematics problems that require independent learning. During the validated media implementation phase, not only trials, but trials of media are run until significant results are obtained.

Verification/evaluation (evaluator)
This activity is graded. Expert validation gathers feedback on the design of our learning technology. Developed learning tools. equipment test

Mathematical problem-solving skills and student learning autonomy were used as research tools. Before using the learning tool, I tested it on a non-sample class. In addition, efficacy and reliability tests were also performed. The goal of this process step is to produce a high quality research tool, both in terms of adequacy and suitability for use in field trials. Field test
To get direct feedback on the learning device, a field trial was conducted and the learning device was perfected. Schools evaluate learning aids to improve students' critical thinking skills in mathematics. Evaluation stage

This activity is executed in all phases of all steps. The ADDIE model is evaluated for bias for further development. This phase is carried out to maximize the development of learning media.

3. Result

**Validation of Learning Tools by Using Problem-Based Learning Tools by Using Developed**

Validation of Flash-based learning media This research uses a problem-solving ability test. Before using the research instrument, its validity and reliability were evaluated in the non-sample class. To create a valid and usable research instrument. The results of the validity and reliability tests are:

By comparing the item scores with the total scores, the validity of the questions is determined. Table 1 shows the results of the student's mathematical critical thinking test... as follows.

**Table 1. Validity of Mathematical Critical Thinking Ability Question Items**

<table>
<thead>
<tr>
<th>Question points</th>
<th>$r_{xy}$</th>
<th>$r_{table}$</th>
<th>Interpretasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>0.838</td>
<td>0.374</td>
<td>Valid</td>
</tr>
<tr>
<td>2.</td>
<td>0.726</td>
<td>0.374</td>
<td>Valid</td>
</tr>
<tr>
<td>3.</td>
<td>0.637</td>
<td>0.374</td>
<td>Valid</td>
</tr>
<tr>
<td>4.</td>
<td>0.701</td>
<td>0.374</td>
<td>Valid</td>
</tr>
</tbody>
</table>

In Table 1 above, we get a test of research instruments for testing a student's mathematical problem-solving ability for four essay questions with a significance level of 5%, $d_{k} = 28$, and $r_{table} = 0.374$. A problem solving ability test is enabled or valid if the reference to the test criteria is $r_{count} > r_{table}$. Therefore, it is concluded that the student's mathematical problem-solving ability test is usable or valid, based on hand calculations and Excel. Table 2 presents the results of expert and practitioner evaluations of the practical suitability of Flash-based learning media. Below: Practicality of Learning Media with Developed Flash-based Learning Media.

**Table 2. Learning Media Validation Results**

<table>
<thead>
<tr>
<th>Validator</th>
<th>Media Pemebalajaran</th>
<th>Tata letak</th>
<th>Tulisan</th>
<th>Warna</th>
<th>animasi</th>
<th>Bahasa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validator 1</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
</tr>
<tr>
<td>Validator 2</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
<td>RK</td>
</tr>
<tr>
<td>Validator 3</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>RK</td>
</tr>
<tr>
<td>Validator 4</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
</tr>
<tr>
<td>Validator 5</td>
<td>RK</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
<td>TR</td>
</tr>
</tbody>
</table>

Information:

RK : Learning media can be used with "small revisions"

TR : Learning media can be used “without revision”
In Table 2, experts and practitioners say Flash-based learning media requires little or no change. Experts say that Flash-based learning media meets practical standards. The practicality of the media will also be checked. PBM implementation is measured through observation sheets. PBM data analysis results.

3.1 Effectiveness of Learning Tools by Using Problem-Based Learning Tools by Using Developed

PBM tools are viable when they facilitate learning. Therefore, her PBM tools developed must meet efficacy criteria. (2) achieve at least 75% of the learning objectives; (3) at least 80% of surveyed subjects give positive responses to the components of the PBM tool; (4) The minimum learning time is the same as the conventional method. Since none of the criteria were met in the first trial, the second trial described the effectiveness of the learning media. Mathematical problem-solving proficiency of 61.76% on the Preliminary Exam II and 77.94% on the Post-Exam II. The post-test results for solving mathematical problems correspond to classical perfection at 77.94% completion. In the second test, the learning materials met the usual standards of completeness using Flash media. His results for mathematical problem-solving skills on his second attempt to meet the learning objectives were 92.71% for index 1, 82.81% for index 2, and 78.47% for index 3. According to the learning objective achievement criteria, the learning objective was achieved with a score of up to 75% on each item, so the achievement of the post-test results of the second field experiment enabled the learning objective to be achieved. The task difficulty index (level) has an average value of 3.5, the stability, limit or range index is 3.4, and the local behavior index (overall) is 3.4.

The second trial period will consist of 3 meetings. Comparing the first-trial PBM training time with the normal training time, no difference was found. Improving students' math problem-solving skills

Analysis of the improvement in the student's mathematical problem-solving skills on the first trial is evident by her N-reinforcement from the results of the pretest and posttest of the student's mathematical critical thinking skills on the first trial. The results of the N-Gain calculation for Mathematical Critical Thinking Skills can be found in the table below:

Table 3. Summary of N-Gain Results of Mathematical Problem Solving Ability Trial I

<table>
<thead>
<tr>
<th>Rentang</th>
<th>Kategori Peningkatan</th>
<th>Jumlah Siswa</th>
<th>Persentase</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ≥ 0.7</td>
<td>Tinggi</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>0.3 ≤ N &lt; 0.7</td>
<td>Sedang</td>
<td>27</td>
<td>79%</td>
</tr>
<tr>
<td>N &lt; 0.3</td>
<td>Rendah</td>
<td>7</td>
<td>21%</td>
</tr>
</tbody>
</table>

In Table 3, 0 students have an N-Gain score greater than 0.7. Twenty-seven students experienced improved math problem-solving skills or again achieved an N-gain score of 0.3 g 0.7 in the moderate category, and she had seven students with an N-gain score of less than 0.7. The g of 0.3 in the first "low" category represents a trial mean of 0.51 gain. How Flash-based learning media improve students' problem-solving skills after initial experiments.

An analysis of the improvement in students' mathematical problem-solving ability on the second trial is evident from the N-gains from the pre-test and post-test data. A summary of N-gains for math problem-solving skills is shown in Table 4:
Table 4. Summary of N-Gain Results of Experimental Mathematical Problem Solving

<table>
<thead>
<tr>
<th>Rentang</th>
<th>Kategori Peningkatan</th>
<th>Jumlah Siswa</th>
<th>Persentase</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ≥ 0.7</td>
<td>Tinggi</td>
<td>13</td>
<td>38%</td>
</tr>
<tr>
<td>0.3 ≤ N &lt; 0.7</td>
<td>Sedang</td>
<td>19</td>
<td>56%</td>
</tr>
<tr>
<td>N &lt; 0.3</td>
<td>Rendah</td>
<td>2</td>
<td>6%</td>
</tr>
</tbody>
</table>

From Table 4 above, we can see that 13 students had N-Gain values > 0.7 according to Table 4. Nineteen students improved their math problem-solving skills in the moderate category or achieved her N-Gain scores of 0.3 to 0.7. and her two students of the lower category. Her 0.62 average win rate on the second try is pretty decent. In a second experiment, Flash-based learning media improved students' math problem-solving skills.

4. Discussion

Learning media, Learning Implementation Plans (RPP) and Student Worksheets (LKPD) are determined to be validated or quite valid based on the validation results of the developed Flash-based learning media. Student learning independence is also valid or has a high level of relevance. This shows that the Flash-based learning media developed by the RPP learning media, LKPD, Mathematical Problem Solving Tests, and the Student Learning Independence Questionnaire have met the validity criteria.

According to Saragih (2014:124), "In the problem-solving, it is often seen that students are only concerned with the final result without knowing how the process if the answer is correct or not." [Citation needed] This frequently leads to the kids providing answers that are inaccurate. This means that when it comes to issue solving, it is common to find that pupils are just concerned with the final result, without making an effort to comprehend whether or not the response process is accurate. The conclusion that "the student's answer is erroneous" frequently emerges as the consequence of this situation. In their study conducted at SMPN 3 Bonegunu, Kadir et al. (2018:3) came to the conclusion that "Factors causing low mathematical problem solving skills are the lack of training in matters relating to mathematical problem solving abilities and the fact that teachers have not used strategies and learning models that can improve students' abilities." kids' ability to solve mathematical problems".

The developed Flash-based learning media meets the criteria for effectiveness, but there are several aspects such as content, language, and structure that need to be modified according to the reviewer's suggestions. This Flash-based learning media based on the validator's comments meets the validity criteria of the valid category, and mentions several minor revisions. In addition, the Flash-based learning media was revised according to the verifier's suggestion.

The statement "mathematical problem solving is one of the important goals in learning mathematics, even the process of solving mathematical problems is at the center of mathematics" is a quote from Branca (Soemarmo and Hendriana, 2014: 23) that demonstrates the significance of having problem-solving skills. In keeping with this idea, Wandari (2017: 6) asserts that "the ability to solve problems is one of the abilities that must be possessed by students" because "this ability is very useful for students when studying mathematics and in everyday life" (students will find it helpful to have this ability when solving problems in both the classroom and in real life. According to Sadiq (2014: 105), there are four actions that must be followed in order to fix the problem. These phases are as follows: "(1) Fully grasping the
nature of the issue at hand; (2) Formulating a strategy for addressing the issue; (3) Carrying out the strategy; and (4) Analyzing or confirming the findings."

And the verification results of the verifier on the Mathematical Problem Solving Ability Test and the Learning Independence Questionnaire also met the content adequacy criteria. The Mathematical Problem Solving Ability Test consists of four post-tests, each of which contains four measures of measurable mathematical problem solving abilities. In addition, non-sample statistical validation or instrumental tests were carried out in the form of tests on students to confirm the validation of the items. From the results of the statistical validation, four math post test questions met the valid criteria. The effectiveness criteria were determined by expert assessment of the developed Flash-based learning media. The acquisition of effective learning media is driven by several factors, including: (1) the developed learning media meets the effectiveness of the content; This means that the development of Flash-based learning media is in accordance with the needs of the existing curriculum. The existing curriculum relates to core competencies (AI) and basic competencies (KD) that students must achieve in targeted learning activities. Material or content for lessons provided. The above is my opinion with Ari (2009: 57) stating that the effectiveness of the content is good if the learning device can measure a certain goal parallel to the lesson material or content provided. Content validity is also called curriculum validity.

According to Sinambela (2017: 18), "the curriculum is not just a concept, but how a teacher can create good learning strategies that are in accordance with educational standards and can cover three aspects, namely affective aspects, cognitive aspects, and psychomotor aspects. Problem-solving abilities are required in order to accomplish the cognitive component. It is expected of students that they will be able to apply the talents discussed here to the solution of mathematical problems, in addition to the students' other abilities. The features of a question are called a problem if the question is closely related to a question that challenges the mind and the problem is not immediately known how to solve it. In other words, a problem is a question that has the characteristics of a question. When we are trying to solve problems, we need to think about how we may solve the problem in stages, so that we can reach conclusions that are reliable and accurate.

Second, (2) the developed Flash-based learning media meets construct validity. That is, the development of flash-based learning media is carried out in accordance with the concepts and indicators of mathematical problem-solving ability and combined with the developed flash-based learning media. The Flash-based learning media that we have developed are positioned to complement each other between lesson plans and worksheets used to measure mathematical problem solving abilities. Recognizing the good aspects of validity above, Akbar (2013: 152) added that high validity was achieved through validation tests on the learning media he developed.

Based on the findings and supporting research that we conducted, it can be concluded that the developed Flash-based learning media meets the expected validity criteria. In this way, you can use Flash-based learning media that has been developed.

The capacity of students to solve problems is currently at a relatively low level, and the low level of students' ability to solve mathematical problems is backed by the findings of various earlier scholars. According to Caprioara (2015: 1862), "Studies conducted on students with significant experience in solving mathematical problems have shown that their results are quite low.," and this is the case even if the problem that needs to be solved does not present a particularly high level of difficulty for that level. This indicates that research carried out on students who have had past expertise in the material aspects of solving mathematical problems
has revealed fairly low results, despite the fact that the problems to be solved do not provide a particularly high level of difficulty.

5. Conclusion

Flash-based learning media for improving students' math problem-solving skills and learning independence met valid criteria, including

1). Test items developed for mathematical problem-solving ability can be used or validated. A statement item questionnaire on student independent learning attitudes with dk = 28 and a significance level of 5% yielded rtable = 0.374. A learning-independent questionnaire can be used or is valid if the test criterion is associated with a test criterion where rcount > rtable.

2) The learning media developed meet practical standards in that: (b) The learning media implementation achieved 3.82 high categories on the first trial and 4.17 very high categories on the second trial.

3) The learning medium developed meets the criteria for effectiveness. Effectiveness criteria related to: (a) Classical student learning completeness was 77.94% on the second trial; (b) A positive student response of 80% or more to the components of the learning tools and learning activities developed; (c) Teachers' learning management ability achieved an average of 4.07, which is included in the good category (3.50 KG 4.50).

4) A student's improvement in mathematics problem-solving ability using Flash-based learning media with a two-variable linear system of equations teaching material reportedly increases when considering her N-Gain test on the first attempt. 27 people in middle school and 0 in high school. On the second trial, 2 students received the low category, 19 students received the medium category, and 13 students received the high category. On this occasion, the authors would like to thank the Director and Deputy Director of the UNIMED Graduate Program, the Director of the UNIMED Graduate Program in Mathematics Education and Research, and the UNIMED Library.

References

The Development of A Teaching Video on the Subject of Creative Product and Entrepreneurship to Increase the Learning Outcomes of Class XI Students at SMK BM Panca Budi Medan

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Abstract. The current state of the COVID-19 pandemic has inevitably led to a pattern of learning that uses information technology and media. This research aimed to describe the development of a teaching video on creative products and entrepreneurship to increase the learning outcomes of class XI students at SMK Panca Budi Medan. This research used Research and Development (R&D) method with 4D type for class XI students at SMK-BM Panca Budi, Medan, Academic Year 2021/2022. The above output of the independent test sample was derived from homogenous data by assuming equal variance, and a significance value (2-tailed) obtained was 0.00 < 0.05 with statistical tests using the t-test with test results showing t_{count} = 30.349 > t_{table} = 1.680 with α= 0.05 and df = 44 or in other words H₀ is rejected, and H₁ is accepted.

Keywords: Teaching Video Development, Camtasia-Based, Student Learning Outcomes.

1 Introduction

The process of learning and teaching is constantly evolving and posing new challenges. This is because of the need to adapt to the continuously accelerating development of both technology and information. The dynamic aspects of education, the learning environments, and the drive to succeed all make valuable contributions to the overall level of happiness experienced by students [1]. These findings imply that the growth of student motivation and achievement will accompany the successful implementation of the dynamic components of learning. This will be the case if the dynamic components of learning are correctly implemented. Both the teachers and the students participated in various educational activities. Both parties carried out these activities. It is essential that the relationship between a teacher and a student be fluid and on equal footing with the concept of education. The actions of the teacher constitute teaching, whereas the students' actions constitute learning [2].
The current trend of online learning inspires and stimulates teachers to be creative in their classroom teaching and the lesson plans they provide for their students. Physical distance should no longer be a barrier to education and information exchange in today's world. As a meeting medium between professors and students, facilitating platforms such as ZOOM, Google Class, WebEx, and others, which have been utilized in the past and are now commonplace, are no longer uncommon. Only during this period of social alienation, in which students were compelled to learn in an online environment, was the application Zoom Meeting used [3]. The presence of information technology must be weighed against the capacity of educators to maintain and cultivate learning methods and practices that can usher in a fresh climate inside educational settings. Students can have much fun using IT media, such as gadgets, because they are familiar with these devices. It is very beneficial if the device is used more for learning and obtaining information to improve knowledge rather than being dominated by playing games or consuming information that is not appropriate for the age of the students. Students can have much fun using IT media, such as gadgets, because they are familiar with these devices. As one of the media, they are using gadgets to make videos in English video assignments has excited students because they are involved as actors/actors to practice English as well as directors and editors in making these assignments. This has made using gadgets to make videos in English video assignments a media that has excited students \[4\]. Because it engages so many of the learner's senses and requires them to perform various actions, this helps the learner better comprehend the core idea of the lesson and remember it for a more extended period.

Only two teachers at SMK Panca Budi Medan occasionally teach virtually, utilizing the lecture technique and PowerPoint. This applies to all of the topics offered at the school. At the same time, some will merely supply the necessary supplies and activities to be completed within a predetermined amount of time. Students are given resources that were obtained from the internet. These materials are offered to them. This results in monotony, and the environment for learning is not participatory. Based on this information, the researchers took the initiative to develop the use of teaching media, specifically the Camtasia software-based teaching video. In this video, the subject teacher directly provided the curriculum according to the expectations of the students. Because of the situation and conditions brought on by the COVID-19 pandemic, which calls for educators to find a solution that involves online learning and the creation of teaching videos based on Camtasia, this will be very helpful. This is because educators are required to provide teaching materials that have been prepared.

Camtasia offers advantages, namely: Camera, Video Record, and Audio Recording: This piece of software can record the action that occurs on the screen, and it can also make use of a webcam. In addition to these capabilities, it also comes with obvious audio recording capabilities. Camtasia is able to be suggested as a popular piece of software for YouTubers who enjoy creating tutorials from their personal computers because it combines three different activities into one. Can edit videos; Camtasia Studio also allows video editing for recorded content, and users have the ability to add up to hundreds of edit screens for any type of content, be it video, audio, or text. Aside from that, the editing tools are also fairly comprehensive, containing a variety of different sorts of standard features. Of course, in addition to their benefits, these tools also have several drawbacks, such as the following: Camtasia's feature set is lacking in comparison to that of Adobe Premiere; nonetheless, the functions included in Camtasia Studio itself are pretty typical. The software's activation can
still be bypassed using cracks and patches. Camtasia is not as feature-rich as Adobe Premiere. The creation of teaching media that uses instructional videos is being done to make it simpler for instructors to generate teaching materials in accordance with the curriculum, as well as for teachers of disciplines that are relevant to the curriculum.

2 Literature review

Teaching and learning are complementary endeavors that require the participation of both students and instructors. The learning process is a process that contains a series of implementations by teachers and students based on reciprocal relationships that take place in educational situations to achieve certain goals. The learning process is a process that contains a series of implementations by teachers and students based on reciprocal relationships [5]. The first prerequisite for the educational process is for students and teachers to maintain some form of interaction or reciprocal relationship. The term "learning" refers to the process by which students engage in activities in an educational setting, such as interacting with teachers or other learning tools. The term "learning" is derived from the root word "learning," which is then modified by adding the prefix "pe" and the suffix "ing." [6]. The phases of change in all human behavior that are generally permanent due to experience and interaction with the environment and involve cognitive processes are referred to as learning. Learning can be defined as the stages of change in all individual behavior. Another point of view about learning was presented, explaining that teaching is an effort to educate children. In this view, implicitly included in the teaching process are efforts to select, determine, and create teaching methods to achieve the intended results in teaching [7].

There are two types of participants involved in learning: students and learners. Learners are subjects (teachers) who "learn" students, whereas students are subjects who "learn" learners (students). Learning refers to altering behavior (a shift in behavior) as a result of new experiences and repeated activities [8]. Experimentation and practice are actions teachers engage in while students engage in these activities with one another as learners. Alterations in conduct might take either a mental or a physical form. Students are encouraged to take an active role in their education through the use of an educational strategy called self-learning. In the meantime, instructional design refers to the process through which traditional teachers develop a teaching program, also referred to as teaching preparation. It is possible to draw the following conclusion from the various definitions of learning that have been presented above: learning can be understood as a change in the behavior of students that occurs as a direct result of interactions between those students and educators or learning resources in an environment that is designed to meet the needs of those students.

The following is a list of the factors that are known to influence learning outcomes:

2.1 Internal factor

- Physiological Factors. In general, physiological conditions, such as excellent health, are not in a state of fatigue or exhaustion. Sometimes things like this can affect student learning outcomes.
• Psychological Factors. In this factor, the psychology or soul, as well as the mentality of each student, is different, but this factor also greatly affects the learning outcomes received by students.

2.2 External Factors

• Family Factor. This family factor is very influential because the child gets the first education in the family. This family factor can also affect the results obtained by the students.

• Community Factors. Community factors are factors whose existence and use are designed in accordance with the expected learning outcomes [9].

The role of the media in the teaching and learning process is very important because the media can facilitate educators and students in achieving their goals. Therefore, some things need to be considered and determined first before delivering the subject matter by educators in the selection of learning media as follows:

• Define goals. The point is the media that will be used per the objectives set or formulated from the material to be conveyed using the media.

• Determine effectiveness. The point is that in choosing media, educators must be able to choose which media to use and whether the media is effective or not to be used to deliver the subject matter in accordance with the learning objectives that have been formulated.

• They are measuring the ability factor of educators and students. The point is that in choosing and using media, educators must consider whether educators can convey material using the media, and the material to be delivered must also be in accordance with students' abilities according to their thinking patterns.

• Considering the flexibility factor (flexibility) durable with reality. The point is that educators in choosing media must consider flexibility in the sense that the media can be used in learning all situations, and durable, not easily damaged and harmless when used, can also take advantage of the media around. e. Pay attention to the media availability factor because every school is not the same in providing various learning media needed in teaching and learning activities. Therefore, educators can take advantage of the media around them. Besides that, educators can also make the media themselves (if the media is easily accessible or can be made yourself), buy (if the funds are sufficient), and others.

• Determine the suitability factor or balance between benefits and costs. The point is that in choosing media, it must be considered whether the benefits derived from learning by using the media and the number of costs incurred for the media must be balanced or in accordance with the benefits obtained.

• Determine the objectivity factor. The point is that choosing the method is not only the teacher's will, pleasure, and needs. However, based on the needs of the learning system. Therefore, educators can ask or ask for input from students. Because if the media used is liked by students, students will easily understand and accept the material presented by the educator.
• In accordance with the teaching program. This means that the media that will be used in delivering learning must follow the teaching program and be in accordance with the applicable curriculum.

• Determine program goals. The point is that the media to be used must be matched with the thinking abilities of students in terms of both. Language, the symbols used, the method and speed, and time of use.

Learning using video can display audio and visuals at the same time. The government and teachers have used video as a medium and source of learning [10]. Such as using educational videos on educational TV sites, Youtube, e-learning, etc. One of the teaching media that uses video is Camtasia Studio. The Camtasia Studio is software developed by a TechSmith corporation specifically in multimedia [11]. Camtasia Studio is an application program for recording, editing, and publishing video presentations on a computer screen.

Camtasia Studio is one of the software developed by TechSmith Corporation, which is currently in version 8.4. Camtasia is used to record all activities on the desktop computer. This software can also be used to create multimedia and e-learning-based learning media by making video tutorials or training and making video presentations known as screencasts. Camtasia Studio is software that can record everything that is going on on your monitor screen [12]. This software is commonly used in making video tutorials and video presentations. Easy use and satisfactory results are one of the recommended software for use in learning. Process learning by using video tutorial media by teachers who utilize Camtasia Studio software is expected to be able to bind and increase students' attention and activity in learning.

3 Method

This research was research and development because, in this research, teaching media in the form of video based on Camtasia Studio was developed in the subjects of Creative Products and Entrepreneurship for class XI students at SMK-BM Panca Budi, Medan, for the Academic Year 2021/2022. The target audience for these teaching materials was students in the 11th grade. The SMK Business Management Unit at the Panca Budi University Foundation in Medan served as the research site (SMK-BM). The time spent conducting the research spanned two months, specifically from February 2022 to April 2022. The course outline for the even semester of the academic year 2021/2022, followed by the student's chosen learning materials, may be found here. All 66 pupils in class XI SMK-BM participated in the research as part of the population. The researchers collaborated with one teacher who taught creative products and entrepreneurship subjects. This teacher played the role of a teacher in the learning videos and provided information regarding students' condition during the implementation of Camtasia Studio teaching videos and how well they understood the concepts of Creative and Creative Products subjects. Students in the eleventh grade at SMK-BM in Panca Budi will learn about entrepreneurship. The class that participated in the experiment was a member of the XI-AP 1 SMK-BM Panca Budi class, and the class that served as the control was a member of the XI-AP 2 SMK-BM Panca Budi class.

This research was a research and development research using the Four-D model developed by Thiagarajan and Semmel [13]. The Four-D model is divided into four distinct phases: the
Stage of Definition, the Design Phase, the Development Phase, and the Evaluation Phase (Disseminate). The following flowchart explains how video media came to be used in the classroom to teach subjects such as creative products and entrepreneurship. The chart focuses on the concept of understanding entrepreneurship.

4 Result and discussion

4.1 Product development research results

Based on the format of the creative and entrepreneurial product learning media that the researchers have prepared, it is found that there are several differences in the steps of the teaching and learning process offered in the media with the teaching and learning process carried out by the teacher which is carried out at the end of each learning activity to determine the extent to which students understand the material. The Camtasia Studio-based teaching video learning media that is arranged is also exciting and is equipped with several images adapted to the subject matter. The stages in product testing. Teaching video media based on Camtasia Studio can be seen as shown in figure 2.
According to the results of limited field trials carried out on 23 students from class XI AP3 at SMK Panca Budi 2 Medan, the generated learning media did not receive any comments or improvements from the students. The improvement that has been made to media learning is beneficial because it piques pupils' attention in the learning process. Students' interest in studying English can be stimulated by using technology-based learning resources, such as videos, in English classrooms, which also helps improve the learning process [14]. This intriguing and cutting-edge medium is expected to increase student participation in the process. The purpose of this study is to describe students' reactions regarding their involvement in the use of English Learning videos made using Camtasia Studio for students in the second grade of primary school. The gathering of data is carried out using the methodology of observations, interviews, and questionnaires filled out by teachers. According to the findings, incorporating technology-based media into a classroom setting was an excellent way to boost students' motivation levels and active learning, leading to an overall improvement in the quality of teaching and learning process quality. The students and instructors responded positively to the media, and they classified it as "Very Good" media, which meant that they found it fascinating and that it addressed the needs of second graders. In addition, it has been suggested for the sake of future research that learning should take place in a variety of settings.
4.2 Research hypothesis test

The validity test was conducted on 23 students in class XI AP3 SMK BM Panca Budi 2 Medan who were not included in the research respondents. It is said to be valid on the items from each of the variables studied if $r_{count} > r_{table}$ where $N = 23$ so that $r_{table} = 0.413$ is obtained. Based on the results of the validity test of the learning outcomes variable, it is known that the questions for the learning outcomes variable were submitted to 25 multiple choice questions to 23 respondents. 1 with $r_{count} > r_{table}$ or $0.666 > 0.413$ is declared valid. Therefore, the number of item items that were declared valid was 21 items. The problem formulation in this study can be analyzed and interpreted by looking at the data on learning outcomes taught using teaching video learning media developed in the classroom. Experiment without using teaching video learning media in the control class. Descriptive data on the value of learning outcomes obtained the lowest score ($X_{min}$), the highest score ($X_{max}$), the average value (mean), and the std. Deviation values in the experimental and control classes can be seen in Table 1.

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment pretest</td>
<td>23</td>
<td>75</td>
<td>81</td>
<td>77.70</td>
<td>1.363</td>
</tr>
<tr>
<td>Experiment posttest</td>
<td>23</td>
<td>89</td>
<td>95</td>
<td>91.78</td>
<td>1.704</td>
</tr>
<tr>
<td>Control pretest</td>
<td>23</td>
<td>75</td>
<td>79</td>
<td>77.35</td>
<td>1.152</td>
</tr>
<tr>
<td>Control posttest</td>
<td>23</td>
<td>85</td>
<td>89</td>
<td>86.78</td>
<td>1.204</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From Table 1 above, it is known that the minimum score, maximum score, mean value, and std. Deviation has a difference. In the experimental class, the minimum and maximum scores were higher than in the control class. It can be seen that the experimental class using the developed teaching video learning media is higher than the student learning outcomes in the control class without using the teaching video learning media. The results show that with the implementation of teaching video learning media in the learning process, the average score is 91.78, which is higher than the student learning outcomes in the control class and the average score is 86.

Hypothesis testing is carried out to prove the established hypothesis's truth so that information is obtained on whether the hypothesis designed in this study was accepted or not. The results of the assessments submitted by several experts and student trials can be seen in Table 2 below.

<table>
<thead>
<tr>
<th>Category</th>
<th>Score Average (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material validation</td>
<td>82%</td>
<td>Very Appropriate</td>
</tr>
<tr>
<td>Media validation</td>
<td>90%</td>
<td>Very Appropriate</td>
</tr>
<tr>
<td>Individual test</td>
<td>85%</td>
<td>Very Appropriate</td>
</tr>
<tr>
<td>Small Group Test</td>
<td>86%</td>
<td>Very Appropriate</td>
</tr>
<tr>
<td>Field Test</td>
<td>89%</td>
<td>Very Appropriate</td>
</tr>
<tr>
<td>Average</td>
<td>86.4%</td>
<td>Very Appropriate</td>
</tr>
</tbody>
</table>
Based on the table of the results of the feasibility study on the developed teaching video learning media, the percentage of the average overall score of 86.4% is included in the "very feasible" category, which means that the teaching video learning media that has been developed is proven to be suitable for use in the teaching and learning process. Sholeh et al. (2018) in the current era of information technology development, teachers must develop teaching materials that utilize information technology. This application is developed based on video and can be equipped with more attractive displays. To increase teachers' role in developing teaching materials, at SMK Muhammadiyah 2 Muntilan, training has been held to make teaching materials using the Camtasia Studio application. The training results produce teaching materials and are ready to be given to students via flash disk or uploaded to the school's e-learning.

The following Statistics Group is to see how big the difference is in student learning outcomes from posttest scores using teaching video learning media with posttest scores without teaching video learning media. Based on the calculation of the statistical group above, the student's learning outcomes in classes that use learning video learning media get an average value of 91.78 is greater than the class that does not use teaching video learning media obtaining an average value of 77.74. Therefore, it can lock the use of creative and effective product learning video learning media.

5 Conclusions

Based on the formulation, objectives, results, and discussion in the research on the development of teaching video learning media for the subject of creative products and entrepreneurship class XI AP SMK BM Panca Budi 2 Medan, which was stated earlier, it can be concluded as follows: (1) The Camtasia Studio-based learning media product for creative products and entrepreneurship with materials applying marketing promotion media in class XI AP SMK BM Panca Budi 2 Medan meets the requirements and is suitable for use based on expert validation of the material including the feasibility of content, and presentation of media. Teaching video learning for creative products and entrepreneurship subjects obtained an average of 82% on the very feasible criteria and the validation of media experts with aspects of media quality and layout obtained an average of 90% on the very feasible criteria. (2) The use of Camtasia Studio-based teaching video learning media on creative products and entrepreneurship subjects is effective in improving student learning outcomes who are taught using video learning media for creative products and entrepreneurship subjects that are developed higher with an average of 91.78 of student learning outcomes those who were taught without video learning media for creative products and entrepreneurship subjects had an average of 77.74.

References


Development of Mathematics Learning Tools With Problem-Based Learning Models to Increase Connection Ability in Junior High School

David Examen Sihombing, Mangaratua M. Simanjorang, Mulyono

Abstract. (1) to analyze how the validity, practicality, and effectiveness of learning tools developed through problem-based learning algebra models in class VII junior high school 4 Tarutung; (2) to analyze how to increase mathematical connection skills using a device developed through an algebraic material model in class VII junior high school 4 Tarutung; This research is classified as Development Research using the learning development model of Thiagarajan and Semmel. This research aims to: (1) analyze how to increase mathematical connection skills using a device developed through an algebraic material model (Four D Model). The findings of the study indicate that: (1) The learning tools of the Problem Based Learning Model are valid, practical, and effective; (2) Increasing students' mathematical connection abilities by using problem based learning learning models on algebraic material; and (3) Increasing students' interest in mathematics through the use of problem based learning learning models on mathematical material.

Keywords: Development of learning tools, Problem Based Learning, mathematical connection ability,

1 Introduction

Mathematics is one of the subjects that students are exposed to throughout their educational careers, beginning with early childhood education and continuing all the way to university level education. This coverage of the subject spans the entire educational spectrum. Mathematical understanding, in both its applied and its reasoning facets, is an essential component of the efforts that are put out in order to acquire a firm grasp of scientific and technological concepts. Mathematics can be regarded of as either a set of tools or a mindset that assists in connecting information with an issue in order to solve the problem at hand. Because of this, the teaching of mathematics in schools need to act as a vehicle for the growth of students' intelligence, capacities, and skills, as well as for the formation of their personalities. The process of learning mathematics involves thinking because it involves a process of thinking, and because the process of thinking involves humans making associations between pieces of knowledge that The
process of learning mathematics requires students to think, because it is via thinking that the meanings of mathematical concepts are first stored in their heads.

The study of mathematics should fulfill two basic aims: (1) formal goals, which emphasize children's thinking and personal formation, and (2) material goals, which emphasize the application of mathematics and mathematical skills, notably the ability to solve mathematical problems. Math should achieve both purposes. This must be done. This is in line with the National Council of Teachers of Mathematics' educational goals (NCTM, 2000). These goals are: (1) developing the ability to communicate mathematically (also called "mathematical communication"); (2) developing the ability to reason mathematically (also called "mathematical reasoning"); (3) developing the ability to solve mathematical problems (also called "mathematical problem solving"); (4) developing the ability to link ideas mathematically (also called "mathematical connections"); and (5) d. (positive attitudes toward mathematics).

In point of fact, the standard of mathematics education is still quite poor, and it is necessary to improve it in order to make progress; this is an issue that requires attention. In other areas, a sizeable percentage of educators still cling to an antiquated teaching approach known as the transfer of knowledge in the context of modern mathematics education.

This is shown by Indonesian kids' weak math performance compared to other students. Indonesia scored 500 on TIMSS (Trends in International Mathematics Science Study) and PISA (Program for the International Assessment of Students), with a standard deviation of 100. Trends in International Mathematics and Science Study and PISA are acronyms. TIMSS stands for Trends in International Mathematics and Science. Program for International Student Assessment (PISA):.

<table>
<thead>
<tr>
<th>Year</th>
<th>PISA</th>
<th>TIMSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>-</td>
<td>34 from 38 country</td>
</tr>
<tr>
<td>2000</td>
<td>39 from 41 country</td>
<td>-</td>
</tr>
<tr>
<td>2003</td>
<td>38 from 40 country</td>
<td>35 from 46 country</td>
</tr>
<tr>
<td>2006</td>
<td>50 from 57 country</td>
<td>-</td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>36 from 49 country</td>
</tr>
<tr>
<td>2009</td>
<td>61 from 65 country</td>
<td>-</td>
</tr>
<tr>
<td>2011</td>
<td>-</td>
<td>38 from 42 country</td>
</tr>
<tr>
<td>2012</td>
<td>41 from 65 country</td>
<td>-</td>
</tr>
<tr>
<td>2015</td>
<td>69 from 76 country</td>
<td>36 from 49 country</td>
</tr>
</tbody>
</table>

Source: Research and Development Agency of the Ministry of Education and Culture, 2016

The existing poor level of education, as was addressed before, needs to be upgraded so that students can better understand fundamental subjects like mathematics, which are relevant to their everyday lives. A nation that wishes to be able to grasp science and technology properly also has to develop workers who have suitable knowledge of mathematics. This is because such a nation needs to be able to master both science and technology. This is due to the fact that it is necessary for a nation to have a solid grasp on both science and technology. One of the students' mathematical powers is the capacity to make mathematical connections, which is one of the mathematical capabilities that should be carefully promoted among children. The value of this ability cannot be overstated. This is due to the interrelated nature of the mathematical concepts and ideas that are involved in this scenario. Mathematical connections are inspired by the fact that mathematics is not partitioned into a variety of fields; rather, mathematics is a cohesive
subject that is hierarchical in its delivery and understanding. This feature helps explain why mathematical connections are so important. In addition, mathematics is not a separate field from other branches of science, nor does it live in a vacuum in day-to-day life. Both of these statements are true.

Because mathematical connections have the power to make links between other mathematical concepts, it will be much simpler for students to comprehend the relationship that exists between various mathematical concepts. Students will have a more comprehensive and in-depth understanding of mathematics if they have such knowledge. In addition, memorization will result in fewer and fewer mistakes, making the process of acquiring mathematical knowledge simpler and richer in significance. Because there is no mathematical connection between the topics, students have to study and recall an excessive number of distinct mathematical concepts and methods (NCTM 2000:275).

Learning is facilitated by the use of tools like books. According to Akbar (2013:33), a textbook can be defined as a publication that serves as a standard reference in a certain field. In order to be considered successful, the The creation of a good textbook requires taking into account not only how effective it is, but also how valid the information it contains. According to Akbar (2013:34), the following characteristics will be present in a book that is of high quality: (1) high-readability textbooks with appropriate sentence length and structure; (2) student-centered orientation; (3) communicative; (4) complete and systematic; (5) student-centered orientation; (6) side with national and state ideology; and (7) student-centered orientation.

The examination revealed that despite recent changes, the textbooks that are still being used at SMP Negeri 4 Tarutung have a number of faults that need to be corrected. The following are some examples of these deficiencies: (1) There is no concept map that is associated with the subject matter, and (2) the textbooks that are being used only contain ideas like subject-related theorems and formulae. (3) the language used in textbooks to explain concepts was still difficult for students to understand, and (4) textbooks lacked non-routine problems. All of these concerns added to students' confusion. Each difficulty contributed to pupils' inability to grasp the concept. Each worry made students unable to comprehend the material.

Haggarty and Keynes (Muchayat, 2011: 201) explained that to improve mathematics teaching and learning in the classroom, teachers, students, and students must improve their understanding. This was stated in the article. The successful completion of learning goals is in large part dependent on the utilization of various learning instruments. To begin with the phenomenon that was addressed earlier, the substantial position that learning tools currently occupy can be seen as a result of this. the many different objects that are utilized for the purposes of education, as well as the interactions that take place between those things In order for the learning objectives to achieve good targets and because it is necessary to select appropriate learning methods and strategies, it is necessary to develop learning tools that are also in accordance with the learning methods and strategies that are being used. This is necessary because it is necessary to develop learning tools that are also in line with the learning objectives, methods and strategies that are being used. Creating learning tools that are not only compatible but also in line with the learning methods and strategies that are currently being implemented It is essential to develop learning tools that are also in line with the learning objectives, methods and strategies that are being used It In addition to this, the development of educational tools is essential.
According to Trianto (2011), the problem-based learning paradigm requires students to work together in small groups with one another to find solutions to challenges that have been predetermined by both the students and the professors. This type of learning requires students to take more responsibility for their education. When the instructor puts into practice the learning paradigm, it's not uncommon for students to employ a wide range of different talents. In the instructional strategy known as problem-based learning, students are initially presented with various mathematical problems to work through. This is the beginning of the connection that may be made between problem-based learning and mathematical concepts. In order to attempt to find answers to issues that involve a variety of mathematical concepts, it is expected of students that they will use all of their abilities and knowledge. As part of problem-based learning, students take part in an investigation of their own choosing. This offers them the opportunity to interpret and explain a phenomena or problem while also improving their grasp of the subject matter. As a consequence of this, students are instructed at a level that is suitable for their aptitudes, which leads to a conditioned and controlled dynamic in which the interaction between teachers and students, as well as between students themselves, takes place. This is true both within the classroom and outside of it.

2 Method

This investigation has been categorized as Development Research based on the learning device development model proposed by Thiagarajan, Semmel, and Semmel, which is more commonly referred to as the 4-D model. Students who are currently enrolled in class VII at SMP Negeri 4 Tarutung, more specifically grades VII-A and VII-B for the 2021/2022 school year, were eligible to participate in this study and were chosen for participation based on a random selection process. The goal of this study was to design a teaching resource based on the Problem-Based Learning model, and it was successful in achieving that goal with the goal of improving students' algebraic knowledge and mathematical connection skills.

2.1 Data analysis

In order to determine the reliability of the educational resources, descriptive statistical analysis was performed, and the results were compared to the perspectives of five mathematical education specialists. On the basis of the judgment of the specialists, the value that each facet will have on average will be established, and then the average value of the entire set of features will be calculated.

When there is a high degree of congruence between the score on an item and the overall score, we say that the item has a high validity. This alignment may be examined using correlation, therefore in order to establish the item's reliability, the following formula for product moment correlation should be used can be utilized.

\[ r_{xy} = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}} \]  

(Arikunto, 2013: 89)

Even when the measurement is repeated on the same subject, the reliability of the testing instrument is evaluated to see whether or not the results obtained are consistent with one another. For the purpose of determining the degree to which each item on the examination may be relied upon, a formula known as
the Alpha-Cronbach formula is utilized. This formula is designed to mimic the format of an essay test (Arikunto, 2013).

Two observers who had been given the appropriate instruction in order for them to be able to appropriately operate the observation sheet on the implementation of the learning device watched the process of the learning device being put into action. The instruction had been given in order to ensure that the two observers could appropriately operate the observation sheet. The instruction had been provided in order to guarantee that both of the observers were capable of operating the observation sheet in the suitable manner. Carry out the procedures described on the sheet of observations regarding the operation of the educational tool. The implementation is presented in the form of two distinct choices, which are indicated by the words "yes" and "no" for each of the two options, respectively. In the case that you give an affirmative response to the enquiry, the following options will become open to you: The following choices are suitable in this situation: These options are as follows: (1) highly appropriate, (2) appropriate, (3) somewhat appropriate, (4) not appropriate, and (5) none of these alternatives are appropriate. The following options are appropriate: (1) highly suitable, (2) suitable, (3) somewhat suitable, (4) not suitable, and (5) none of these choices are appropriate: (1) very suitable, (2) suitable, (3) somewhat suitable, (4) not suitable, and (5) none of these options are suitable: (1) highly suitable; (2) suitable; (3) somewhat suitable; (4) not suitable; and (5) none of these options are suitable (5:very inappropriate).

The degree of mastery that can be achieved by students who participate in more conventional types of education is utilized as a measure for determining how effective educational materials are in terms of their capabilities to connect mathematical ideas. Analyzing The results of the posttests that the students took at the end of each class to evaluate their mathematical connection abilities allowed for the calculation of the percentage of students who were able to determine mathematical connections and comprehend the concept. This was done by taking the data that was acquired and conducting the analysis on it. If a student gives the proper response to the comprehension question, then the student is considered to have understood the topic.

2.2 Data Collection Instruments and Techniques

The validity of the necessary learning materials and instruments was evaluated using each of the validation sheets that were included in this study. The PBM model necessitated the adaptation and modification of each of these validation sheets in order to meet its requirements. The validation sheet for the learning device is the tool that is utilized to collect information regarding the level of quality that the educational tool possesses as determined by the perspectives of a number of specialists in the relevant field. sheets of validation for the Learning Plans for implementation, worksheets for students, textbooks for students, and textbooks for teachers, in that order respectively.

**Mathematical Connection Ability Test Instrument**

The student's validation sheet for the mathematical connection ability test is divided into three sections: instructions, assessed aspects, and assessment conclusions. The sequence in which these sections are listed can be found up top. Examining a student's capacity for mathematical connection was approached from the perspective of three (three) different components, which are as follows: (1) the content; (2) the structure; and (3) the drafting of questions or assertions. It is possible to establish validity for the conclusions that were acquired from the assessment of the pupils' capability of making mathematical connections tests that were devised. Table 2 contains the instrument grid as well as the scores obtained from the mathematical connection ability test:
Table 2. Grid of mathematical connection ability test

<table>
<thead>
<tr>
<th>No</th>
<th>Indicator</th>
<th>Question Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understand the connection of mathematical concepts with other mathematical concepts</td>
<td>1,2,3,4,5</td>
</tr>
<tr>
<td>2</td>
<td>Using mathematics in other fields of science</td>
<td>1,2,3,4,5</td>
</tr>
<tr>
<td>3</td>
<td>Using mathematics in daily life</td>
<td>1,2,3,4,5</td>
</tr>
<tr>
<td>4</td>
<td>Seeing mathematics as an integrated part</td>
<td>1,2,3,4,5</td>
</tr>
</tbody>
</table>

3 Results

3.1 Description of Learning Device Development Stage

According to the findings of It is evident, based on observations made at SMP Negeri 4 Tarutung as well as an analysis of learning tools that were carried out there, that teachers do not have access to adequate learning tools, and those tools are only occasionally utilized in the process of education. The existing plan for the application of learning does not involve any adjustments in the strategy that will be utilized to implement the learning.

**Design Stage**

Two observers who had been given the appropriate instruction in order for them to be able to appropriately witness the process of the learning device being put into action while you operate the observation sheet on the procedure. operate the observation sheet pertaining to the implementation of the learning device The implementation comes in the form of two different possibilities, each of which is denoted by the word “yes” or “no” correspondingly. If you respond "yes" to the question, you will be given the following options to choose from: (1) very suitable, (2) suitable, (3) somewhat suitable, (4) not suitable, and (5) none of these options are suitable. If you answer "no" to the question, you will not be given any of these options. (1) extremely suitable; (2) suitable; (3) somewhat suitable; (4) not suitable; and (5) none of these options are acceptable (5:very inappropriate).

The degree of mastery that can be acquired by students who participate in more conventional methods of education is utilized as a measure for measuring how effective educational materials are in terms of their skills to link mathematical ideas. Analyzing the posttest results of the students' mathematical connection abilities at the end of each class allowed for the calculation of the proportion of students who were able to determine mathematical connections. Examining a candidate's ability to make mathematical connections using algebraic content and student disposition surveys are the two components that make up the test in question. Your capability to establish mathematical connections will be evaluated using a set of five questions that are in the form of descriptions. A total of one hundred and twenty minutes has been allotted for the completion of the examination.

There were a total of 32 statements in the questionnaire that the students were asked to fill out describing their mathematical disposition. These statements were designed to serve as indicators of independent learning. There were a total of 32 items, and five of those items discussed having interest and curiosity, five of those items discussed having self-confidence, seven of those items discussed being diligent and persistent, eleven of those items discussed having self-confidence, and nine of those items discussed evaluating the application of mathematics.

**Development Stage**
a) Expert Validation Results

The experts then validate the Preliminary Draft that was produced as a result. Validation by specialists was carried out across the board for all of the constructed implements. The resources that are provided to students include Lesson plans, LKPD, teacher books, and student books. Validation results, which are presented as alterations and recommendations, serve as the foundation upon which the learning device's development is based. The improved teaching tool that was created as a result of the validators' feedback is known as Draft-I.

b) Trial Results I

The validity of each pre-test and post-test item is evaluated using the formula for product moment correlation, and the findings are presented in the following format provided in Table 3 and Table 4 in the following format:

Table 3. Validity of Pre-test Items

<table>
<thead>
<tr>
<th>No</th>
<th>$r_{xy}$</th>
<th>$t_{count}$</th>
<th>$t_{table}$</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.99</td>
<td>23.7</td>
<td>2.08</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.99</td>
<td>15.9</td>
<td>2.08</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.99</td>
<td>29.8</td>
<td>2.08</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>0.98</td>
<td>22.2</td>
<td>2.08</td>
<td>Valid</td>
</tr>
<tr>
<td>5</td>
<td>0.97</td>
<td>14.3</td>
<td>2.08</td>
<td>Valid</td>
</tr>
</tbody>
</table>

According to the data in the table that can be found above, all of the possible interpretations of the pre-test and post-test items fall into the category of having a high degree of validity. In light of the fact that the calculations for both the pre-test and the post-test were carried out manually and with the assistance of excel, it has been determined that each and every one of the items in question is appropriate for deployment.

Educators with years of experience working in the field of mathematics studies served as observers and monitored the process of putting into action all of the learning materials that were utilized in the research. Table 5, which can be found below, contains a recapitulation of the observations that were made in relation to the application of learning:

Table 5. Recapitulation of Observation Results on the Implementation of Learning Devices in Trial I

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspects Observed and Assessed</th>
<th>Meeting</th>
<th>Average</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>I. The Learning Implementation Plan is going to be put into action.</td>
<td>I</td>
<td>3,50</td>
<td>4,00</td>
</tr>
</tbody>
</table>
Table 5 shows that the average application of the learning tools produced during Trial I was 70% at the first meeting, 82% at the second, 90% at the third, and 92% at the fourth. First, second, third, and fourth meetings had these percentages. Four meetings yielded these results. The four sessions implemented 84% of the total number of learning tools.

Table 6 presents the results of the first test, which tested students’ ability to make mathematical relationships.

<table>
<thead>
<tr>
<th>Information</th>
<th>Pretest Mathematical Connection Ability</th>
<th>Posttest Mathematical Connection Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>The highest score</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>Lowest Value</td>
<td>45</td>
<td>60</td>
</tr>
<tr>
<td>Average</td>
<td>62.25</td>
<td>77.75</td>
</tr>
</tbody>
</table>

According to the findings of the students’ pre-tests, which are presented in Table 6, it can be seen that their post-test abilities resulted in an average mathematical connection ability of 77.75. In addition, the outcomes of pupils' classical mastery of their mathematical connection abilities on their very first attempt are presented in Table 7. below:

Table 7. Classical Completeness Level of Students' Mathematical Connection Ability in Trial I

<table>
<thead>
<tr>
<th>Category</th>
<th>Pretest</th>
<th>Classical Completeness Percentage</th>
<th>Posttest</th>
<th>Classical Completeness Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>4</td>
<td>20%</td>
<td>14</td>
<td>70%</td>
</tr>
<tr>
<td>Not Complete</td>
<td>16</td>
<td>80%</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>Amount</td>
<td>20</td>
<td>100%</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

According the light of the facts presented in Table 7: It is evident that the students' mathematical connection abilities in the pre-test trial only possessed a classical completeness of 20 percent, but that this percentage increased to 70 percent in the post-test trial. As a result, one may arrive at the conclusion that the application of the problem-based learning model learning device that was generated did not match the requirements conditions necessary to achieve classical completeness in Trial I.

a) Result Trial II

The following table, number 8, provides a recapitulation of the observations that were made in relation to the application of learning

Table 8. Recapitulation of Observations on the Implementation of Learning Devices in Trial II

<table>
<thead>
<tr>
<th>No.</th>
<th>Meeting</th>
<th>Average</th>
<th>%</th>
</tr>
</thead>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Worksheets for the Students’ Use as an Implementation</td>
<td>3.50</td>
<td>4.50</td>
</tr>
<tr>
<td>3</td>
<td>The Administration of the Instructor's Manual</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>The actualization of the Student Handbook</td>
<td>3.50</td>
<td>4.00</td>
</tr>
<tr>
<td>Average Execution</td>
<td>3.50</td>
<td>4.12</td>
<td>4.50</td>
</tr>
<tr>
<td>Percentage of Execution</td>
<td>70%</td>
<td>82%</td>
<td>90%</td>
</tr>
</tbody>
</table>
Table 8 shows that the average implementation of the learning tools developed during Trial I was 80% at the first meeting, 85% at the second, 90% at the third, and 95% at the fourth. First, second, third, and fourth meetings had these numbers. First, second, third, and fourth meetings had these results. In addition to this, the total amount of learning tools that were implemented as a result of the four sessions had an average value of 87 percent.

Table 9, provided below, provides a detailed explanation of the findings of the students' mathematical connection abilities with regard to the second test.

**Table 9. Description of Students' Mathematical Connection Ability Results in Trial II**

<table>
<thead>
<tr>
<th>Information</th>
<th>Pretest Mathematical Connection Ability</th>
<th>Posttest Mathematical Connection Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>The highest score</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Lowest Value</td>
<td>50</td>
<td>65</td>
</tr>
<tr>
<td>Average</td>
<td>63.5</td>
<td>82.25</td>
</tr>
</tbody>
</table>

According to the data in Table 9, which compares the students' performance on the pre- and post-tests, the students' average mathematical connection ability increased from 63.5 to 82.25 points.

In addition, Table 10 presents the results of the second trial of students' mathematical connection abilities, which can be considered as an indication of their level of classical mastery:

**Table 10. Classical Completeness Level of Students' Mathematical Connection Ability in Trial II**

<table>
<thead>
<tr>
<th>Category</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total students</td>
<td>Classical Completeness Percentage</td>
</tr>
<tr>
<td>Complete</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Not Complete</td>
<td>15</td>
<td>75%</td>
</tr>
<tr>
<td>Amount</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 10 demonstrates that students' levels of classical mastery of their mathematical connection abilities during the pretest trial II were only 25%, but during the posttest trial II, those levels increased to 90%. It is required that at least 85 percent of students who take the test on their ability to make mathematical connections receive a score of 75 or higher in order to fulfill the learning outcomes for classical pupils. The results of the posttest for the students' mathematical connecting abilities met the traditional standards for mastery because they got at least 90 percent correct. In the second test, the problem-based learning model's learning tools were successful in meeting the requirements for classically achieving acknowledged mastery levels.
3.2 Improving Students' Mathematical Connection Ability

The research that compared the results of improving students' connection abilities in trials I and II found that the average connection ability in the first trial's posttest results was 77.75, but it increased to 82.25 in the second trial. This was the finding of the research that compared the results of improving students' connection abilities in trials I and II. This was found out by comparing the posttest results of the two separate trials and looking for differences. These results are based on research that investigated the effect of teaching students connection skills in trials I and II on improving their performance could help them perform better overall. As a direct consequence of this, the kids' capacity to link increased by 4.5.

The utilization of educational technologies for problem-solving should result in increased connectedness. Mathematical connections can be improved through the application of a method known as "problem-based learning" since it helps students locate the problems and concepts. The duty of the teacher is to provide pupils with guidance and encourage them to think independently so that they might discover universal concepts. The instructor's questions and level of guidance depend on the students' present understanding and the topic being covered.

This is consistent with Rohaly and Abadi's (2019) research, which revealed that problem-based learning improves students' mathematical connecting ability. Researchers confirmed this. Problem-based learning increases mathematical connections, as can be seen.

4 Conclusion

Validation of learning media created with macromedia flash was deemed "valid" by the people who validated it. Learning media built with Macromedia Flash were able to meet the standards for practicability in terms of analyzing the application of learning. The initial experiment's learning implementation findings were "Implemented Less Well" and did not meet study standards. Despite this, the second trial of observing learning implementation was "Well Implemented."

Due to pre-trial adjustments. The created products meet the criterion for usefulness of learning media. The learning medium that makes use of Macromedia Flash has demonstrated that it satisfies the specified efficacy requirements in terms of the students' capacity for visual thinking, the ideal amount of time required to finish activities, and the typical responses given by students. The ability of the students to think visually was the basis for these criteria. utilizing educational tools that are supported by Macromedia Flash to improve students' visual thinking, as shown by the normalized gain index. First, "low" criteria increased value, then "mid" criteria increased value. Both results supported the idea.

References


Development of Teaching Style Animation Video Tutorials for Middle School PJOK Teachers in Humbang Hasundutan Regency in 2021

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Abstract. This study aims to produce an animated video tutorial development of teaching style for PJOK junior high school teachers in Humbang Hasundutan district. This research was conducted on teachers of the PJOK junior high school Humbang Hasundutan district from December 2021 to March 2022. The type of research used is development research with Research & Development (R&D) research design from Borg and Gall. The sampling technique used purposive sampling with a Phase I trial of 10 PJOK teachers and a Phase II trial of 20 PJOK teachers. Furthermore, from the Phase I trial, it showed a figure of 81.4% with the Very Eligible, then from the Phase II trial, it showed a figure of 94% in the Very Eligible. The development of animated video tutorials for teaching styles for PJOK junior high school teachers in Humbang Hasundutan district was declared feasible to be developed as teaching materials.

Keywords: Video Tutorial, Animation, Teaching Style

1 Introduction

Humans are created by various cultures in this world. Humans are perfect because they are physical and mental bodies that can regulate their effectiveness in this world. The normal human system will develop when people experience a process of development and mental health through a process that is directed at achieving various positive experiences, through one education. In the nuances of education, the person is the subject of education as a subject of education, then education will help people develop self-esteem and human abilities into a product of developing a person into a fully functioning person. An understanding of education about human potential and nature is very important for the ability of education to achieve its goals in human reasoning. Leaders must learn how to achieve those goals by establishing and implementing educational concepts. The main problem with education is how to develop all the abilities that people have from birth to development, so that people can play with each other and individually through personal experience. On the other hand, physical education has an important role in the implementation of national education and in which physical education is education that uses physical activities designed to improve the physical fitness of students, from
motor, social and knowledge skills. According to Wawan S. Suherman (2004:22-23), physical education is education that uses physical activities designed systematically to improve physical fitness, motor skills, emotional intelligence and a healthy lifestyle. Physical education is not only aimed at training aspects of physical and psychomotor fitness, but the main target of physical education is also affective and cognitive aspects.

Physical education is carried out from elementary school, junior high school to high school. Physical education learning material is a continuation of the previous physical education learning material, so there needs to be an innovation in learning. In other cases, there are many physical and psychological changes experienced by adolescence. The delivery of learning at different levels really needs to be considered in implementation. This is because each age has a different potential development at each level in students starting to be seen so that teachers must be able to develop and maintain it. The implementation of education cannot be separated from the role of the teacher as a source of learning. So educators must have academic qualifications and competencies as learning resources. One of the competencies that every educator must have is pedagogic competence. Teaching style is one example in the application of pedagogical competence. The delivery of learning can be accepted by students if the teacher uses the right learning style in the learning process. As we know, there are several teaching styles, according to Agus SS (2001) Mosston's teaching styles commonly used by health sports physical education teachers, including: command teaching style, exercise teaching style, reciprocal teaching style, inclusive teaching style, guided discovery teaching styles, convergent teaching styles, divergent teaching styles, individual teaching styles, and these teaching styles are learner-motivated and independent teaching styles. The use of teaching styles aims to give students a role in learning that is useful for developing potential in students and can launch a learning process if school facilities and infrastructure are limited. There is no right or best teaching style. All teaching styles can be said to be good if the teacher can use these styles according to the existing circumstances.

As we know, the rapid development of technology today makes people always want to do creativity in order to spur new innovations which can be applied and can be used effectively and efficiently. The development of this technology has become a necessity that cannot be separated from human life so that it stimulates the human mindset to be creative in technological developments, especially the development of teaching style animation video tutorials. This is what underlies that the next generation has creative and innovative ideas for developing science and technology, so that the generation that will be able to continue the development of Science and Technology (IPTEK) will continue from generation to generation. The next generation. However, in the current reality where information technology is developing so fast and the existing facilities and infrastructure in schools has increased, it has not been effectively implemented.

Furthermore, to strengthen the assumption, the researcher made observations in the form of observations and interviews conducted by researchers in several junior high schools in Humbang Hasundutan Regency. Furthermore, after conducting observations and interviews, the researchers distributed a needs analysis to 10 junior high school teachers in Humbang Hasundutan Regency and obtained the following data: 10 teachers (100%) said there were some obstacles in the learning process, 10 teachers (100%) did not understand all teaching styles in the learning process, 3 teachers (30%) said “yes”, 7 teachers (70%) said “no” about mastering technology in supporting the learning process, 2 teachers (20%) said “yes”, 8 teachers (80%).
The needs analysis above makes it clear that many teachers are still not optimal in implementing teaching styles in the PJOK learning process and also states the need or need for animated teaching style tutorial videos to support the application of teaching styles in the learning process. Based on the background of the problem described above, teachers need a media that is expected to help and provide insight into the development of knowledge about teaching styles in the PJOK learning process, so that later it can be applied to students. Because of the importance of using the right teaching style in a learning process, the development of Mosston's animated teaching style video tutorials can support and assist teachers in learning PJOK SMP in Humbang Hasundutan Regency. Based on these conditions, the researcher intends to conduct research with the title "Development of Mosston Teaching Style Animation Video Tutorials for PJOK Teachers at SMP Humbang Hasundutan Regency in 2021"

2 Research methodology

The development used in a study must be based on the problems raised. Furthermore, the variables raised in the background of the problem will require a development and method to solve it, even though the research problem is the same but sometimes a researcher can choose one or more types of research development that can be used to solve the problem. In addition, a development also depends on the objectives and limitations of the research in the form of time and research costs. The method used in this research is development research. According to Winarno (2011: 76), development research is research that seeks to develop certain products by perfecting old products or creating new products. The development of certain products is tailored to the needs in the implementation of learning, especially in learning physical education, sports, and health. Meanwhile, according to Sugiono (2011:297) research and development methods are research methods used to produce certain products, and to test the effectiveness of these products, whether or not the product is the result of a development will be known when the product is experimented on research subjects. There is also research and development according to Sukmadinata (2011:164) is "a process or steps to develop a new product or improve an existing product that can be accounted for." Budi Wanto (2006:9) also explains in his book that development research is "a research design that is oriented towards developing or producing products." All research and development is always oriented towards developing a particular product. The steps for the development method are as follows:

![Figure 1. Schematic of Research and Development](image-url)
Steps The next step is to make an initial product in the form of a series of video tutorial developments for teaching style animation to teachers which can later be used as a guide or reference in learning especially by teachers. PJOK SMP in Humbang Hasundutan Regency. The initial product was poured in the form of an animation-based teaching style video tutorial. The development of this product is expected to be a product that can be developed systematically and logically, so that this product has appropriate effectiveness and efficiency for use.

3 Description of research results

The rapid development of technology today makes people always want to do creativity in order to spur new innovations which can be applied and can be used effectively and efficiently. The development of this technology has become a necessity that cannot be separated from human life so that it stimulates the human mindset to be creative in technological developments, especially the development of Mosston teaching style animation video tutorials. This is what underlies that the next generation has creative and innovative ideas for developing science and technology, so that the generation that will be able to continue the development of Science and Technology (IPTEK) will continue from generation to generation. the next generation. However, in the current reality where information technology is developing so fast and the existing facilities and infrastructure in schools has increased, it has not been effectively implemented.

The teacher is the spearhead of learning when at school the knowledge transfer process provided will make students enthusiastic in carrying out the learning process. Teachers need a media that is expected to help and provide insight into the development of knowledge about teaching styles in the PJOK learning process, so that later it can be applied to students. Because of the importance of using the right teaching style in a learning process, the development of Mosston's animated teaching style video tutorials can support and assist teachers in learning PJOK SMP in Humbang Hasundutan Regency.

3.1. Information Gathering

Researchers made observations in the form of observations and interviews conducted by researchers in several junior high schools in Humbang Hasundutan Regency. Furthermore, after conducting observations and interviews, the researchers distributed a needs analysis to 10 junior high school teachers in Humbang Hasundutan Regency and obtained the following data: 10 teachers (100%) said there were some obstacles in the learning process, 10 teachers (100%) did not understand all teaching styles in the learning process, 3 teachers (30%) said “yes”, 7 teachers (70%) said “no” about mastering technology in supporting the learning process, 2 teachers (20%) said “yes”, 8 teachers (80%). The needs analysis above makes it clear that many teachers are still not optimal in applying teaching styles in the PJOK learning process and also states the need or need for animated teaching style tutorial videos to support the application of teaching styles in the learning process.
3.2. Designing Mosston Teaching Style Animation Video Tutorials for Middle School PJOK Teachers

Determine what form of development will be an object of research against the background of the problem and design a development product that has been determined, according to the needs of the research object. The results of the information from the problems that exist in the field can be concluded that the researcher designed the product design according to the potential and the problem. The initial product of this research is a teaching style reading book, then the design product that will be developed is in the form of an animated video tutorial about the teaching style adopted from Mosston in the form of an application and in the application there are sections and subsections of teaching styles, there are descriptions, anatomy described through animated video tutorials of each type of teaching style. Researchers with the help of IT experts designed the animated video in such a way as to describe the factual learning process of PJOK by applying the chosen teaching style in each sub-section, so as to be able to explain the roles and involvement of students and teachers as well as the differences between teaching styles at each stage. Starting from the problem to be studied, the specific purpose of this research is to produce a video animation development product for the application of Mosston's teaching style to PJOK teachers which makes it easy for teachers to learn about teaching styles which can later be applied to students seeing this product as well. can be in the form of application services in a smartphone that becomes a source of instant service knowledge about teaching styles. It is also possible to become a source of additional knowledge for teachers of other subjects, especially in Humbang Hasundutan Regency.

Furthermore, in making media developed by researchers, product consultations are carried out with experts, especially in physical education learning experts along with media / IT experts so that they can produce perfect products. The product for developing a teaching style based on animated video tutorials for PJOK teachers is an animation-based teaching style video tutorial which is included in a video that contains various types of teaching styles for PJOK teachers in Humbang Hasundutan Regency. Teaching based on animated video tutorials to PJOK teachers starts from an initial concept that is developed systematically and according to needs, so that the development of animated video tutorials is expected to have effectiveness and efficiency and become suitable for use by PJOK teachers, especially in Humbang Hasundutan Regency. The instrument design that will be developed is as shown in the following image:

![Figure 2. Teaching Style Video Tutorial Application](image-url)
3.3. Product

Trial Phase I Phase I trials were conducted on 10 junior high school teachers in Humbang Hasundutan district. This aims to provide input and assessment of the results of trials conducted on samples to see the level of usefulness of the Mosston teaching style tutorial video animation for PJOK junior high school teachers and their effectiveness. Mosston's teaching style animation video tutorial for junior high school PJOK teachers, so that it meets the theoretically and empirically feasible criteria. The data obtained is then used as a basis in an effort to make revisions at a later stage. The results obtained in the field after conducting the Phase I trial were the work of the Mosston teaching style tutorial video animation for the SMP PJOK teachers that was used to work quite well and could be used as a reference for SMP PJOK teachers in applying the Mosston teaching style in PJOK learning so that it was more interesting.

From the results of trials conducted by researchers on 10 junior high school teachers in Humbang Hasundutan district, it can be seen that they have been classified in the form of a questionnaire questionnaire, by grouping them into 3 aspects, namely, video animation tutorials, media aspects for teachers in applying teaching styles, results of using video animation tutorials, so that there are a total of 14 questions, the results of the teacher's answers are grouped into 5 categories, namely SS (Strongly Agree), S (Agree), SD (Medium), TS (Disagree), STS (Strongly Disagree) with an assessment of 5,4,3,2,1. The results of the first phase of the teacher's trial are outlined through the presentation formula for the maximum number of answers/scores x 100% with the following results. From 10 samples of small group trials with a total score of 570 divided by a maximum score of 700 x 100% resulting in a presentation of 81.4% with Very Eligible criteria. At the time of the Phase I trial, the researchers found findings in the field on the Mosston teaching style animation tutorial video for Middle School PJOK teachers which the researchers put into Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The sample looked confused at first when the researcher explained about the product developed by the researcher</td>
</tr>
<tr>
<td>2</td>
<td>The sample is still unable to run the Mosston teaching style animation video application</td>
</tr>
<tr>
<td>3</td>
<td>The sample has not been able to download the Mosston teaching style animation video application</td>
</tr>
<tr>
<td>4</td>
<td>The sample suggests that the teaching style be made with an example</td>
</tr>
<tr>
<td>5</td>
<td>The sample suggests adding an example Mosston teaching style</td>
</tr>
</tbody>
</table>

3.4. Results of the Phase II

The Phase II trial was conducted on 20 junior high school teachers in Humbang Hasundutan Regency. This aims to provide input and assessment of the results of the trials conducted on the sample to see the level of usefulness of the Mosston teaching style tutorial video animation for Middle School PJOK teachers and their effectiveness. Mosston's teaching style animation video tutorial for middle school primary school teachers, so that it meets the criteria for being theoretically and empirically feasible, so that it meets the criteria for being feasible theoretically and empirically. The data obtained is then used as a basis for efforts to improve the final product of the Mosston teaching style animation tutorial video for Middle School PJOK teachers. The results that can be obtained in the field after conducting the Phase II trial are animated videos of Mosston teaching style tutorials for Middle School Primary School teachers whether it is
feasible to use and meet the criteria referred to in the Mosston teaching style tutorial animation videos for Middle School Primary School teachers. From the results of the trials carried out, it can be seen and classified in the form of a questionnaire questionnaire, by grouping into 3 aspects, namely, animated video tutorials, media aspects for teachers in implementing teaching styles, the results of using animated tutorial videos so that a total of 14 questions are answered, the results of the teacher's answers grouped into 5 categories, namely SS (Strongly Agree), S (Agree), SD (Medium), TS (Disagree), STS (Strongly Disagree) with an assessment of 5,4,3,2,1. The results of the first phase of the teacher's trial are outlined through the presentation formula for the maximum number of answers/scores x 100% with the following results. Of the 20 samples of the Phase II trial with a total score of 1,316 divided by a maximum score of 1,400 x 100% resulting in a presentation of 94.0% with Very Eligible criteria.

4 Discussion results

Physical education is an educational process that utilizes physical activity to produce holistic changes in individual qualities, both physically, mentally and emotionally. Physical education places great emphasis on aspects of comprehensive education in terms of health, physical fitness, critical thinking skills, emotional stability, social skills, reasoning and moral action. Dini Rosdiani (2015:1) explains that "Physical education is an educational process through providing learning experiences to students in the form of physical activities, playing and exercising that are systematically planned to stimulate growth and physical development, skills, motor, thinking skills, emotional, social, and morals, the provision of learning experiences is directed at fostering, as well as forming a healthy and active lifestyle throughout life.

Darminto (2017:2) also explains that physical education, sports and health are education systems that prioritize physical, physical, game and sports activities that are used as media to achieve comprehensive development of individuals. A similar explanation was also put forward by Andriyanto (2016: 4) that sports and health physical education implies learning that puts forward physical activity as a medium in achieving a learning goal. From this explanation, it can be concluded that physical education is an integral part of an overall education that contributes to the growth and development of each student. In physical education learning, pencak silat material is an important material that must be applied to students. The teaching style applied by Musca Moston is a teaching style that is often used in teaching physical education in schools, especially junior high schools (SMP). The teaching style must be taught in various ways according to the needs of students, the teacher must also be able to develop a teaching style in teaching it to students, this makes the teacher have to think about concrete ways in teaching the learning. One way that is fairly new in teaching this teaching style is by using animated videos in these learning applications, because teachers must be able to prepare animated videos by using technology in learning so that learning does not seem monotonous, especially in this digital era, it is appropriate. The teacher is able to design a teaching style that attracts students in doing learning so that the objectives of the learning run well.

The use of teaching styles aims to give students a role in learning that is useful for developing potential in students and can launch a learning process if school facilities and infrastructure are limited. There is no right or best teaching style. All teaching styles can be said to be good if the teacher can use these styles according to the existing circumstances. The need for a new touch in teaching teaching styles by teachers to students requires teachers to be more creative, this is supported by the results of the needs analysis for Middle School PJOK teachers in Humbang
Hasundutan Regency that PJOK teachers feel they are not optimal in implementing teaching styles in PJOK learning. Therefore, the research that the researchers did by developing an animated video tutorial on the Muska Mosston teaching style that the researchers made more interesting by using media as teaching materials got high enthusiasm from the PJOK teachers in Humbang Hasundutan district, so that it would motivate teachers in making learning media and teaching styles that suit student needs. This is supported by data from the results of the first stage of the trial and the second stage of the trial where at the time of the first stage of the trial it was conducted on 15 junior high school teachers in Humbang Hasundutan district. The level of usefulness of the Mosston teaching style tutorial video animation for Middle School Primary School teachers and the effectiveness of the Mosston teaching style tutorial animation video for Middle School Primary School teachers, so that it meets the theoretically and empirically feasible criteria. The data obtained is then used as a basis in an effort to make revisions at a later stage. The results obtained in the field after conducting the Phase I trial were the work of the Mosston teaching style tutorial video animation for the SMP PJOK teachers that was used to work quite well and could be used as a reference for SMP PJOK teachers in applying the Mosston teaching style in PJOK learning so that it was more interesting.

From the results of trials conducted by researchers on 10 junior high school teachers in Humbang Hasundutan district, it can be seen that they have been classified in the form of a questionnaire questionnaire, by grouping them into 3 aspects, namely, video animation tutorials, media aspects for teachers in applying teaching styles, and the results of using video animation tutorials, so that there are a total of 14 questions, the teacher's answers are grouped into 5 categories, namely SS (Strongly Agree), S (Agree), SD (Medium), TS (Disagree), STS (Strongly Disagree) with an assessment of 5,4,3,2,1. As for the results of the first phase of the trial, it is stated through the formula for the presentation of the maximum number of answers/scores x 100% with the following results. Of the 10 small group trial samples with a total score of 570 divided by a maximum score of 700 x 100%, it resulted in a presentation of 81.4% with Very Eligible criteria. While the second phase of the trial was conducted on 20 junior high school teachers in the Humbang Hasundutan district, this aimed to provide input and an assessment of the results of the trials carried out on the sample to see the level of usefulness of the Mosston teaching style tutorial video animation for Middle School PJOK teachers and the effectiveness of the animated tutorial video. Mosston's teaching style to PJOK junior high school teachers, so that it meets the criteria for being feasible theoretically and empirically, so that it meets the criteria for being feasible theoretically and empirically. The data obtained is then used as a basis for efforts to improve the final product of the Mosston teaching style animation tutorial video for Middle School PJOK teachers. The results that can be obtained in the field after conducting the Phase II trial are animated videos of Mosston teaching style tutorials for Middle School Primary School teachers whether it is feasible to use and meet the criteria referred to in the Mosston teaching style tutorial animation videos for Middle School Primary School teachers. From the results of the trials carried out, it can be seen and classified in the form of a questionnaire, by grouping into 3 aspects, namely, video animation tutorials, media aspects for teachers in applying teaching styles, and the results of using video animation tutorial so that a total of 14 questions are answered, the teachers' answers are grouped into 5 categories, namely SS (Strongly Agree), S (Agree), SD (Medium), TS (Disagree), STS (Strongly Disagree) with an assessment of 5,4,3,2,1. As for the results of the second phase of the trial, it is stated through the formula for the presentation of the maximum number of answers/scores x 100% with the following results. Of the 20 samples of Phase II trials with a total score of 1.316 divided by a maximum score of 1.400 x 100% resulting in a presentation of 94% with Very Eligible criteria.
5 Conclusion

Based on the results of the development research carried out, based on the data obtained from the results of small group trials and large field trials as well as discussion of research results, it can be concluded that the feasibility of an animated video tutorial on the application of Mosston's teaching style to PJOK teachers is declared "appropriate" and can be "used." for PJOK teachers in using the Muska Mosston teaching style.

References


Feasibility of Indonesian Poetry Study Module Based on Genetic Structuralism Theory in Indonesian Language and Literature Study Program, Universitas Muhammadiyah Sumatera Utara

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Abstract. This study aims to explain the feasibility of the Indonesian Poetry Study learning module based on the theory of genetic structuralism at the Indonesian Language and Literature Study Program, Universitas Muhammadiyah Sumatera Utara. The data collection technique used a module feasibility data analysis (descriptive data analysis). The results showed that the results of material validation included content feasibility with an average of 90.31%, presentation feasibility with an average of 93.75, and linguistic aspect assessment with an average of 93.40%, all three with very good criteria. Product trials were carried out in three stages, namely individual trials, small group trials, and limited field trials. The three trials with good criteria. Thus, the Indonesian poetry learning module based on the theory of genetic structuralism at the Indonesian Language and Literature Study Program, Universitas Muhammadiyah Sumatera Utara was declared suitable for use in the learning process.

Keywords: Feasibility, module, Indonesian poetry study, genetic structuralism.

1 Introduction

Teaching materials are one of the important components in the world of education, because teaching materials are things that support the learning process. At the university level, the selection and development of teaching materials is a demand for lecturers in their professional activities. A lecturer must be able to investigate and understand the needs of his students. From these results can be found a number of information about various kinds of student needs to be developed optimally in learning.

Learning activities can be successful and run well if a lecturer is right in choosing teaching materials. Teaching materials are tools, information, or texts needed by lecturers for the study and planning of learning implementation (Hamid, 2013:129). Therefore, to support good learning planning, teaching materials are needed.
One type of teaching material is a module. Learning will not run optimally if the teaching materials are inadequate. Adequate in this case is to follow the applicable curriculum, adapt to the characteristics of students, and in accordance with the conditions of the university environment. In line with this statement, it is in accordance with Prastowo's opinion (2015: 24) that if learning uses adequate teaching materials, then the implementation of learning will be more effective and interactive. Modules as teaching materials have several advantages. The advantage is that the module can be used independently without the presence of a lecturer. Teaching materials in the form of modules are easier for students to understand for independent study because the language in the modules is more communicative and interactive than other teaching materials. By using the module, students can carry out learning activities according to their own speed of thinking and abilities. Modules can be used whenever and wherever students are, not necessarily in the classroom, so that student activities and learning outcomes can increase.

The study of Indonesian poetry is one of the compulsory subjects of the study program, meaning that this course must be taught, especially in the Indonesian Language and Literature Study Program, Muhammadiyah University of North Sumatra (UMSU PBSI Study Program). Graduate Learning Outcomes (CPL) based on the KKNI Curriculum are students who are expected to be able to prepare, apply and improve their knowledge and skills in studying Indonesian poetry. The expected Subject Learning Outcomes (CPMK) are that students are able to understand and recognize approaches in literary works.

Learning Indonesian poetry studies courses at the PBSI UMSU Study Program is a provision for students to become professional Indonesian language and literature teachers from the aspect of content or material. The purpose of learning Indonesian poetry studies is to provide students with experience in poetry appreciation activities, as well as to equip students on how to teach poetry learning in schools. As a provision to become a teacher of Indonesian language and literature, Indonesian poetry studies courses must be understood about various approaches (theories) of literature.

Studying Indonesian poetry studies conducted at UMSU on the approach material in literary works, students are taught ways to analyze Indonesian poetry with mimetic, expressive, pragmatic, and objective (theory) approaches. Some of these approaches are presented in general terms and have not been elaborated with literary theories, while learning must be developed in accordance with scientific developments. Learning must be adapted to the emergence of various disciplines. Based on the development of literature, literary theory has undergone developments which are often referred to as contemporary literature. The process of studying poetry in the PBSI UMSU Study Program has not fully followed the development of contemporary literary theories. Contemporary literary theories such as structuralism, feminism, deconstruction, postcolonialism, genetic structuralism have not been clearly stated in the RPS. Based on the absence of these theories listed in the RPS, the researchers developed a module for studying Indonesian poetry based on the theory of genetic structuralism.

2 Theoretical basis

Modules as teaching materials

Teaching materials are a set of learning materials that are arranged systematically, showing the full form of student competence in learning activities. If teaching materials are inadequate,
then learning will not run optimally. Quality teaching materials are able to make students more reasonable in understanding the concepts of learning to be taught. Through teaching materials, students are expected to find new ideas and knowledge which will then be able to apply those ideas and knowledge in everyday life. Teaching materials according to Prastowo (2018: 25) are teaching materials that are one of the main components of all instructional system components, both specifically designed and according to their nature used in learning activities.

The types of teaching materials are very diverse, one of which is the module. According to Sukiman (2019:131), the module is a complete measuring tool that can measure goals which are program packages arranged in certain units for learning purposes. With the module, students are required to be able to understand the material, find sources of information, and solve problems independently without the help of a lecturer. In line with Sukiman, Sani (2014: 183) module learning is an independent learning process regarding a particular unit of discussion using teaching materials that are arranged systematically, operationally, and directed for use by students, accompanied by guidelines for their use for educators.

Based on some of the understandings of the module above, it can be concluded that module teaching materials are one type of teaching material that is compiled completely and systematically with the aim that students (students) are able to learn on their own, not depending on others.

**Eligibility Criteria for Teaching Materials**

The eligibility criteria for teaching materials are things that can be used as a tool to examine and determine the feasibility of teaching materials/teaching materials. Government Regulation Number 19 of 2005 concerning National Education Standards, article 43 paragraph 5, stipulates four criteria in assessing the feasibility of teaching materials, namely 1) content feasibility, 2) presentation feasibility, 3) language feasibility, and 4) graphic feasibility. The explanation of the four eligibility criteria for teaching materials based on the attachments of the instruments that have been set by BSNP is as follows.

1) Content Eligibility

Content feasibility is the feasibility of the substance or content of the material presented or exposed in the textbook. Feasibility of content includes subaspects

(1) the suitability of the material with KI and KD, including the completeness of the material and the breadth of the material, (2) the accuracy of the material, (3) the up-to-dateness of the material (4) encouraging curiosity.

2) Serving Eligibility

Feasibility of presentation, namely systematic feasibility and order of presentation of learning materials. The presentation eligibility criteria include (1) presentation techniques (2) presentation of learning, and (3) completeness of presentation.

3) Language Eligibility

The feasibility of language is the feasibility of using the language used to express ideas. The eligibility criteria for the language aspect include (1) straightforward, (2) communicative, (3)
dialogical and interactive, (4) conformity to the level of development of students, (5) coherence and integration of the flow of thought, (6) use of terms, symbols, and icon.

4) Feasibility of Graphics

The graphic eligibility criteria include (1) the size of the teaching materials that match the size of the teaching materials with ISO standards (A4, A5, and B5); conformity with the content of teaching materials, (2) cover design of teaching materials (cover), displaying layout elements on the front, back, and back covers in harmony with rhythm and unity and consistency; display a good center point; the colors of the layout elements are harmonious and clarify the function; the composition and size of the layout elements (title, author, illustration, logo, etc.) are proportional, balanced, and in tune with the layout of the content (according to the pattern); the size of the title of the teaching material is more dominant and proportional than the size of the teaching material, the name of the author; the color of the title of the teaching material contrasts with the color of the background; don't use too many typeface combinations; describe the content/teaching materials and reveal the character of the object; and shape, color, size, proportion of objects according to reality, (3) design of teaching material content, placement of consistent layout elements based on patterns; separation.

Poetry Study

The study of poetry consists of the words "study" and "poetry." The word study comes from the root word, namely study. In the fifth edition of the KBBI (2021:723), the word study is an investigation about something. Meanwhile, the word study is the result of studying. The same thing was also expressed by Hikmat et al. (2017: 19) stated that the term study was the result of the investigation process and also said that the term popular study was used as the name of the course. According to Al Ma'ruf and Nugrahani (2017: 41) the term study is often equated with the term analysis in English, or closer to study, which means to deepen, study and/or study seriously. Assessment is also sometimes equated with the term study (study) which means conducting a study or review, but the term assessment is more accurately equated with analysis or study.

Poetry according to Sehandi (2014: 61) is a literary work that is bound by the sound of language (rhyme, rhythm, intonation), the form of lines (lines) and stanzas and is characterized by the use of dense language. According to Waluyo in Wisang (2014: 12) poetry is a literary work with the presentation of language that is condensed, shortened and given a rhythm with a unified sound and imaginative choice of words. From some of the opinions above, it can be concluded that the study of poetry is the result or process of an investigation using certain steps to produce an objective study of the analyzed poetry.

Genetic Structuralism

Wiyatmi (2013:124) says that genetic structuralism is a type of literary sociology theory developed by Lucien Goldmann (1977, 1981) from France which examines literary works in relation to the worldview of the author's social group. Furthermore, Kurniawan (2012:103) suggests genetic structuralism is a literary approach that moves from the text as an autonomous focus to factors that are extrinsic (outside the text), namely the writer as the collective subject of a society.
Based on some of the expert opinions above, it can be concluded that genetic structuralism is a type of literary sociology theory developed by Lucien Goldmann (1977, 1981) from France which examines literary works in relation to the worldview of the author's social group. The process of creating literary works in genetic structuralism as a totality of a combination of internal structure and external structure does not only have a loose structure, but there is the intervention of other factors (social factors).

**Concept of Genetic Structuralism Study**

According to Wiyatmi (2013: 125) there are five concepts in genetic structuralism that need to be understood, namely the author as a collective subject, the structure of literary works, worldview (vision du monde, world view), human facts, and dialectics of understanding-explanation. In line with the opinion above, Faruk (2017:12-19) says the concept of genetic structuralism is a category. Those categories are facts of humanity, collective subject, structuration, world view, understanding and explanation.

a. **Humanity Facts**

Is all the results of human activities both verbal and physical that is understood by science. The form of various human facts can be divided into two, namely individual facts and social facts. Individual facts are the result of libidinal behavior such as dreams, the behavior of crazy people and so on. Social facts have a role in history.

b. **Collective Subject**

Is the subject of social facts (historical).

c. **World View (Structure and Structure)**

It is a comprehensive term for the ideas, aspirations and feelings that bind together members of a particular social group and contrast them with members of other groups.

d. **Literary Work Structure**

Is a concept of the structure of a literary work that is different from the commonly known structure concept, namely the thematic structure concept which is the center of attention is the relationship between character and character and character and objects around him.

e. **Dialectic of Understanding and Explanation**

What is meant by understanding is an attempt to describe the structure of the object being studied, while explanation is an attempt to combine it into a larger structure.

Based on some of the opinions above, it can be concluded that the study concept of genetic structuralism theory consists of 5 aspects, namely Human Facts, Collective Subjects, World View (Structure and Structure), Literary Work Structure, and Dialectics of Understanding and Explanation are aspects that are very useful in expressing meaning of a literary work.
3 Research method

The data collection technique used in this study was in the form of a questionnaire. According to Sugiyono,(2018: 199) a questionnaire is a data collection technique by giving a number of questions to respondents to answer. The technique of analyzing data on the feasibility of teaching materials uses descriptive data analysis using descriptive statistics. Descriptive statistics are statistics used in analyzing data by describing or describing the data that has been collected as is without intending to make conclusions that can be applied to the public or generalizations (Sugiyono, 2018:207).

The data obtained are quantitative and qualitative data. The results of the data are in the form of validation and testing in the form of numbers which will be described later. Quantitative data comes from a Likert scale assessment questionnaire, while qualitative data is in the form of additional assessments or suggestions from the validator.

4 Results and discussion

4.1. Research result

The feasibility of the Indonesian poetry study module based on the theory of genetic structuralism at the PBSI Study Program, Muhammadiyah University of North Sumatra can be seen from the results of the validation carried out by a team of experts, lecturers, and field trials (individuals, small groups, and limited groups).

4.1.1 Results of Module Validation by Material Experts

The expert validation of the Indonesian poetry study module material based on the theory of genetic structuralism was carried out by two experts, namely a postgraduate lecturer at the Universitas Negeri Medan and a writer at the Balai Bahasa SUMUT. Material expert validation was carried out to assess the feasibility of Indonesian poetry study material based on the genetic structuralism theory contained in the module. The feasibility of the assessed material consists of 3 assessment aspects, namely (1) content feasibility aspects, (2) presentation feasibility aspects, and (3) language feasibility aspects. The following are the results of the validation of the two material experts.

Table 1. Results of Validation by Material Experts I and II

<table>
<thead>
<tr>
<th>No.</th>
<th>Assessment Subcomponent</th>
<th>Evaluation X1</th>
<th>Evaluation X2</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content Eligibility</td>
<td>92,70%</td>
<td>88,33%</td>
<td>90,03%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Presentation Eligibility</td>
<td>94,44%</td>
<td>90,27%</td>
<td>92,35%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Language Eligibility</td>
<td>97,92%</td>
<td>88,88%</td>
<td>93,4%</td>
<td>Very good</td>
</tr>
<tr>
<td></td>
<td>Jumlah Rata-rata</td>
<td>95,02%</td>
<td>89,16%</td>
<td>91,92%</td>
<td>Very good</td>
</tr>
</tbody>
</table>


Based on the table above, material experts I and II considered that the Indonesian poetry study module based on the theory of genetic structuralism developed was suitable for use in the field. The percentage of the average score of the overall expert assessment I and II for the feasibility of the content is 90.03%. The average score percentage of the overall language eligibility assessment is 92.35%. The percentage of the overall average score of the presentation feasibility assessment is 93.4%. The average number of overall assessment results from expert validators I and II is 91.92% with the criteria of "very good". In other words, this module deserves to be tested in the field without any revision from the material expert validator and can meet the demands of learning needs.

4.1.2 Module Validation Results by Design Expert

The expert validation of the design of the Indonesian poetry study module based on the theory of genetic structuralism was carried out by two lecturers at the State University of Medan. The process of validating the design of the Indonesian poetry study module based on the theory of genetic structuralism was carried out until it met the valid/fit criteria for use in the field according to the validator. Design expert validation was carried out to assess the feasibility of the graphic which consisted of 3 assessment indicators, namely (1) the physical size of the module, (2) the design of the module cover, and (3) the design of the content of the module. The following are the results of validation by design experts. The following are the results of the validation of the two material experts.

Table 2. Results of Validation by design experts I and II

<table>
<thead>
<tr>
<th>No</th>
<th>Assessment Subcomponent</th>
<th>Evaluation X1</th>
<th>Evaluation X2</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Module Physical Size</td>
<td>92.70%</td>
<td>88.33%</td>
<td>90.03%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Module Cover Design</td>
<td>94.44%</td>
<td>90.27%</td>
<td>92.35%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Module Content Design</td>
<td>97.92%</td>
<td>88.88%</td>
<td>93.4%</td>
<td>Very good</td>
</tr>
<tr>
<td></td>
<td>Average Amount</td>
<td>95.02%</td>
<td>89.16%</td>
<td>91.92%</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Based on the table, design experts I and II considered that the Indonesian poetry study module based on the theory of genetic structuralism developed was suitable for use in the field. The percentage of the average score of the overall expert assessment I and II for the physical size of the module is 87.5%. The average score percentage of the overall module cover design assessment is 95.61%. The percentage of the average score of the overall module content design assessment is 99.34%. The average number of overall assessment results from design expert validators I and II is 94.15% with the criteria of "very good".
Based on the validation results, the Indonesian poetry study module is based on the theory of genetic structuralism which was developed based on the design, the module is feasible to be tested in the field without any revision from design expert validators and can meet the demands of learning needs.

4.1.3 Lecturer Response Results to the Module

The lecturer's assessment of the Indonesian poetry study module based on the theory of genetic structuralism was carried out by two lecturers of the Indonesian poetry study course at the Muhammadiyah University of North Sumatra. The assessment of the module was carried out to obtain data regarding information about the feasibility of this module as teaching material in the Indonesian poetry study course. Responses to the module consist of three aspects of the assessment, namely from the aspect of the module display, the presentation of the material, and the benefits of the module. The following are the results of the responses of the two lecturers.

Table 3. Respondents to the Indonesian Poetry Study Module Based on Genetic Structuralism Theory

<table>
<thead>
<tr>
<th>No.</th>
<th>Statement</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Module Display</td>
<td>80.50%</td>
<td>Good</td>
</tr>
<tr>
<td>2.</td>
<td>Material Presentation</td>
<td>83%</td>
<td>Good</td>
</tr>
<tr>
<td>3.</td>
<td>Module Benefits</td>
<td>83.20%</td>
<td>Good</td>
</tr>
<tr>
<td>Total Average</td>
<td></td>
<td>82.23%</td>
<td>Good</td>
</tr>
</tbody>
</table>

Based on the table above, it can be illustrated that the average percentage of lecturer responses to the Indonesian poetry study module based on the theory of genetic structuralism is 82.23% with the criteria of "good". The average percentage obtained from the module display aspect is 80.50% with "good" criteria, 83% material presentation aspect with "good" criteria, and the module benefits aspect is 83.20% with "good" criteria.

4.1.4 Student Response Results to the Module

4.1.4.1 Individual Trial Results

Individual trials were conducted on three students who had high, medium, and low abilities. Data on the results of student responses at the individual trial stage to the Indonesian poetry study module based on the theory of genetic structuralism can be seen in the following table.

Table 4. Results of Individual Trials on Indonesian Poetry Study Modules Based on Genetic Structuralism Theory

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theory</td>
<td>80.16%</td>
<td>Good</td>
</tr>
<tr>
<td>2.</td>
<td>Language</td>
<td>79.20%</td>
<td>Good</td>
</tr>
<tr>
<td>3.</td>
<td>Interest</td>
<td>80.15%</td>
<td>Good</td>
</tr>
<tr>
<td>Total Average</td>
<td></td>
<td>*9.83%</td>
<td>Good</td>
</tr>
</tbody>
</table>
Based on the results of research on individual trials obtained an average total percentage of 79.83% with the criteria of "very good". The average percentage results obtained based on the assessment indicators from the material aspect were 80.16% with the criteria of "very good", from the language aspect 79.20% with the criteria of "very good", and from the aspect of interest 80.15% with the criteria "very good"

4.1.4.2 Small Group Trial Results

Small group trials were conducted to identify deficiencies in the developed product. The data on the results of student responses at the small group trial stage to the Indonesian poetry study module based on the theory of genetic structuralism can be seen in the following table.

Table 5. Small Group Trial Results of Indonesian Poetry Study Module Based on Genetic Structuralism Theory

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theory</td>
<td>81.20%</td>
<td>Good</td>
</tr>
<tr>
<td>2.</td>
<td>Language</td>
<td>83.20%</td>
<td>Good</td>
</tr>
<tr>
<td>3.</td>
<td>Interest</td>
<td>84.30%</td>
<td>Good</td>
</tr>
<tr>
<td>Total Average</td>
<td>82.91 %</td>
<td>Good</td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the small group trial, the total average percentage was 82.91% with "good" criteria. The average percentage results obtained based on the assessment indicators from the material aspect are 81.20% with the criteria of "good", from the language aspect 83.20% with the "good" criteria, and from the interest aspect it is 84.30% with the "good" criteria.”

4.1.4.3 Limited Field Trial Results

Limited field trials were conducted to identify the shortcomings of the developed product when used in a wider scope. Limited field trials were carried out in one class, namely in the 4th semester morning class with 30 students. The data on the results of student responses at the limited field trial stage to the Indonesian poetry study module based on the theory of genetic structuralism can be seen in the following table.

Table 6 Limited Field Trial Results of Indonesian Poetry Study Module Based on Genetic Structuralism Theory

<table>
<thead>
<tr>
<th>No.</th>
<th>Rating Indicator</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theory</td>
<td>81.30%</td>
<td>Good</td>
</tr>
<tr>
<td>2.</td>
<td>Language</td>
<td>83.20%</td>
<td>Good</td>
</tr>
<tr>
<td>3.</td>
<td>Interest</td>
<td>83.87%</td>
<td>Good</td>
</tr>
<tr>
<td>Total Average</td>
<td>82.79%</td>
<td>Good</td>
<td></td>
</tr>
</tbody>
</table>
Based on the results of research on limited field trials, the total average percentage was 82.79\% with the criteria of "good". The average total percentage of results obtained based on the assessment indicators from the material aspect is 81.30\% with the criteria of "very good", from the language aspect 83.20\% with the "good" criteria, and from the interest aspect it is 83.87\% with the criteria "good".

4.2. Discussion

Research on the development of teaching materials is carried out to produce suitable teaching materials. After the module is developed, the next step is to validate the module by experts and test it with students. The feasibility test was carried out on 4 aspects of the assessment in accordance with the BSNP, namely 1) content feasibility, 2) presentation feasibility, 3) language feasibility, and 4) graphic feasibility. This is also supported by Oktavia's opinion (2017: 252) which states that the module teaching materials describe the basic competencies that will be achieved by students, use good and easy-to-understand language, have an attractive appearance, and are equipped with illustrations.

Research on the development of this module aims to produce teaching materials that are suitable for use. Determination of the feasibility of the Indonesian poetry study module based on the theory of genetic structuralism was carried out with validation. Validation is the process of requesting validation of the conformity of the module to the needs. To get this conformity acknowledgment, validation needs to be done by involving expert practitioners in accordance with the relevant fields in the module (Depdiknas, 2008:14).

Furthermore, based on a statement by the National Education Standards Agency (BSNP) (in BSNP Bulletin, Vol II, January 2007: 21), which states that a quality textbook (module) must meet four elements of eligibility, namely, the feasibility of the material (content), presentation, language, and graphics (display). In line with the two statements, the feasibility of the Indonesian Poetry Study Module Based on Genetic Structuralism Theory was obtained from the results of the validation (assessment) provided by a team of material experts and design experts. The two teams of experts were selected who are already experts in the field. The material expert team assesses the feasibility of the material (content), presentation, and language. Next, the design expert team assesses the feasibility of the graphic (display). The material and design expert team each consists of 2 validators. The total number of validators is four people. The criteria for each assessment indicator as a whole are determined by the average score of the assessment criteria of each expert. The results of the assessment were analyzed to determine whether or not the design was suitable for trial in class A Semester 4 in the PBSI UMSU Study Program. It is appropriate or not appropriate for the Indonesian poetry study module based on the theory of genetic structuralism that has been developed in the product being tested on Semester 4 students of the UMSU PBSI Study Program. Furthermore, the product is given to the lecturer to find out the results of the assessment and suggestions given.

The results of the validation of material experts I and II assessed that the Indonesian poetry study module based on the theory of genetic structuralism developed was suitable for use in the field. The results of the assessment of the overall average score of the expert assessments I and II for the feasibility of content, language feasibility, and presentation feasibility are in the "very good" criteria.
The validation results of design experts I and II assessed that the Indonesian poetry study module based on the theory of genetic structuralism developed was suitable for use in the field. The results of the assessment of the overall average score of expert assessments I and II for the size of the material, the assessment of the cover design of teaching materials (cover), and the assessment of the design of the content of teaching materials are in the "very good" criteria.

The assessment of the lecturers of the Indonesian poetry study course on the Indonesian poetry study module based on the theory of genetic structuralism was carried out by Ms. WR and Ms. ER. The assessment is carried out to obtain information in improving the quality of the developed product. The results of the assessment in the form of scores on the learning indicators contained in the developed module are adjusted to the learning of Indonesian poetry studies courses in this case through the theory of genetic structuralism.

The results of the responses or responses carried out by lecturers of the Indonesian poetry study course concluded that the use of the Indonesian poetry study module based on the theory of genetic structuralism in learning obtained an average of 82.23% with the criteria of "good.

Student responses to the Indonesian poetry study module based on the theory of genetic structuralism in learning revealed that the results of the individual trial assessment included the "good" criteria with a total average percentage of 79.83%. Individual trials were carried out to find out the initial responses of students in identifying the shortcomings of the Indonesian poetry study module based on the theory of genetic structuralism which was developed prior to the small group trial. The percentage results are obtained based on the assessment indicators in the form of 20 statements that have been provided.

Based on the results of the small group trial assessment, it was concluded that the module for the Study of Indonesian Poetry Based on Genetic Structuralism Theory developed was included in the "very good" criteria with a total average percentage of 82.55%. Small group trials were conducted to determine student responses to the lack of Indonesian poetry study modules based on the theory of genetic structuralism that was developed prior to the limited field trials.

Limited field trials were carried out in class A Semester 4 of the PBSI FKIP UMSU Study Program for 30 students. The benefit of this limited field trial is to get an idea of the feasibility of the teaching materials in the form of modules being developed. The results of a limited field trial regarding student responses to the Indonesian Poetry Study module based on the theory of Genetic Structuralism that have been developed show an average percentage of 82.79% with the criteria of "very good". This means that the Indonesian poetry study module based on the theory of genetic structuralism developed has increased development and can meet the demands of learning needs. This limited field trial assessment is the final stage of product testing.

The results of the feasibility of teaching materials based on these limited field trials are practical. In line with the research of Windrianto, et al. (2017) suggest that the feasibility of the trial is said to be practical if the user has no difficulty in terms of presenting the material and using learning materials.
5 Conclusion

Based on the results of the research and discussion of the feasibility of the Indonesian poetry study module based on genetic structuralism theory, it was concluded that the Indonesian poetry study module based on the genetic structuralism theory developed was suitable for use for third semester students at the UMSU PBSI Study Program. This can be seen from the validation results obtained from material experts, design experts, responses from lecturers, and responses from students at the UMSU PBSI Study Program. The feasibility of the negotiating text module is not only seen from the assessment of experts, but also from the responses of the module users, namely lecturers and students.

References

Abstract. This study aims to describe: 1) the validity, practicality and effectiveness of teaching materials developed by implementing virtual manipulatives and problem-based learning oriented; 2) improvement of critical thinking and problem solving skills of SMP MARS Pematang Siantar Class VIII students by using teaching materials developed by implementing virtual manipulative and problem based learning oriented. This research is a development research. The development model used in this study is the Thiagarajan model. The results showed that: 1) the teaching materials developed by implementing virtual manipulative and problem-based learning oriented were declared valid, practical and effective; 2) there is an increase in critical thinking and problem solving skills for students of SMP MARS Pematang Siantar Class VIII by using teaching materials developed by implementing virtual manipulative and problem-oriented base learning. In the first trial there was an increase in the value of critical thinking skills of 0.35 and the value of problem solving abilities of 0.44 with moderate criteria. Likewise, in the second trial there was an increase in the value of critical thinking skills of 0.42 and the value of problem-solving abilities of 0.53 with moderate criteria.

Keyword: Virtual Manipulative, Problem Based Learning, Critical Thinking Ability, Problem Solving

1. Introduction

Problem-solving skills are one of the topics covered in math classes. One of the primary objectives of learning mathematics, according to NCTM in Rofiqoh, et al., is for pupils to develop their problem-solving abilities. Since learning and solving issues allows students to practice applying their prior knowledge and skills to the solution of non-routine situations, problem solving is a crucial component of the mathematics curriculum [1]. Problem solving ability is one of the high-level cognitive abilities that enable students to acquire knowledge and skills [2]. This problem-solving ability must be possessed by students because problem-solving skills are the basis of learning mathematics, besides that problem solving is a basic ability in learning mathematics, because mathematics is one part of problem solving. Furthermore, Wibowo explained that problem solving ability is an individual’s ability to carry out a series of processes with the aim of solving a problem using concepts that have been mastered previously. Good mathematical problem solving skills will support success in learning mathematics. Problem solving ability is the potential of a student to solve or prove story
problems and non-routine questions. The non-routine questions are identical to problem-solving abilities because they are one of the abilities that must be possessed or mastered by a student [3].

It is clear from the previous argument that students should place a high value on their ability to solve problems. This is true because students' abilities to read and comprehend story questions, the language of mathematical models, plan calculations from mathematical models, and carry out calculations from non-routine inquiries are all directly tied to their problem-solving abilities. In order for students to practice and integrate the concepts, theorems, and skills they have acquired, problem solving is crucial in mathematics education. In addition, problem solving skills can boost students' creativity, confidence, and mathematical talents [4]. Novitasari and Wilujeng explain that students are expected to have problem solving skills and develop them to deal with problems experienced in their lives, so problem solving skills are very important for students [5].

However, the reality on the ground is in contrast to these theories. When students are solving problem solving problems, students are still difficult to understand the core of the problem well, are unable to understand the subject being asked in the question, still have difficulty in writing down what is known and asked when solving the problem, not being careful in doing arithmetic operations and not writing conclusions from the problem. [6]. The low problem solving ability of students can also be caused by the difficult and scary character of mathematics according to students [7], the challenging and intimidating nature of mathematics might also contribute to pupils' poor problem-solving skills. Additionally, when learning activities are used, kids receive more material information than when thinking activities are used to address their math issues [8].

This is in accordance with the results of the initial observations that the author made at the Private Junior High School MARS Pematang Siantar, based on the results of observations obtained information that the problem solving ability of class VIII students is still low. In the category of understanding the problem 20 students have understood the problem well, 5 students are in the sufficient category and 5 students are in the less category. In the indicator of planning, 15 students are in the less category, 7 students are in the sufficient category and 8 students are in the good category. Furthermore, the indicators of solving the problem, 14 students are in the less category, 8 students are in the sufficient category and 8 students are in the good category. Finally, the indicator rechecked the answers, as many as 25 students were in the less category, and 5 students were in the sufficient category. It can be seen that the problem solving ability of class VIII students of private SMP MARS Pematang Siantar is still dominated by the low category.

In addition to problem solving skills, another ability that must be possessed by students is the ability to think critically. The goal of mastering arithmetic includes critical thinking in large measure. Students are encouraged to have the following skills, according to the Ministry of National Education in Wiliawanto [9]: (1) mathematical skills that can be applied to solving mathematical problems, other subjects' problems, or problems in real life; (2) mathematical skills that can be applied as a tool for communication; (3) mathematical skills that can be applied as a way of reasoning that can be applied in every situation, such as logical thinking, systematic critical thinking, honesty, discipline, in viewing and so on.

Using the capacity for introspective and logical thought, critical thinking seeks to help people decide what to believe or do [10]. Critical thinking is a process of a student in distinguishing and sorting and then grouping and looking for their relationship to the information or problems obtained. A student who thinks critically processes the existing information systematically to state the truth of his opinion. Critical thinking skills are the ability to determine reliable sources,
distinguish between relevant or irrelevant data, identify and analyze assumptions, identify biases and views, and access evidence. Critical thinking is very important so that students become someone who always thinks actively and positively where students first understand the ins and outs of the real problem, are not easily influenced by the opinions of others, solve problems properly and neatly, and can conclude correct or incorrect information. Wrong. Hendriana, et al [11] explained that there are several reasons why students need to have critical thinking skills in learning mathematics. First, mathematical critical thinking skills are contained in the curriculum and learning objectives of mathematics. These include training in logical, systematic, critical, creative, and careful thinking as well as objective thinking, being open to dealing with problems in everyday life and facing an ever-changing future. Second, in critical thinking, a person does not easily accept something he receives without knowing its origin, but he can account for his opinion accompanied by logical reasons.

In contrast to the current notion, however, the reality shows that children still have limited mathematical critical thinking abilities. According to the findings of a study done by Ayu Latifa et al. [12], students’ critical thinking abilities are lacking since the learning approach that has been used thus far has not been able to strengthen them and because activities to do so have not been done. Another explanation is that the learning model being utilized seems uninteresting and unchanging. Another reason why students struggle to think critically during the learning process is teacher-centered learning (conventional), which is frequently used in schools today and makes students more passive because the teacher plays a more dominant role [10].

The above is also in line with the results of the initial observations that the author made at the Private Junior High School MARS Pematang Siantar, based on the results of observations obtained information that the mathematical critical thinking ability of class VIII students is still low, students are still not able to give simple explanations, set strategies and tactics, provide explanations further, and draw conclusions.

Applying the Problem Based Learning (PBL) approach is one way to get around pupils' poor problem-solving and critical thinking skills. Students are presented with a problem at the outset of the Problem Based Learning (PBL) learning model, which is followed by a student-centered information search process [13]. Aufa, Saragih and Minarni explained that the problem-based learning model or Problem Based Learning (PBL) is a learning model with a learning approach that brings students closer to authentic and meaningful problems, and makes the basis for students to conduct research, so that learners can create their own knowledge, advance their abilities and inquiry methods, becoming independent and boosting their self-assurance [14].

However, what is happening in the field is inversely proportional to these theories. Safanati and Suhendar [13] explained that in the process of learning mathematics the teacher still uses the lecture and question and answer method. Therefore, students often feel bored and do not dare to answer questions because they do not understand the material well. Marisa [15] shows how the use of learning models may not always be in line with students' needs when it comes to studying mathematics. Students do not accept learning well because they are less engaged in two-way communication with teachers during lessons and prefer to converse with their peers instead of listening to the teacher explain the topic. In addition, the enthusiasm of students in participating in mathematics learning in class is very low, students are sleepy and do not pay attention to when the teacher explains, then like to chat alone with friends when the teacher is explaining the lesson [16].

This is also consistent with the findings of the author's initial investigations into the mathematics learning process at the Private Junior High School MARS Pematang Siantar, the teacher seems to be more dominant in mastering the learning process in the sense that the teacher provides
more information than students seek information. Students look more passive, so they are not active in their learning, students only listen to the teacher's explanation then do the exercises according to the teacher's directions. Learning like this will be monotonous and make students bored so that it has an impact on problem solving skills and students' critical thinking skills. Another factor that needs to be considered so that the problem solving ability and critical thinking ability of students is increased is the development of teaching materials that are also in accordance with the model and learning media used. Teachers and students employ teaching materials, which are systematically organized resources or subject matter, to aid in the learning process. All items used by teachers to conduct teaching and learning activities in the classroom are referred to as teaching materials.

The reality is that a lot of teachers still haven't done a good job of designing their lesson plans, though. Learning issues that arise during the learning process frequently have a connection to the learning tools and materials. Due to the scarcity of teaching resources, teachers only use textbooks provided by the school when instructing students, and as a result, they rarely give them exercises to test their knowledge [17].

According to the author's findings, few teachers have created teaching resources that make it simpler for pupils to learn independently at the Private Junior High School MARS Pematang Siantar, where the subject teachers exclusively use textbooks to carry out the mathematical learning process. So to help students understand the material, teachers need other teaching materials.

Another solution that can be done by teachers besides using the right learning model in learning mathematics is the use of learning media that can interpret the mathematical concepts more concretely. One of the media in learning is teaching aids. In recent years, the use of computer-based teaching aids has begun to become popular in the community, which is referred to as virtual manipulative teaching aids [18]. Manipulative media are objects, tools, models, or mechanisms that can be used to assist in understanding during the problem solving process related to a mathematical concept or topic [19]. Hanah et al explained that manipulative materials are physical objects used by students and teachers to describe and discover mathematical concepts [20].

However, it is still the case that teachers struggle to effectively integrate technology into the teaching and learning of mathematics. In reality, children merely copy what the teacher does when studying arithmetic because the teacher rarely gives them the chance to create their own mathematical notions. Additionally, when responding to practice questions supplied by the teacher, pupils are not given the chance to express their thoughts and come up with their own. Many teachers have not developed learning media by utilizing existing software on the computer. In fact, in facing the era of globalization and welcoming the free market era, it is necessary to have the ability to master the development of learning technology, which includes the use of computer software as a medium for learning mathematics, especially in the form of interactive CDs. Mayasari [21] added that the activities that are routinely carried out by teachers still use ordinary learning so that students are more passive. In addition, the availability of media in schools is limited, schools only have a few media and mathematics teaching aids [22].

2. Research Method

The type of research that will be conducted is development research (development research). This research will use Thiagarajan 4-D development model. This research was carried out at the MARS Private Junior High School Pematang Siantar in class VIII students in the even semester of the 2020/2021 academic year. The subjects in this study were class VIII students of the MARS Pematang Siantar Private Junior High School for the 2020/2021 academic year, while
3. Results and Discussion

3.1. Validity of Teaching Materials Based on Problem Based Learning Models

The teaching materials were deemed to be valid or to have a high degree of validity based on the findings of the validation of the manipulative virtual teaching materials geared toward the proposed problem-based learning model. The teaching materials created are then said to be practical based on all of the teaching materials' valid points. Also valid or valid to a good extent are the findings of the validation of the learning implementation plan (RPP), student book (BS), student worksheet (LKPD), and assessments of critical thinking and problem-solving skills. This demonstrates that the problem-based learning model-focused manipulative virtual teaching materials developed have met the validity standards. In general, it means that the teaching materials developed can meet the demands of learning needs for cube and block building materials. Therefore, it can be said that the problem-based learning model-focused manipulative virtual teaching materials generated in this study have complied with the validity requirements.

3.2. Practical Results of Teaching Materials Based on Problem Based Learning Models

Based on the findings of the experts' evaluations (validators), each validator concluded that with a few minor adjustments, the generated instructional materials may be used. Then, using the observation sheet on the implementation of learning using developed manipulative virtual teaching materials oriented to the problem-based learning model, which was distributed to two observers at each trial meeting I and II, the results showed that in the first trial, the score for observing the implementation of learning did not meet the practical criteria, specifically with a score of 2.96 in the low category. Furthermore, in the second trial, a score of 3.63 was obtained in the high category.

3.3. Results of the Effectiveness of Teaching Materials Based on Problem Based Learning Models

a. Critical Thinking Ability Test Achievement and Student Problem Solving Ability

The students' critical thinking and problem-solving abilities were deemed to have met the conventional completeness criteria based on the findings of the test analysis in the first and second trials. This is due to the material and problems that exist in the teaching materials developed in accordance with the conditions of the student learning environment. By using this teaching material, students will more easily understand the material of building space (cubes and blocks). In the first trial, students' performance on the final test of their critical thinking and problem-solving skills was 36.7% successful, with 11 students receiving a certificate of completion. Therefore, it can be stated that the use of manipulative virtual teaching materials created for the problem-based learning model did not match the requirements for obtaining classical completeness (>80%) in the first trial. However, in the second trial, 27 students were judged complete since their performance on the final exam of their critical thinking and problem-solving abilities met the required standards, or 90%. Therefore, it can be said that the problem-based learning model-focused manipulative virtual teaching materials have met the efficacy criteria in the area of developing students' critical thinking skills.
b. Deal Time Achievement

According to a study of the findings from the first trial's observation of student activity, the average percentage of student activity deal time success for the trial's three sessions was 20.98%, 18.19%, 19.93%, 23.78%, 8.74%, and 8.74%. The average student activity deal time achievement percentage for the four meetings in the second experiment was 22.20%, 18.52%, 23.84%, 23.28%, 7.14%, and 5.02%. These findings indicate that every student activity in the second trial complies with the required deal time %.

c. Student Response

Students in the trial and trial I expressed interest in the generated instructional materials, according to analysis of the findings of the student replies previously mentioned. The average score of student replies demonstrating interest in learning with the created instructional materials demonstrates this. According to the results of the student response survey, the first trial's score was 82%, while the second trial's score was 91%. Therefore, it can be inferred from the students' responses to engaging instructional materials built on the successfully created problem-based learning paradigm. According to Ismail, Abrar, Nur, Suharti and Halimah (2021: 1) the application of teaching materials based on problem based learning models received a positive response from students. Furthermore, the results of research by Nuraeni Indrayanti and Sukmaningthias (2021: 65) that student responses to the application of problem-based learning-based teaching materials obtained an average score of 3.29 or in the positive category.

3.4. Improving Students’ Critical Thinking and Problem Solving Skills

According to the normalized gain index, the value of critical thinking skills increased by 0.35 and the value of problem-solving skills increased by 0.44 with moderate criteria in the first trial. The value of critical thinking skills increased by 0.42 and the value of problem-solving skills increased by 0.53 with moderate criteria in the second trial. It follows that the produced manipulative virtual teaching resources based on the problem-based learning model can help students become more adept at critical thinking and problem-solving.

4. Conclusion

a. The teaching materials developed by implementing virtual manipulative and problem-based learning oriented are declared valid, practical and effective;
b. Using instructional materials created by implementing virtual manipulative and problem- oriented base learning, SMP MARS Pematang Siantar Class VIII students’ critical thinking and problem-solving abilities improved. With intermediate criteria, there was a 0.35 increase in the value of critical thinking abilities and a 0.44 increase in the value of problem-solving skills in the first trial. The value of critical thinking skills increased by 0.42 and the value of problem- solving skills increased by 0.53 with moderate criteria in the second trial.

References


Development of Textbook Based on Science Literacy on Ecosystem to Improve Science Learning Outcomes in Class V SDN 101783 Saentid Regency of Deli Serdang

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Abstract. This study aims to develop a science literacy-based textbook and test its feasibility and effectiveness. The development of the textbook uses a 4D model development procedure. Data collection instruments are in the form of assessment sheets for material experts, media experts, design experts, and learning outcomes tests. The method used in analyzing the data is using a quantitative descriptive technique which is stated in the rating scale category. The results of the development of the textbook product that has been validated state that the textbook product developed is feasible to use. The results of student learning completeness on the pre-test and post-test have differences. This shows that science literacy-based textbooks are more effective than commonly used textbooks.

Keywords: Textbooks, Science Literacy, Learning Outcomes.

1 Introduction

Scientific literacy is the ability to use scientific knowledge, identify problems, and draw conclusions based on evidence, to understand and make decisions about nature and its changes as a result of human activities. Scientific literacy needs to be mastered by every individual because it is not only limited to the development of science and technology but also relates to how one can understand the environment and other problems faced by modern society. In scientific literacy, there are several parts, including (1) Science as a body of knowledge; (2) Science as a way to investigate; (3) Science as a way of thinking; and science as the interaction of science, and technology in society.

Currently learning in elementary schools uses the 2013 curriculum or thematic learning that combines more than one material into one theme, including science. Science learning in the
classroom has not fully made the surrounding environment an example of what is done during teaching and learning activities. Learning Natural Sciences in Elementary Schools is a lesson that has been systematically arranged and studies nature and its surroundings. In learning science in class V, scientific literacy can be applied to students through ecosystem materials. Ecosystem materials can involve the surrounding environment because these materials interact directly with the environment. Thus, ecosystem materials are expected to make it easier for students to understand learning because they can find examples when studying in the surrounding environment. Ecosystem materials are easily obtained through student handbooks. However, in the current student handbook, there are still many reading contexts so it is still a little difficult for students to understand. Thus, it is necessary to develop textbooks that make it easier for students to study ecosystem material.

According to [1], in essence, textbooks are the elaboration of curriculum content. Before the elaboration, it is necessary to pay attention to several things, including the objectives of primary or secondary education, educational standards, and learning theories, the use of language, media or images used, and others related to parts of the teaching book. Textbooks for students are a learning resource in which there are teaching materials for each meeting. Thus it is said that the textbook is a student handbook where there is material content that is interrelated to learning. The suitability of choosing textbooks can affect learning and increase the value of learning.

From the results of observations made in class V on Ecosystem material, it can be seen that in that class students are still less interested in reading the textbooks that have been provided. This is because the textbooks used are less attractive, besides the teaching materials, there are also other learning materials. So that students do not seem to focus on completing the ecosystem material being taught. Lack of student knowledge about the importance of reading books is one of the causes of problems that often occur when studying. Thus, educators are expected to use teaching materials, which are easy for students to understand. The solution to improving reading skills in the classroom is to choose and use the right textbooks when learning.

There are many ways that teachers can do in improving students' scientific literacy skills, one of which is by applying and choosing books that allow students to further develop their ability to master learning. Science learning essentially has main elements such as 1) product, science is not only presented about the concept of facts or concepts; 2) scientific processes, science to study natural processes and phenomena; 3) and IPA as attitude fertilization. In this case, the researcher develops a product in the form of a book based on scientific literacy where the book will describe the three main concepts of science. By developing science literacy-based textbooks, it is hoped that students will be more effective in learning so that students not only learn the components of scientific literacy but also the main elements in science learning.

Based on the background, it is known that the research objective is to produce a valid scientific literacy-based textbook product based on input and advice from experts so that textbooks can be used during the learning process.

2 Method

The research was conducted at the Basic Education Program, Medan State University, and State Elementary School 101783 Saentis Deli Serdang Regency in February 2022. The
The subjects in this study were 4 expert lecturers and 20 elementary school students. Meanwhile, the object of this research is textbooks based on scientific literacy on ecosystem materials. This research is the development of Research and Development (R&D) by producing certain products. The development model uses Four-D by Thiagarajan. The procedures for this research model include: (1) defining, by analyzing the initial needs of students and teachers; (2) design, by designing the initial product as a result of the analysis from the previous stage; (3) development, by including the results of the revision of expert lecturers and conducting trials on the developed product; (4) and dissemination, by disseminating the final product of the development. Instruments in analyzing the data in the form of validation sheets for the feasibility of textbooks, the feasibility of graphics, and the feasibility of the presentation modified by [2] were filled by expert lecturers from Medan State University.

Data analysis on product development is descriptive and quantitative. The score data obtained from the validator is marked with a checklist in the form of a Likert scale table.

<table>
<thead>
<tr>
<th>No.</th>
<th>Answer Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Very good</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Well</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Not good</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Not good</td>
<td>1</td>
</tr>
</tbody>
</table>

After the score results are obtained, it is analyzed to determine the percentage gain for each category that has been developed, using the formula [4].

\[ \text{Score(\%)} = \frac{\text{skor per kategori}}{\text{skor maksimal}} \times 100\% \quad (1) \]

The results of the percentage analysis obtained are then confirmed as follows:

<table>
<thead>
<tr>
<th>Percent Value Interval</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%-100%</td>
<td>Very good</td>
</tr>
<tr>
<td>70%-84%</td>
<td>Well</td>
</tr>
<tr>
<td>60%-69%</td>
<td>Pretty good</td>
</tr>
<tr>
<td>50%-59%</td>
<td>Not good</td>
</tr>
</tbody>
</table>

The reliability test in this study was conducted to measure the reliability, as well as the consistency of the test in measuring the data. [6] said that the reliability test can use the Kuder-Richardson formula.
3 Result and Discussion

This development has the aim of obtaining printed books on ecosystem materials.

Definition

The first stage in this development is analyzing student needs, collecting information about learning materials such as syllabi, and lesson plans, and observing the textbooks used. After that, observations were made on students, concept analysis, and task analysis. Based on the results of observations of current student teaching materials, students are less involved in learning, so it is known that the acquisition of learning scores is still not successful or many are incomplete. Task analysis for ecosystem materials is intended to make it easier for researchers to identify the main skills on the subject.

Table 3. Ecosystem Material Task Analysis

<table>
<thead>
<tr>
<th>Topics</th>
<th>Type of activity</th>
<th>the meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystem Components</td>
<td>- Pay attention to the teacher's explanation.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Students can determine the various components in the ecosystem in the surrounding environment correctly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Conduct question and answer activities with the teacher.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Students can name the types of components in an ecosystem.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Solve problems related to the components contained in the ecosystem that have been listed in the book.</td>
<td></td>
</tr>
<tr>
<td>Relationships between living things in an Ecosystem</td>
<td>- Pay attention to the teacher's explanation, ask questions, and discuss with other students about the learning material.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Solve problems related to the relationship between living things in the surrounding environment that have been listed in the book.</td>
<td></td>
</tr>
<tr>
<td>Ecosystem Balance</td>
<td>- Pay attention to the teacher's explanation, ask questions, and discuss with other students about the learning material.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>- Solve problems related to the balance of the ecosystem that has been listed in the book.</td>
<td></td>
</tr>
</tbody>
</table>

Based on the task analysis table, it can be concluded that in learning students are given tasks based on each material contained in the product developed by the researcher.

Design

The stage in this development is to design an initial product that is adjusted to the results of the analysis at the definition stage. The results at this design stage are test questions, learning media, and assessment formats. The format of the book is the same as before, namely: title, KD, materials, supporting information, exercises and assessments.

Development

This development stage is: validation of material lecturers, media lecturers, and learning design lecturers; further testing 1.2 using the product developed.
Table 4. Validation of subject matter expert lecturers

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Validator 1</th>
<th>Validator 2</th>
<th>Average</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content eligibility</td>
<td>84.37</td>
<td>93.75</td>
<td>89.06</td>
<td>Very good.</td>
</tr>
<tr>
<td>Serving Eligibility</td>
<td>87.5</td>
<td>90</td>
<td>88.75</td>
<td>Very good.</td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td></td>
<td>88.90</td>
<td>Very good.</td>
</tr>
</tbody>
</table>

Table 5. Validation of Learning Media Expert Lecturers

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Validator</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial design</td>
<td>92.85</td>
<td>Very good.</td>
</tr>
<tr>
<td>Content design</td>
<td>100</td>
<td>Very good.</td>
</tr>
<tr>
<td>Textbook cover typography</td>
<td>91.66</td>
<td>Very good.</td>
</tr>
<tr>
<td>Content illustration</td>
<td>100</td>
<td>Very good.</td>
</tr>
<tr>
<td>Average Earnings</td>
<td>96.12</td>
<td>Very good.</td>
</tr>
</tbody>
</table>

Table 6. Validation of Learning Design Expert Lecturers

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Validator</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving eligibility</td>
<td>100</td>
<td>Very good.</td>
</tr>
<tr>
<td>Presentation</td>
<td>87.50</td>
<td>Very good.</td>
</tr>
<tr>
<td>Language</td>
<td>91.66</td>
<td>Very good.</td>
</tr>
<tr>
<td>Image selection</td>
<td>100</td>
<td>Very good.</td>
</tr>
<tr>
<td>Earnings—average</td>
<td>94.79</td>
<td>Very good.</td>
</tr>
</tbody>
</table>

From the results of tables 2, 3 and 4 above, it can be said that the acquisition of percentage values and expert responses is in the "Very Good" criteria. The results from the material lecturers got a score of 88.90%, the media expert lecturers got a score of 96.12, and the learning design experts got a score of 94.79%. The conclusion is that printed textbooks are suitable for use in the classroom.

Based on the calculation analysis, the reliability results obtained are 0.735. This means that the reliability of the student learning outcomes test of the developed product is in the "High" criteria. It can be said that all test items in the test meet the reliable criteria and can be used without revision.
Based on table 4 above, it is known that the students who succeeded in the first trial were 7 students and 19 students during the second trial. Therefore, it can be said that the use of science literacy-based textbooks on ecosystem materials is successful in improving student learning outcomes.

**Disseminate**

The process of spreading this only to school teachers was investigated.

The product was developed in the form of a Science Literacy-Based Science book for ecosystem materials intended for fifth grade elementary school students.

**Table 8.** Composition of Materials in Ecosystem Textbooks Based on Science Literacy

<table>
<thead>
<tr>
<th>Subject</th>
<th>Subject matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1. Ecosystem Components</td>
<td></td>
</tr>
<tr>
<td>Science as the Body of Knowledge</td>
<td>a. Definition of ecosystem.</td>
</tr>
<tr>
<td></td>
<td>b. Examples/types of pet food.</td>
</tr>
<tr>
<td></td>
<td>c. Classification of animal types</td>
</tr>
<tr>
<td></td>
<td>d. Life cycle.</td>
</tr>
<tr>
<td></td>
<td>e. Life cycle in animals</td>
</tr>
<tr>
<td>Science as a way to investigate</td>
<td>Observing the animals found in the surrounding environment, then classifying the animal into what type of animal and mentioning the type of food from the animal.</td>
</tr>
<tr>
<td>Science as a Way of Thinking</td>
<td>a. Let's do it</td>
</tr>
<tr>
<td>Subject</td>
<td>Subject matter</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
</tr>
<tr>
<td>b. Let's observe</td>
<td>c. Recalling</td>
</tr>
<tr>
<td>d. Enrichment</td>
<td>e. Let's practice</td>
</tr>
<tr>
<td>f. Let's write</td>
<td>g. Let's discuss</td>
</tr>
<tr>
<td>h. Competence test</td>
<td></td>
</tr>
<tr>
<td>Science Interaction with Society</td>
<td>a. Environment in the ecosystem (abiotic and biotic)</td>
</tr>
<tr>
<td>b. Activities carried out by humans in the face of changing ecosystems.</td>
<td></td>
</tr>
<tr>
<td>Chapter 2. Relationships Between Living Things In Ecosystems</td>
<td></td>
</tr>
<tr>
<td>Science is the Body of Knowledge</td>
<td>a. Definition of symbiosis</td>
</tr>
<tr>
<td>b. Types of symbiosis</td>
<td>c. Definition of food chain</td>
</tr>
<tr>
<td>d. The relationship between living things in an ecosystem</td>
<td></td>
</tr>
<tr>
<td>Science as a way to investigate</td>
<td>Investigate the types of animals found in certain ecosystems, then look for similarities and differences between animals that live in one ecosystem and another.</td>
</tr>
<tr>
<td>Science as a Way of Thinking</td>
<td>a. Let's practice</td>
</tr>
<tr>
<td>b. Let's observe</td>
<td>c. Let's do it</td>
</tr>
<tr>
<td>d. Let's think</td>
<td>e. Competence test</td>
</tr>
<tr>
<td>Science Interaction with Society</td>
<td>a. Relationship between living things and their environment</td>
</tr>
<tr>
<td>Chapter 3. Ecosystem Balance</td>
<td></td>
</tr>
<tr>
<td>b. Food chain,</td>
<td>c. Food webs.</td>
</tr>
<tr>
<td>d. Factors causing disruption of ecosystems.</td>
<td></td>
</tr>
<tr>
<td>Science as a way to investigate</td>
<td>analyze the types of human activities that can harm the local ecosystem</td>
</tr>
<tr>
<td>Science as a Way of Thinking</td>
<td>a. Let's practice</td>
</tr>
<tr>
<td>b. Let's try</td>
<td>c. Let's do it</td>
</tr>
<tr>
<td>d. Competence test</td>
<td></td>
</tr>
<tr>
<td>Science Interaction with Society</td>
<td>a. The relationship of every living thing in the balance of the ecosystem</td>
</tr>
</tbody>
</table>

The composition of the material that has been designed aims to make it easier for readers to understand the part of scientific literacy in the developed textbooks. In each chapter, there are indicators of scientific literacy that students must learn. Thus, students can focus more on the distribution of ecosystem materials from books that have been developed. The front of the textbook is made based on the existing environmental concept so that the cover and the contents of the book are still related to each other.
Discussion

The results of the development of the textbook were reviewed by expert lecturers from Medan State University. The validation of material expert lecturers is carried out by two lecturers from the Unimed postgraduate program, while for media and learning design by one expert lecturer each. Thus, the researcher used four expert lecturers in developing science textbook products based on Ecosystem material science literacy in elementary school. After filling in the score data on the instrument, suggestions and input were given regarding the development of textbooks that had been carried out.

The opinion of the material expert is that the material is still small, so it is necessary to add to the textbook material. Input from media experts, namely the size of the image in the book to be enlarged so that it is more clear for students to understand the image. Input from learning design experts is whether the pictures in the book are made in real form or not in the form of animation, and the picture is made as a description of the picture. The appearance of attractive textbooks is expected to increase students' desire to participate in learning activities both inside and outside the environment.

Aspects of the developed textbooks are stated to be very good invalidity because the product after being developed is by the indicators on the instruments that have been provided. Based on the score of the material expert, it is said that the material is appropriate so that it supports teaching and learning activities. The media aspect of the developed textbooks is said to be very good for use during teaching and learning activities. Because the product is by the expected presentation instrument. The learning design aspect is declared valid because it is following the expected presentation standards. The validity status in each category has been declared very good because it has been adjusted and compiled based on the grid from the assessment of the textbook instruments provided.

The product that has been developed makes students more active with the illustrations that are placed, with these illustrations students will be more enthusiastic and the interaction between educators and students is better. Based on the instrument category, it is known that the science literacy-based textbooks on ecosystem materials have been systematically prepared for students. The material chapters contained in the textbook make the surrounding environment the main material for the media in its preparation so that students have no difficulty in thinking about the types of examples given during learning.
4 Conclusion

The validity of the development of the product that has been developed has been in very good criteria so that the product is declared suitable for use for learning activities with ecosystem materials. The scientific literacy used has also been well structured based on suggestions and input from validation experts so that students can more easily understand the learning material by utilizing the scope of the material and also part of the learning that involves parts of the ecosystem. The score obtained is the expert lecturer presenter 88.90%, media experts 96.12, and learning design experts got a score of 94.79%. The score is obtained by conducting a study of the textbook using the specified instrument.

References

The Development Of Hand Puppet As A Creative Media To Improve Speaking Skills For Students In Class V Sd.Rk.No.1 Sibolga

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Abstract. The development of this hand puppet media aims to improve students' speaking skills. Students are actively involved in using hand puppets by presenting the text they have been working on. The research subjects were 30 students of class V B SD.RK No 1 Sibolga. This media development trial was carried out using the Steady method (five-stage method) which was modified from the results of the Borg and Gall design which included (1) Preliminary Research Phase, (2) Model Development Phase, (3) Model Validation Phase, and (4) Effectiveness Test Phase, and (5) Dissemination Phase. In the interview process with the fifth grade Indonesian language teacher, it was found that learning activities to achieve students' speaking skills based on KD 4.3 are usually carried out using the discussion method. Then one of them conveys the results of the discussion by reading. This method does not support the participation of all students in speaking, only active students will advance. This happens because of the lack of concrete media that involves all students playing an individual role. So the purpose of this development research is to develop hand puppets as creative media to improve students' speaking skills based on the validity and practicality of the media. Product validity can be seen from the results of the approval given by media experts through a validation process where the score obtained is 80% with a valid category, and the results of material validation get a score of 92% in the very good category, and the results of media validation with a score of 88.9% while practicality data is known from the increase in the percentage of students from 68.7% pretest results to 81% posttest results. From the results obtained both from the results of validity and practicality, the hand puppet media can be said to be a creative medium and suitable to be used as a learning medium to improve students' speaking skills.

Keywords: Media development, Hand Puppets, Speaking skills.
Introduction

Advances in technology today make children more busy using gadgets than interacting with other people, including their peers. This makes children less able to communicate with those around them. Communication is an interaction process that involves two or more people in sending and receiving messages (Alo Liliweri, 2017). Lack of communication can impact on speaking skills. It is the teacher's job at school how students can communicate with speaking skills. According to TW. Solchan (2020) the essence of speaking is the expression of one's thoughts and feelings in the form of language sounds. While Supriyana (2019) concludes that a person's level of speaking proficiency is seen from his level of understanding of the language. The more often students express their opinions, the better they are at speaking and have the confidence to communicate with their peers. These speaking skills are obtained from the educational path that teaches the use of standard language and exercises (Subhyani et al., 2018).

In the 2013 Curriculum, speaking skills are abilities that must be achieved by fifth grade elementary school students. Basic Competence 3.4 is to analyze the information conveyed by advertisement exposure from print or electronic media and Basic Competence 4.4 is to re-enact the information conveyed by advertisement exposure from print or electronic media in spoken, written and visual language. Students first make a summary of the existing text then students explain or explain the summary results using effective sentences in front of the class. These two basic competencies show that there is a relationship between listening and speaking skills. However, it is generally easier for students to write than to speak, meaning that students' speaking skills are still lacking.

Developing speaking skills cannot only depend on the activeness of the teacher but students must be actively involved in learning activities and give them the experience of speaking themselves. This means that students learn by experiencing the learning process themselves. Therefore, the development of speaking skills requires a method that requires the active participation of students. In this case the researcher uses a presentation method using hand puppet media. The development of learning media using hand puppets has a positive influence on students that hand puppets have a special attraction for students, (Dhieni 2011). Hand puppet media is an alternative to foster students' interest and interest in speaking. Tompkins and Hoskisson (Siti Mariana, 2014: 47) revealed that simple dolls can provide opportunities for children to develop creativity and dramatic skills.

Learning with hand puppet media makes students not bored and gain real experience during the learning process. In addition, making hand puppet media is very easy and simple, so teachers don't need to have trouble finding this media. This is in line with the opinion of Daryanto (2013: 33) which states the advantages of hand puppet media, namely: 1) efficient in terms of time, place, cost, and preparation; 2) does not require complex skills; 3) can develop children's imagination and activities in a happy atmosphere. Using media is one way to improve the learning process that is fun and has a positive impact on students. Students get all-time learning outcomes (Saragin, 2018). Hand puppet media is used as a creative medium in Indonesian language learning. Students are actively involved in performing or presenting, describing the content of the lesson in turns so
that they can achieve the KD 4.4 objectives, namely (a) practicing oral expression skills, (b) training self-confidence, (c) developing fantasy and imagination, and (d) fostering and developing attitudes, as well as good behavior. With the media of hand puppets, the level of speaking skills is getting better. The level of intellectual, emotional and spiritual intelligence of children develops because without realizing it, children will get used to memorizing and dare to appear in front of others.

Hand puppet media is a creative medium for teachers. The formulation of the problem is formulated as follows:

How is the process of developing hand puppet media as a creative medium to improve students' speaking skills?

How can the validation results of developing hand puppets improve students' speaking skills?

How is the effectiveness of hand puppet media as a creative medium in learning to improve students' speaking skills?

With the aim based on the formulation of the problem, namely to describe the process of developing hand puppets to improve students' speaking skills. Knowing the results of the validation of the development of hand puppet media to improve students' speaking skills. Knowing the effectiveness of developing hand puppet media to improve students' speaking skills.

The benefits of developing this media are addressed to several parties, specifically to the school, which is divided into three interests, namely Benefits for Students 1). The use of hand puppet media can improve students' memorization. 2). The use of hand puppet media can increase the interest and enthusiasm of students to speak fluently and confidently. 3). Students are able to use hand puppet media both at school and at home (if any). Benefits for teachers 1) The results of this development provide motivation in using appropriate media to improve students' speaking skills. 2) Provide new experiences that there are many methods to improve students' speaking skills 3). That by using the media learning activities will be more lively and enthusiastic. The benefits for schools are used as a basis for consideration to complete learning facilities and infrastructure in supporting the quality of student learning outcomes.

2. Research Methods

This study uses the Five-Stage Model (Stable) which is modified from the Borg and Gall design, namely the R&D model without reducing the existing one but having differences in the research stages to produce certain products and test the effectiveness of the product. This study focuses on students' speaking skills using hand puppet learning media. Development research serves to develop products, namely creating new products that have never existed before at SD.RK.No.1 namely hand puppet media devices and learning modules. The research stages were carried out according to the Mantap model developed by Sumarni and two other colleagues.
Phase I: Preliminary Research

Exploring research problems and limiting problems through analysis of the level of urgency and feasibility of problems to be researched. Finding the causes of problems, analyzing the relationship between problems and causes and analyzing the needs of the object of research.

Phase II: Product Development

Review relevant media to solve problems by creating new products or developing existing ones. Based on this analysis, the product structure is formulated according to the needs of the object.

Phase III: Conduct Product Validation Test

Testing the feasibility of the product qualitatively, quantitatively, or both. Qualitative product validation tests can be carried out through Expert Assessment with the Delphi technique, namely sending media concepts to one expert/expert for input.

Stage IV: Conduct Product Effectiveness Test

Conduct product trials both quantitatively and qualitatively. To get more comprehensive results, the research method used is the mixed method with limited group product trials. The determination of the trial subjects was selected by being controlled by the research objectives.

Stage V: Dissemination
Socializing and disseminating finished products. The results of the study strengthen the assumptions that have been there before with scientific analysis. The results of media research and development are disseminated so that many parties can take advantage of the products of the media development. Dissemination is done by:

Writing articles in national and international scientific journals and

Publish a book.

The research was conducted in SD.RK.No 1 class V B as the research subject because apart from being close to the researcher, hand puppet media did not yet exist in the school. The research was conducted using quantitative methods to obtain accurate data based on the responses given by both students as subjects and validators. The data used are in the form of 1). The student questionnaire contains statements related to the use of media. 2). Expert validation team questionnaire; questionnaire sheet to obtain assessment data from media experts and material experts, product design experts. Assessment is adjusted between media, materials and learning products.

Data analysis is based on the value of students' speaking skills practice, student responses, validation of the feasibility of the content of the material and validation of media feasibility by expert validators. The data were analyzed descriptively quantitatively, namely calculating the percentage of indicators for each category in the developed learning media, with the formula:

\[
\text{Percentage score} = \frac{\text{Number of indicators per category}}{\text{Number of category total indicators}} \times 100\% \quad (1)
\]

From the results of calculations using the formula above, a number is produced in the form of a percent. The score classification is then converted into a classification in the form of a percentage (Sugiyono, 2017:352), then interpreted with qualitative sentences, according to the table below:

<table>
<thead>
<tr>
<th>Score</th>
<th>Interval Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>81% ≤ X &lt; 100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>B</td>
<td>61% ≤ X &lt; 80%</td>
<td>Good</td>
</tr>
<tr>
<td>C</td>
<td>41% ≤ X &lt; 60%</td>
<td>Average</td>
</tr>
<tr>
<td>D</td>
<td>21% ≤ X &lt; 40%</td>
<td>Poor</td>
</tr>
<tr>
<td>E</td>
<td>0% ≤ X &lt; 20%</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

Which is made in the form of a Likert scale that has been given a score as in the table below;
Table 2 Answer Criteria for Validation Instruments

<table>
<thead>
<tr>
<th>No.</th>
<th>Answer Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Good</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Average</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Poor</td>
<td>1</td>
</tr>
</tbody>
</table>

3. Results and Discussion

1. Development of Hand Puppet Media to improve Students' Speaking Skills

   a. Hand Puppet Media Development Process

   The making of hand puppet media in this study is different from hand puppets in general. The basic materials are selected from soft materials, forming a pattern and sewing the pattern as the clothes used. The location of the development of this hand puppet product is to have costumes that can be replaced as desired so that the media is not only more cost-effective but also does not make you bored. On the head and clothes are glued so that the clothes stick to the head.

   The stages of making puppet learning media are as follows:

   Doll's head: The head is separated from the doll's body

   Forming a dress pattern: Determining the size of the clothes according to the size of the doll's head so that there is harmony between the size of the head and the clothes that will be worn on the doll. For the selection of shirt materials, skirts and pants are adjusted to the applicable school uniform or tailored to the needs.

   The pattern of the clothes is sewn like the clothes of school children in general
Table 3 The Steps for making hand puppets

<table>
<thead>
<tr>
<th>Process Description</th>
<th>Picture</th>
<th>Exp</th>
</tr>
</thead>
<tbody>
<tr>
<td>The head of the doll is shaped according to the needs.</td>
<td><img src="image1.png" alt="Picture" /></td>
<td></td>
</tr>
<tr>
<td>The adhesive cloth is sewn around the neck of the doll</td>
<td><img src="image2.png" alt="Picture" /></td>
<td></td>
</tr>
<tr>
<td>The fabric is shaped according to the doll's clothes pattern</td>
<td><img src="image3.png" alt="Picture" /></td>
<td></td>
</tr>
<tr>
<td>The pattern of the shirt is sewn using adhesive on the neck of the shirt.</td>
<td><img src="image4.png" alt="Picture" /></td>
<td></td>
</tr>
<tr>
<td>The clothes that are ready to wear are attached to the neck of the doll.</td>
<td><img src="image5.png" alt="Picture" /></td>
<td></td>
</tr>
</tbody>
</table>

b. Teaching Material Development Process

This study focuses on students' speaking skills based on Basic Competence 3.4, namely analyzing information conveyed by advertisement exposures from print or electronic media and Basic Competence 4.4, namely re-enacting information conveyed by advertisement exposures from print or electronic media in spoken, written and visual language. The teaching materials in the student book 5i Thematic Integrated Themes of **Objects in Our Circumstances** from the publisher
Erlangga that in KD 4.4 are Demonstrating information using spoken language and Competency Indicators in 4.4.1 are presenting information conveyed using spoken language.

The learning design carried out in the students' speaking skills learning activities is as follows:

The first meeting

The teacher conveys material about speaking skills. The teacher conveys what needs to be considered when practicing speaking skills in presentation activities, namely paying attention to speech (vocals), voice, expression, appearance, appreciation in accordance with the assessment of speaking skills based on linguistic factors.

Second meeting

The teacher presents promotional materials for making advertisements by paying attention to the elements of advertising. Students are given the opportunity to make advertisements, namely the promotion of the school where they have studied for five years. In making advertisements, you can use tools in the form of images related to schools.

Third Meeting

Carry out direct learning according to the Learning Implementation Plan as follows:

Initial Activity

The teacher opens the lesson by greeting and the teacher appoints one student to lead the prayer together, one of the students cleans the blackboard before the lesson begins.

Student attendance. The teacher checks student attendance.

The teacher triggers students' curiosity about the learning objectives.

The teacher explains the learning objectives, motivates students to be actively involved in the learning process.

c. Core Activities

The teacher introduces the hand puppet media to the students.

The teacher tells students about the signs in playing hand puppets before students try them, namely how to play the dolls must be right not to let go, the story is told enough, intonation must be considered, timing and speaking skills in storytelling need to be considered.

The teacher explains how to use hand puppet media and gives an example of how to use hand puppet media with storytelling material, namely by inserting the palm of the hand into the doll and then the fingers can be used to support the movement of the hands and head of the doll.

The teacher invites students to use hand puppets to present the promotional advertisements that they have done. During the presentation, the other students paid attention to their friend's
presentation, then followed by a question and answer session with the presenting student. The teacher gives freedom of time during the presentation so that students do not rush to convey their promotional exposure.

The teacher makes an assessment of the students who are presenting.

The teacher gives feedback to the students who have made their presentation.

d. End Activities

The teacher provides reinforcement and brief explanations and conclusions and holds questions and answers to all students to determine the level of development and increase in students' knowledge and understanding of advertising.

The teacher asks one of the students to conclude the lesson and give a reward for the student who makes a good presentation.

2. Validation of Hand Puppet Development as a Creative Media

Validation is carried out by experts using validation instruments and revising some points that need to be improved. Based on the questionnaire given, the validation results are as follows: 1) the results of the validation carried out by media experts on the developed design were obtained with a percentage of 98.07% with very good criteria (VGB). 2) the results of the validation carried out by learning materials experts as the first validators of the product design developed obtained a score of 144 and a percentage of 92.3% with very good criteria (VGB), 3) the results of the validation carried out by design experts on the developed designs were obtained by the total score is 94 with a percentage of 92.5% with very good criteria (VGB).

3. Test the effectiveness of Hand Puppets as Creative Media

The effectiveness of learning hand puppets as creative media is known through learning outcomes tests. The form of test used to test the effectiveness of hand puppet learning media as a creative medium is an essay test. The essay test was taken in two stages, namely pretest (before) and posttest (after) using hand puppets. The purpose of the pretest was to determine the average initial ability of students before using hand puppet learning media as a creative medium in learning. While the posttest aims to determine the ability of students' speaking skills using hand puppets.

The effectiveness of the learning process without using hand puppets got a score of 2063 with an ideal score of 3000, while the effectiveness of the learning process using hand puppets got a score of 2430 with an ideal score of 3000. The difference between the pretest and posttest percentages was 12% with the posttest score better than the pretest. So, the contribution of the effectiveness of the use of hand puppets as creative media in the presentation text material is 12%. In conclusion, hand puppets as creative media in learning are more effective by 81% in the good category and the effectiveness of the lecture method by 68.7% in the less category. So hand puppets as creative
media are declared effective to be used as additional teaching materials for students in the text presentation material.

Table 4 Summary of the Average Pretest and Posttest

<table>
<thead>
<tr>
<th>No</th>
<th>Group</th>
<th>Score Averages</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before (Pretest)</td>
<td>68.7</td>
<td>11.3</td>
</tr>
<tr>
<td>2</td>
<td>After (posttest)</td>
<td>81</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows that the difference from pretest to posttest scores obtained is 12 with an average pretest of 68.7 on the "enough" criteria and an average posttest of 81 on the "good" criteria. It can be concluded that learning to use hand puppets as creative media can improve student learning outcomes in learning Indonesian, especially students' speaking skills.

From the results obtained, it can be concluded that hand puppets function as media that should be taken into account to involve students in speaking skills with presentation activities or explain texts so that students are more active in expressing learning content using hand puppet media, not only that students may be more interested to play it. With hand puppet media students can have speaking skills which he pours out by expressing during presentations according to the speaking method that students have learned.

Not only that, hand puppet media makes students enthusiastic about participating in learning and encourages students to be active in learning, makes students understand the material using hand puppet media, can make students work well in groups even though the class conditions and situations become very crowded but the class can still well controlled by the teacher. This is in line with the theory "the most important thing from using hand puppets in learning activities is that each student gains new experiences to improve speaking skills." (Gunarti, 2010:10). The development of learning media to achieve speaking skills using hand puppets has a positive influence on students that hand puppets have a special attraction for students. Learning with hand puppet media makes students not bored and gain real experience during the process.

4. Conclusion

1. Conclusions

Based on the description of the research results, conclusions can be drawn relating to the development of hand puppets as creative media for the fifth grade students of SD. RK. No. 1 Sibolga, conclusions obtained based on the formulation of the problem, research objectives, results, and discussion, can be described as follows:
Based on the results of the needs analysis obtained a score of 85% indicating that teachers and students need hand puppet media in the learning process. Media design to be appropriate media helps the effectiveness of learning with a score of 81%.

Based on the results of the distribution of learning media in the expanded trial, the total score was 4731 with a percentage of 81.5% with Good (B) criteria. So from the results of the motivation stated. Based on the results of the calculation of the questionnaire to see the motivation of students in the expanded trial of the development of hand puppets as creative media, the total score was 4731 with a percentage of 81.5% with criteria Good (B). So from the results of the motivation, it was stated that hand puppets were effective as a medium to improve students’ speaking skills.

2 Suggestions
Learning outcomes of text exposure using hand puppets as creative media have been described at the conclusion of the research results of developing hand puppet media. Hand puppet media in learning is expected to be used in the learning process outside and inside the classroom to help students actualize themselves in learning materials. The research products in the form of hand puppets and teaching materials are expected to be used as a reference for research on the development of the next learning teaching materials. The results of this study are expected to be able to carry out further and in-depth research on learning text exposure, the need for collaboration between educational institutions because in this study it has limitations and needs to be followed up in the steps of this research by conducting the same study, but at different locations and schools. which can play a role in enriching and adding additional data on cases of educational institutions to be used as evaluation material.

References

Higher Order Thinking Skills Students Of Water Cycle Materials Through *Flipbook-Based Electronic Textbooks*

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Abstract. This study aims to develop a flipbook-based electronic textbook on learning science water cycle material. This type of research uses the Development Research method which uses the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model. This study involved 25 VA class students of SD Alulum Terpadu Medan for the 2021-2022 school year using data analysis techniques carried out by direct observation, interviews, questionnaires, and questionnaires. The results showed that the foldbook-based electronic textbooks developed have met BSNP standards. The results of the standardization of the development of flipbook-based electronic textbooks based on BSNP carried out by textbook feasibility expert validators obtained 90.71% were declared very feasible. As for the feasibility value of the media / design by IT experts, a value of 90% was obtained with very decent criteria, and the N-Gain value was obtained 0.64 with a medium category. So that it can be concluded that the flipbook-based electronic textbook is valid and can be used in the learning process.

Keywords: Electronic textbook, Flipbook, Higher Order Thinking Skills (HOTS)

1. Introduction

Education has an important function for humans to welcome an environment that is constantly undergoing changes. Education is an effort made by humans to categorize their inner abilities towards a better direction. Education has an important role as the process of making the individual into himself [1].

The target of learning in the 21st century is to encourage students to become active learning in order to be able to seek, find, construct, process, use their knowledge so as to create a meaningful learning. The processes of active students in the 21st century have been adapted in the education system in Indonesia through the current 2013 curriculum through a scientific approach. The process of applying science in learning is carried out by involving 5M procedures, such as observing, questioning, trying, reasoning, and communicating. Therefore,
the context of the learning process is directed to encourage students to find out from various sources (observation), be able to formulate problems (questioning) not just solve problems [2].

Natural Sciences (IPA) is one of the eight learning content that needs to be mastered at the elementary school education level. In classes I, II, III, science content is integrated in Indonesian content, while in grades IV, V, VI, science becomes a stand-alone learning content in integrated thematic learning. Science learning is a process and outcome-oriented learning [3]. The science learning process in elementary schools not only focuses on comprehension abilities but also on the development of critical thinking skills [4]. Science learning must be developed to be student-centered, where learners strengthen problem-solving skills and increase curiosity in each learning process [5]. The water cycle material is one of the materials in science learning which contains an explanation of how the process of the water cycle occurs, human activities that can affect the water cycle, and how to save water [6]. This material is very important to be taught in elementary schools with the aim that students know and understand how to behave towards nature and to have a caring attitude towards nature [7].

One of the learning resources that can be used in the science learning process that is in accordance with the demands of the industrial revolution era 4.0 is electronic books which are often referred to as e-books. Electronic textbooks have become popular because they combine conventional teacher teaching materials into electoral teaching materials that can be accessed anytime and anywhere. The practicality of electronic textbooks is also recognized by many parties because they contain animations that are presented multimedia by combining text, audio and visual [8].

Based on the results of interviews and observations with class V teachers of SD Swasta Al-Ulum Terpadu Medan, it shows that the results of learning science are still below the KKM set by the school, namely 78. This is due to several factors both from the teacher and from the students themselves. Most students have difficulty in understanding a material, especially in science learning. Their memory cannot last long because when the learning process students only rely on explanations from teachers with conventional learning methods. Another problem is that the learning resources used are less varied, only utilizing existing images, the learning model that is often used is the discussion method, while other learning methods have been carried out, but to carry out the method requires energy and a long enough time so that the learning process is not carried out optimally. In addition, the books used by students currently still use the package books given by the Ministry of Education and Culture revised in 2018 and a companion book entitled "I'm Ready" published by the publisher Pustaka Mulia which contains several thematic subjects along with a collection of questions, and the two books used are still in the form of printed books, so that the source of student information is still limited.

The textbook references used are found to be a lot of incomplete discussion of material and a fairly wide scope of material, then the presentation of images is less supportive such as unclear meaning of the image, so the meaning or intention of the image is not understood by students so that students must think abstractly to understand the material, especially in science learning class V semester 2, one of which is on theme 8 "Our Friends Environment" water cycle material. Whereas in 2013 learning. Based on observations of the teaching and learning process and student learning outcomes are classified as low. This is also supported by data on science learning outcomes on the UTS scores of VA class students at Al-Ulum Integrated Private Elementary School Medan totaling 25 students with a KKM of 78, where there are still many average student completion scores below KKM in the VA class of students who have not reached KKM as many as 19 people and students who have reached KKM as many as 6.
people or around 76% of students who are not completed on the UTS exam.

Therefore, to support the science learning process, it is necessary to develop *flipbook-based electronic textbooks* which are the development of e-books as an alternative in making it easier for students during the science learning process which is expected to improve high-level thinking learning outcomes, especially water cycle materials.

As stated by Sitepu [9] that a set of materials that have been adapted to the curriculum that has been set in writing or unwritten and described in sequence can be referred to as textbooks that are used as manual guidelines for teachers in carrying out learning and also as the main reference for students to learn. So based on this description, it can be said that the existence of textbooks plays a very big role in the success of the learning process.

Agreeing with this according to Sukerni [10] the benefits that can be obtained by developing a companion textbook are that the material and discussion are obtained that are broader and more detailed both in more knowledge and information, the variety of science is also more numerous and diverse for students to learn. Therefore, this reason makes the development of textbooks important to do as a way to improve the quality of learning. Along with the development of technology, a book is not only in print, or sheets of paper, but can also consist of various types such as Prastowo's opinion [11] when viewed from its nature textbooks are divided into four types, namely print media-based textbooks, technology-based textbooks, textbooks with special steps, and interactive textbooks.

Based on the description above, it is considered necessary to develop *flipbook-based* electronic textbooks with the aim of producing flipbook-based electronic textbooks that are feasible according to textbook feasibility experts and media / design according to BSNP criteria.

### 2. Research Method

This research uses research and development methods (*Research and Development*). The development model used in this study is ADDIE which has five steps or stages that include aspects of analysis, design, development, implementation, and evaluation, at the implementation stage using a Pre-Experimental Design research design in the form of *One Group Pretest-Posttest* i.e. with only one class as an experimental class (with treatment) [12]. The data analysis technique used in this study is the analysis of data on the validity of textbooks and the media / design of flipbook-based electronic textbooks in science learning.

<table>
<thead>
<tr>
<th>Score</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Excellent</td>
</tr>
<tr>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Not Good Enough</td>
</tr>
<tr>
<td>1</td>
<td>Very Bad</td>
</tr>
</tbody>
</table>

Table 1. Expert Validation Assessment Score

Then the resulting score is analyzed using the percentage of the score by using the formula:
The calculation of the validation result data using the formula above will produce a number in the form of percent, then changed to a classification in the form of a percentage, the next step is to determine the level of feasibility of the textbook based on the results of the research that has been carried out. Then categorized with qualitative sentences as listed in Table 2.

<table>
<thead>
<tr>
<th>Percent Interval</th>
<th>Value</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>85,01%-100%</td>
<td>Excellent</td>
<td>or can be used without revision</td>
</tr>
<tr>
<td>70,01%-85,00%</td>
<td>Either, or</td>
<td>usable but needs a minor revision</td>
</tr>
<tr>
<td></td>
<td>should be</td>
<td>revised</td>
</tr>
<tr>
<td>50,01%-70,00%</td>
<td>Not good</td>
<td>it is recommended not to be used because it needs a major revision</td>
</tr>
<tr>
<td>01,00%-50,00%</td>
<td>Not good, valid</td>
<td>or should not be used</td>
</tr>
</tbody>
</table>

3. Result and Discussion

A. Result

This development research uses the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model.

Analysis

The results obtained in the early stages of the analysis are that the textbooks used in the learning process are still in the form of printed books published by the Ministry of Education and Culture and contain several subject content that is incorporated into thematic learning so that the material on science learning is still minimal, learning outcomes, especially in science learning are still relatively low, this is seen based on the results of UTS scores in science learning where the predetermined KKM value is 78 and the results obtained that only 6 students were completed in the process activities.

Design

The design of electronic textbooks is based on the 2013 curriculum syllabus and book analysis. The advantages of each book are taken for use in the design and development of textbooks. Textbooks developed with several references from the internet and several textbooks that contain material on the water cycle in science learning. The book developed has an appeal to read, the material discussed is easy to understand and clear, there are project tasks, in each chapter there are practice questions, there are final evaluation questions, and glossaries so that students are actively involved in the learning process and the language used is communicative. Electronic textbook creation developed using the flipbook application is one of the flipbook applications that is easy to use and can be accessed online, namely Heyzine Flipbooks.
Figure 1. Electronic Textbook Cover Design

At the design stage, electronic textbooks combine learning media with learning resource materials about the water cycle in science learning. In electronic books, there are materials, material summaries, practice questions, and there are learning videos packaged in electronic books (e-books) using the Heyzine Flipbooks application. The use of flipbook maker-based electronic textbooks (e-books) can facilitate students in the learning process both at school and at home.

Development

In the development stage, it aims to determine the quality assessment of the products that have been developed, the results of validation of the feasibility of textbooks and the validation of media / design of flipbook-based electronic textbooks in accordance with the modified National Standards Board for Education (BSNP).

The results of the validation of lecturers and teachers who are experts in the feasibility of flipbook-based electronic textbooks on water cycle material in class V science learning can be seen in Table 3.

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Total Items</th>
<th>Average Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Eligibility of Contents</td>
<td>26</td>
<td>91,11</td>
<td>Excellent</td>
</tr>
<tr>
<td>2</td>
<td>Language Eligibility</td>
<td>20</td>
<td>90,00</td>
<td>Excellent</td>
</tr>
<tr>
<td>3</td>
<td>Feasibility of Presentation</td>
<td>9</td>
<td>90,28</td>
<td>Excellent</td>
</tr>
<tr>
<td>4</td>
<td>Chart Eligibility</td>
<td>15</td>
<td>91,25</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td><strong>Total Average Percentage</strong></td>
<td></td>
<td><strong>90,66</strong></td>
<td><strong>Excellent</strong></td>
</tr>
</tbody>
</table>

Based on the results of the percentage of eligibility of electronic textbooks of 90.66%, it can be concluded that flipbook-based electronic textbooks are categorized very well. For the results of the media assessment / flipbook-based electronic textbook design carried out by expert lecturers, the results in Table 4 were obtained.
Table 4. Media Feasibility Assessment / Flipbook-Based Electronic Textbook Design water cycle material in science learning Class V elementary school

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Total Items</th>
<th>Average Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover Design</td>
<td>2</td>
<td>93.75</td>
<td>Excellent</td>
</tr>
<tr>
<td>2</td>
<td>Content Design</td>
<td>4</td>
<td>87.50</td>
<td>Excellent</td>
</tr>
<tr>
<td>3</td>
<td>Highlights of the Look</td>
<td>4</td>
<td>84.38</td>
<td>Excellent</td>
</tr>
<tr>
<td>4</td>
<td>Content Feed Suitability</td>
<td>2</td>
<td>87.50</td>
<td>Excellent</td>
</tr>
<tr>
<td>5</td>
<td>Ease of Use</td>
<td>3</td>
<td>100.00</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>Total Average Percentage</td>
<td></td>
<td>90.63</td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the calculation of the percentage of feasibility of media / design of flipbook-based electronic textbooks of 90.63%, it can be concluded that the media / design of flipbook-based electronic textbooks is categorized very well.

Implementation

At this stage, the developed electronic textbooks have been validated and improved according to the suggestions of the validators, so that the developed electronic textbooks have been feasible to be applied in the learning process of science water cycle materials. This research was carried out on April 18, 2022. The samples in this study were class students of Al-Ulum Integrated Private Elementary School Medan.

Evaluation

At this stage after implementing the application of the flipbook-based electronic textbook that has been developed, to measure students' high-level thinking ability through the flipbook-based electronic textbook that has been developed can be calculated through N-Gain. After being given pretest and posttest, it is known the gain results obtained from each participant

Table 5. Results of Calculating N-Gain Value to Improve Student Learning Outcomes

<table>
<thead>
<tr>
<th>Number of Learners</th>
<th>Average Value</th>
<th>N-Gain</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttes</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>61.9</td>
<td>87.8</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Based on Table 5 shows that the average N-Gain of learners is 0.64 in the Medium N-Gain criterion. So with the application of flipbook-based electronic textbooks can affect students' higher-order thinking ability

B. Discussion

The results of this study are related to the development of flipbook-based electronic textbooks to improve the learning outcomes of higher-order thinking in learning science water cycle materials. Books are an indispensable learning resource during the learning process, books have been systematically arranged in order to help students understand the material and achieve learning objectives [13]. In today's digital era, books can be presented in physical form or presented in a simpler and more interesting embodiment, namely in the form of electronic books (e-books) or non-physical books. Electronic books can be compiled with
multi-media applications because they can combine various media in the form of text, images, graphics, music, animation, video, and interaction into a digital file, and can be used as a message to users of the book [14]. *Flipbook* is often known as a professional PDF, flipbook software can turn PDF into HTML5 or flash with 3D animation that can be used on various devices such as computers / android. The manufacture of electronic textbooks must be in accordance with the assessment of the National Standardization Board for Education (BSNP) as textbooks that are worthy of use in the learning process. Based on the results of the validation calculations of media experts 90.63% and design 90.66%, it can be concluded that the media / design of flipbook-based electronic textbooks is categorized very well. The results of this study are in accordance with the results of Hayati's research [15] the results of this study show that based on the results of validation by media experts, it is obtained results of 91.46% and from meter experts by 94.17%, it can be concluded that electronic textbooks are able to display interactive simulations by combining reading text, images, audio, video, and animation, so that the learning process can take place interestingly and fun.

The creation of a *flipbook-based* textbook used in this study was made using the *Microsoft word* application, after it was typed, the raw file of the textbook was converted into PDF form. After the textbook file becomes a PDF, the file is uploaded to the *hayzine flipbook* website and then the researcher can edit the flipbook-based electronic textbook that is already based online. Electronic textbooks are edited to make it look more interactive and can make it easier for students to use and learn the subject matter in the book. The creation of this flipbook-based electronic textbook can actually use the *3D Page Flip Pro, Kvisoft Flipbook Maker* and *Flipbook Maker Pro* applications. However, considering that the application is a paid application, but the output produced is not much different from making electronic textbooks through the *hayzine flipbook* website, therefore, researchers choose to make flipbook-based electronic textbooks using the website. One of the advantages in the use of flipbook-based electronic textbooks is the ease of making them that are felt by researchers and then in their operation which is felt by students, so that according to researchers learning by using electronic textbooks is better and can improve student learning outcomes [16].

4 Conclusion

The results of the validation of the development of *flipbook-based* electronic textbooks in improving high-level thinking on water cycle materials get the results of the validation of the feasibility of flipbook maker-based electronic textbooks the development results have been valid (very feasible) to be used according to the BSNP (National Standards Agency for Education) which has been modified with a value of 90.66% for the feasibility of flipbook-based electronic textbooks and flipbook-based electronic textbook media/design of 90.63% (very feasible). So textbooks can be used in the learning process to help students' higher-order thinking abilities on water cycle materials.

References


Development Edmodo Of Based On Learning Media With Zoom Meeting Applications And Whatsapp Social Media To Increase Learning Outcomes And Student Learning Motivation At SMA Swasta Jaya Krama Beringin

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¹, ², ³

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Abstract. The purpose of the research is to evaluate the viability and efficacy of learning media created with the intention of enhancing educational outcomes and to ascertain how students' learning motivations interact. The ADDIE technique is used in this study. The SMA Swasta Jaya Krama Beringin served as the research site for this project. Class X MIA served as the research's sample. The study's findings are based on instructional materials that have been created and that are legitimate (eligible) for use in economics classes. based on the evaluation of the material, learning design, and media expert validators. The student educational outcomes based on learning media underwent adjustments that were successfully applied in economic learning, and the validator received 85% in the "very feasible" category. students' education.

Keywords: Based Learning Media, Motivation, Educational Outcomes

1 Introduction

Student learning outcomes can be used to judge a program's effectiveness. Students' educational outcomes can be seen from their achievement as measured by their scores on Daily Tests, Mid-Semester Exams, and Final Semester Exams. In reality, there are still many students whose learning outcomes are low. According to Purwanto (2010: 44), learning outcomes are teaching and learning processes that are in accordance with educational goals and make reference to changing behavior that occurs.

The learning process may be impacted by numerous things. Shah (2011: 145) classifies the elements that affect learning outcomes into three categories: There are three types of components: 1) internal aspects, which include pupils' emotional and physical health; 2) environmental circumstances nearby; and 3) external ones. A learning strategy is a kind of student learning
endeavor that entails the tactics and techniques that students employ to carry out tasks related to subject-matter study. Ayuba (Yusni: 2017) asserts that the use of learning media that are appropriate to students' needs for learning materials and can encourage students to learn can motivate students in the implementation of learning and increase the learning outcomes attained. The need to improve learning outcomes through the

25 kids from class X MIA SMA Swasta Jaya Krama participated in the experiment. The question consists of four questions in the form of a description and has been studied, but only 36% of the 25 students who took the test demonstrated complete learning, and 74% scored below the KKM.

Based on the findings of their interviews with students and teachers, the authors learned that there was a difference during the Covenant-19 epidemic because, unlike today, when teachers used to teach face-to-face in the classroom, they now educate online or remotely. When students are at school, the teacher directly teaches them the topic from start to finish and can easily see how much of it they have understood. When teaching online, teachers sometimes encourage their students to ask questions if they don't understand, but doing so makes it difficult for them to keep track of how well their pupils are learning. Because it is transmitted via photos, PowerPoint, or written summaries shared over WhatsApp, the teacher's material is not optimal. It will affect pupils who are

One factor that is closely related and can support student learning outcomes in learning is student learning motivation. According to Sukmadinata (2005: 61), motivation is a force that drives individual activities, conditions within individuals that encourage or move individuals to carry out activities to achieve goals. As with learning motivation, the drive that exists in students to achieve maximum learning outcomes. Students will make various efforts to get factory results if they have good motivation. According to Sumadi Suryabrata (2002: 70), motivation is a state in a person's personality that encourages people to carry out certain activities to achieve goals. It can be concluded that learning motivation is a condition that exists within the individual that encourages students to learn and perform certain activities to obtain maximum learning outcomes and goals.

In accordance with the adoption of COVID-19, the government, through the Ministry of Education and Culture, issued guidelines for home learning for all schools and madrasas. These guidelines also included a directive for all educators or education personnel to conduct their work from home, or what is known as "Work from Home." This is being done to stop the COVID-19 transmission chain. As a result of this policy, teachers and students can no longer learn together in person as they typically do in the classroom; instead, they must communicate virtually using an online platform.

This is the best period for student learning to occur. Teachers are still working to make the most of online systems that use the internet as one of the learning medium for distance learning. In addition, instructors are compelled to alter commonly used learning models or methodologies. digitalizes the classical. The paradigm and method of information delivery in the field of education have changed as a result of the rapid growth of technology and information. The present learning media will expand as a result of using internet access as education technology advances. The
technology of the present day has also been able to use the technology of recent years, including traditional teaching techniques. Using e-learning is one of the various technologies available today that we can utilize for learning. Students can now experience changes in their many potentials in addition to being able to understand the material thanks to the introduction of e-learning as a type of educational innovation.

With the use of information and communication technology, students can now learn at any time and through any application (Dahiya, 2012). The 1970s saw the beginning of electronic learning, or e-learning (Waller and Wilson, 2001). E-learning is defined as structured learning with the intention of using an electronic or computer system by Michael (2013: 27). It might assist with studying. According to Nursalam (2008:135), the following are the characteristics of e-learning: (1) electronic technology services; (2) computer excellence; (3) the use of independent teaching materials that are then stored on the computer, allowing lecturers and students to access them whenever and wherever they are needed; and (4) the ability to view learning schedules, curriculum, progress results, and issues relating to educational administration at any time on a computer.

There are various e-learning media available. However, not all educators are skilled in the use of technology. For this reason, in order to maintain the highest level of student learning, we require an e-learning medium that is comparatively simple to operate and has good teacher-use capabilities. By adopting an online/online system and e-learning as one of the learning medium, educators aim to maximize remote learning. Additionally, educators are pressured to adapt traditional teaching methods or digital learning tactics. E-learning media have various kinds. For example, Google Classroom, Moodle, and Schoology. The social media involved in supporting e-learning are Instagram, WhatsApp, Twitter and E-mail. The web meeting application that is often used is zoom meeting and Google meet. So, in this study, the e-learning media used was Edmodo, supported by WhatsApp social media and the use of video conferencing was zoom.

Edmodo is the program utilized as a teaching tool. "Edmodo is an appealing social networking tool for instructors and students with a feature that resembles Facebook, however there is actually more value in this app” (Basori, 2013). With Edmodo, learning is flexible and not constrained by time or place. Meanwhile, Edmodo is a social networking-based website with a variety of educational content, according to Zwang (Hadi: 2018:64). With features similar to Facebook, Edmodo is an extremely appealing social media site for educators and students. Because it offers the best and most useful features, the Edmodo program makes it very simple for teachers to carry out the learning process and simply control the activities of their students. The Edmodo application's capabilities, which include sharing learning resources, assignments, quizzes, polling, groups, announcements, notes, and the comment feature that students may use, all make learning activities simple to use. The teacher supervises student learning activities on Edmodo in order to maintain a positive learning environment.

According to Wankel (Usman, 2016:3297), "the advantage of Edmodo is that it is easy to send files, images, videos and links, and easy to create groups for separate discussions according to certain classes or topics". According to Vittorini (Usman 2016:3297), "the lack of Edmodo is that
it does not have the option to send closed messages between fellow students, communication between students takes place globally within the group”. In using Edmodo, the language used must be formal and clearly there should be no word abbreviations in using the language. Teachers and students must also work together to achieve the expected goals and learning process.

There is a previous study by Lila Listiyani whose results show that the learning media used is very effective in improving student learning outcomes. Furthermore, according to Pardanus’ research (2016) entitled Development of e-learning in Operating System Subjects for Class X Smk N 3 Manado, the results show that e-learning media using Edmodo is an attractive, efficient and effective medium, and can improve student learning outcomes.

From the explanation above, it can be concluded that the Edmodo application is an attractive and effective medium, so that it can improve student learning outcomes. Therefore, researchers are interested in conducting a study entitled "Development of Edmodo-Based Learning Media with Zoom Meeting Applications and WhatsApp Social Media Improving Learning Outcomes and Motivation of Oktafulana (2015), entitled Development of Learning Media on Competency Standards Applying Fundamentals of Digital Techniques Assisted by Edmodo Classroom X Tei at State Vocational High School 3 Jombang studied at Krama Beringin Private High School.”

2. Theory

The media has only ever been a teaching tool in the history of education. In contrast to today, the availability of learning media can also encourage, stimulate, and support kids' intellectual and emotional development. At first, the tools used were visual aids, namely in the form of tools that can provide experience through the sense of sight to achieve learning objectives. It can clarify and facilitate abstract concepts, and enhance absorption, but currently its function must be able to motivate learning, generate student creativity and learn to think at a high level (Rusman, 2013: 160). According to Sudjana (2009:2), Learning media can improve how students learn in the classroom, which is anticipated to improve how well students learn. The benefits of learning the media will certainly enhance the process and learning outcomes. There are several benefits of learning the media, according to Sanjaya (2012: 70), revealing the benefits of learning the media in particular, namely: Capture a certain object or event. Manipulating certain circumstances, events, or objects. Increase passion and motivation to learn.

Learning outcomes are the results of a relationship between the act of learning and the act of teaching, claims Dimyati (2006:3). The process of evaluating learning outcomes marks the conclusion of the instructional action from the perspective of the teacher. Learning outcomes represent the end of the learning process from the perspective of the students. Then, according to Shah (2003:213), "Learning achievement is an ideal learning outcome that includes all psychological domains that change as a result of the experience and learning process of students". According to Ahmadi and Supriono (2004:138), in order to help students obtain the best learning outcomes, it is crucial to introduce the components that affect learning achievement. Learning
achievement is influenced by both internal and external influences, specifically as follows: Internal variables are categorized as:
1. Physical characteristics (physiology) can be inherited or acquired. These elements comprise sight, hearing, body composition, and others.
2. Congenital and acquired psychological variables include:
   a) Talent and intelligence are potential influences.
   b) The accomplishments that have been made are the true indicator of skill.
   b. Non-intellectual variables, such as specific personality traits like attitudes, routines, interests, wants, drives, and emotional responses.
   c. Characteristics of physical and mental maturity

3. Research Method

At SMA Swasta Jaya Krama, located on Jalan Mimbar Umum Pasar VI Sidodadi Ramunia, Beringin, and Deli Serdang, this study was carried out. This study was carried out in class X MIA throughout the 2021–2022 school year. With the aid of Edmodo, research was done to create learning materials on economic topics. Making relevant learning materials is the aim. This kind of research is development-oriented (R&D). The ADDIE development model, which is an extension of analysis, design, development, implementation, and evaluation, is used in this study's creation.

A quantitative method will be used in further experimental study to examine the outcomes of this development. Researchers aimed to explore how to use produced media to improve student learning results and motivation. The results of a learning motivation questionnaire and post-test data were employed in the technical analysis of the data, which was a 2-way ANOVA test. All of the participants in this study were members of class X MIA, which had three classes total. Class X MIA1 served as the experimental class in this study, and class X MIA2 served as the control class.

4. Results and Discussion

It was discovered that the device developed was Edmodo-based learning media with Zoom Meeting Applications and Whatsapp Social Media to increase student motivation and student learning outcomes by using the ADDIE development model. This conclusion was reached based on the description of the research results that have been described in the research results section. Analyses, designs, development, implementation, and evaluation are extended in an R&D development model with the ADDIE approach. The validity and efficacy of the outcomes of the development of learning tools will be evaluated.

Based on validation through a series of trials and revisions that have been carried out, the Edmodo-based learning medium already has a valid status. The trials were carried out in seven stages: 1) media expert validation, 2) learning design expert validation, 3) material expert
validation 3) individually, in small groups, and in the field. Table 1 below shows the findings of the evaluations provided by several professionals and student trials:

1. Feasibility of using Edmodo-Based learning media with Zoom Meeting Applications and Whatsapp Social Media to increase learning motivation and student learning outcomes.

Table 1: Assessment Results on Edmodo-Based learning media with Zoom Meeting Applications and Whatsapp Social Media

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>%</th>
<th>Average Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Media Validation</td>
<td>84%</td>
<td></td>
<td>Very worth</td>
</tr>
<tr>
<td>2</td>
<td>Learning Design Validation</td>
<td>84%</td>
<td></td>
<td>Very worth</td>
</tr>
<tr>
<td>3</td>
<td>Material Validation</td>
<td>80%</td>
<td></td>
<td>worth</td>
</tr>
<tr>
<td>4</td>
<td>Individual Test</td>
<td>96%</td>
<td></td>
<td>Very worth</td>
</tr>
<tr>
<td>5</td>
<td>Small Group Trial</td>
<td>82%</td>
<td></td>
<td>Very worth</td>
</tr>
<tr>
<td>6</td>
<td>Field Trial</td>
<td>84%</td>
<td></td>
<td>Very worth</td>
</tr>
<tr>
<td></td>
<td>Rata-Rata</td>
<td>85%</td>
<td></td>
<td>Very worth</td>
</tr>
</tbody>
</table>

According to the table of results from the feasibility assessment of the Edmodo-Based Learning Media with the Zoom Meeting Application and WhatsApp Social Media, which was developed with an average percentage score of the overall variable score of 85%, it is categorized as "Very Good" Edmodo-Based Learning Media with the Zoom Meeting and Social Application. The produced Whatsapp medium has shown to be effective for usage in the teaching and learning process.

According to the study's findings (Fadloli, 2014), Edmodo-based Learning Media, expert review test results obtained an average score of 79%, small group trials obtained an average score percentage of 82%, and field trials obtained an average score percentage of 81%. Media experts received an average percentage of 85%, and experts in the field of media received an average percentage of 86%. In order for this Edmodo-based blended learning platform to be utilized as a learning tool.

Furthermore, the results of research (Barus, 2018) state that learning media by utilizing E-learning Media (Edmodo) on Local Area Network subjects is feasible to use. From the data obtained through existing questionnaires, overall, respondents rated E-learning learning media very interesting, creative and structured and met the eligibility indicators of 4.77 from material experts and 4.66 from students' Very Good criteria.

From the discussion above, it can be concluded that the development of the media is feasible to be used as a learning tool. Edmodo-Based learning media with the Zoom Meeting Application and Whatsapp Social Media can be used as a medium for economic learning in class X MIA1.

2. The Effectiveness of Edmodo-Based Learning Media With Zoom Meeting Applications And Whatsapp Social Media To Increase Learning Motivation And Student Learning Outcomes
Because each research participant's number is unique, the hypothesis will be tested using the 2x2 factorial analysis of variance (Anava) method and then further tested using the Scheffe test. The SPSS 21 program was used to process the data in order to produce the hypotheses' outcomes, which were as follows:

**Table 2. Hypothesis Test Results Using SPSS 21**

Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>2104.420*</td>
<td>3</td>
<td>701.473</td>
<td>20.087</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>400095.900</td>
<td>1</td>
<td>400095.900</td>
<td>11457.146</td>
<td>.000</td>
</tr>
<tr>
<td>Learning Media</td>
<td>165.186</td>
<td>1</td>
<td>165.186</td>
<td>4.730</td>
<td>.030</td>
</tr>
<tr>
<td>Learning Motivation</td>
<td>337.567</td>
<td>1</td>
<td>337.567</td>
<td>9.667</td>
<td>.002</td>
</tr>
<tr>
<td>LEARNING MEDIA * Learning motivation</td>
<td>1526.853</td>
<td>1</td>
<td>1526.853</td>
<td>43.723</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>1955.580</td>
<td>56</td>
<td>34.921</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>407500.000</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>4060.000</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .518 (Adjusted R Squared = .493)

Based on this data, it could be concluded that using Edmodo-based learning resources along with Zoom meeting applications and WhatsApp social media revealed outcomes of $F_{count} > F_{table}$ at a significance of 0.030 less than 0.05. It illustrates how students who are taught using Edmodo-based learning resources and the Zoom Meeting application learn economically. This research hypothesis is accepted based on the economic learning results of students who are taught utilizing Google Classroom and WhatsApp medium. Motivation displays the $F_{count} > F_{table}$ results with a significance level of 0.002, which is lower than 0.05. It demonstrates that students who are motivated achieve better results in economic learning than students who are less motivated, supporting the validity of the research hypothesis. The findings of $F_{count} > F_{table}$ at a significance of 0.000 less than 0.05 indicate that there is an interaction between the utilization of Edmodo-based learning media with the Zoom Meeting application and student motivation. This suggests that the application and Edmodo-based learning resources are interacting. This research hypothesis is supported by Zoom Meeting and student motivation for economic learning results.
According to the results of previous research (Muhajir, 2019), it is stated that the average value of the pre-test of the experimental group was 40.74 and the post-test was 80.31, while the results of the pre-test of the control group were 53.98 and the post-test value was 67, 65 then the student learning outcomes or post-test results of the experimental class students are higher than the post-test results of the control class. Meanwhile, according to the t-test calculation, the average post-test score for the control class is 80.53 and the post-test average for the experimental class is 67.68. This shows that the average value of the experimental class is higher than the control class. This result is also evidenced by the significance of the independent test sample t, which is 0.044. The significant results indicate that 0.044 <0.05 or t count > t table then the hypothesis is accepted. It can be said that the application of Edmodo learning media is more because there is an increase in motivation and learning outcomes.

According to Nurul, 2017), the average value of students learning motivation who are taught with Edmodo media is 86.2 and those who do not use Edmodo media is 78.10. While the average value of student learning outcomes who are taught with Edmodo media is 82.5, those who are not taught using Edmodo media are 75.23. Based on statistical analysis for student learning motivation, which shows that the count obtained is 7.142 and the table is 2.00, for learning outcomes it is shown that the count obtained is 4.94 and the table is 2.00. So tcount > ttable. This shows that the difference in motivation and student learning outcomes on physics materials is significant in the middle between students who are taught using Edmodo media and those who are not taught using Edmodo media in class XI IPA SMAN 1 Tanete Rilau.

Thus, this increase in learning outcomes proves that the Edmodo-Based learning media with the Zoom Meeting Application is effectively used as a good learning tool for teachers in the field of economics studies or for students in the media. In other words, a learning device is said to be effective if it is achieved in the form of learning outcomes, effective and efficient in its use.

Conclusions and Suggestion

Based on the findings and discussion of the development research conducted, it can be concluded as follows:

1. Edmodo-Based learning media with the Zoom Meeting application developed meets the eligibility requirements (valid) to be used as learning media on economic subjects in the Cooperatives in the Indonesian Economy. The product developed, based on the assessment of material aspects, media aspects, and learning design aspects, which were carried out by experts and also student responses, obtained an average percentage of 85% feasibility level so that the conclusion was classified as "very feasible", category.

2. Edmodo-Based learning media with the Zoom Meeting application developed meets the effectiveness requirements to be used as learning media in economic subjects. The product developed based on statistical tests of learning motivation data and student learning outcomes taught using developed media were higher than the learning motivation and learning outcomes of students who were taught without developed media. This can be seen based on the test results using the 2-way ANOVA test with the test results showing the results of Fcount 6.872> Ftable 4.013 at a significance of 0.030 less than 0.05. It explains that the economic learning outcomes of students who are taught with Edmodo-based learning media economic The Zoom Meeting
application is higher than the economic learning outcomes of students who are taught using google classroom and Whatsapp media, which means that this research hypothesis is accepted. Similarly, student motivation shows the results of $F_{\text{count}}$ 9.66 $> F_{\text{table}}$ 4.013 at a significance of 0.002. It shows that the economic learning outcomes of students with high motivation are higher than the economic learning outcomes of students who have low motivational abilities, which means that the research hypothesis is accepted. Furthermore, there is an interaction between the use of Edmodo-based learning media with the Zoom Meeting application and student motivation with the results of $F_{\text{count}}$ 43,723 $> F_{\text{table}}$ 4,013 at a significance of 0.000 less than 0.05. This indicates that there is an interaction between Edmodo-based learning media and the Zoom Meeting application and student motivation towards economic learning outcomes.

5 Conclusions

The following conclusion can be drawn from the development research's findings and analysis: 1) Edmodo-based learning resources that utilize the Zoom Meeting application have been produced and are eligible (valid) for use as educational materials on economic topics in cooperatives in the Indonesian economy. The generated product received an average feasibility level of 85% based on expert assessments of material elements, media aspects, and learning design features as well as student reactions, leading to the classification of the result as "extremely viable." 2) Edmodo-based learning resources with the created Zoom Meeting application meet the standards for effectiveness for use as teaching aids in economics courses. The product developed based on statistical tests of learning motivation data and student learning outcomes taught using developed media were higher than the learning motivation and learning outcomes of students who were taught without developed media. This can be seen based on the test results using the 2-way ANOVA test with the test results showing the results of $F_{\text{count}}$ 6.872 $> F_{\text{table}}$ 4.013 at a significance of 0.030 less than 0.05. It explains the economic learning outcomes of students who are taught economic-based media economics. This research hypothesis is accepted since the Zoom Meeting application outperforms the economic learning results of students who are taught through Google Classroom and Whatsapp media. Similar results from $F_{\text{count}}$ 9.66 $> F_{\text{table}}$ 4.013 are displayed for student motivation, with a significance level of 0.002. It demonstrates that students with high levels of motivation outperform those with low levels of motivation in terms of economic learning outcomes, supporting the validity of the research hypothesis. Furthermore, the results of $F_{\text{count}}$ 43,723 $> F_{\text{table}}$ 4,013 at a significance of 0.000 less than 0.05 show an interaction between the utilization of Edmodo-based learning material with the Zoom Meeting application and student motivation. This suggests that there is interaction between student motivation for economic educational results and Edmodo-based learning media and the Zoom Meeting application.

From the conclusions that have been stated, the following are suggested: 1) Edmodo-based learning media with the Zoom Meeting application have been tested for feasibility and effectiveness. It is recommended for teachers to use this learning medium as an alternative choice in the learning process, especially on different materials. 2) Edmodo-based learning media with the Zoom Meeting Application on Cooperatives in the Indonesian Economy. It can be suggested to
teachers or further researchers that Edmodo-based learning media with the Zoom Meeting application can also develop all other aspects, such as aspects of religious values, and morals, physical, motoric, social, emotional, cognitive, language, and artistic integrity.

References

Development of Android-Based Interactive Multimedia on Odd Semester Chemistry Materials for Class X SMA/MA

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Abstract. This study aims to develop android-based interactive multimedia for chemistry subjects for class X odd semesters that are valid, practical and effective. This research is a development research. The data analysis technique used is quantitative descriptive analysis technique and qualitative descriptive analysis technique. The results of this study are android-based interactive multimedia that has been developed based on the design (storyboard) that was designed, according to a review by two material experts, the average value of the three aspects considered to be in the valid category (93%), according to a review by a media expert, indicates a valid category (88%), and according to a review of two chemistry teachers showed the average value of the three aspects that were assessed in the good category (86.67%). Thus this interactive multimedia is said to be valid, practical and effective and can be implemented for the learning process.

Keywords: Interactive Multimedia, Android Based, Chemistry

1 Introduction

The development of information technology today is so rapid that it affects the world of education. The rapid development of science and technology has a major influence on improving the quality of teachers in Indonesia [1]. Learning in education must also be interactive, inspiring, challenging, and improve the quality and motivation of the learning process [2]. Global demands demand that the world of education be able to adapt technological developments to improve the quality of education, so that educators as facilitators are required to be more creative in developing quality learning media and teaching materials to be used in learning. Quality learning media must be able to present teaching materials in accordance with the demands of the curriculum, follow the development of science and technology (IPTEK) [3].

Chemistry is one of the subjects considered difficult by students. It is difficult for students to understand chemistry learning because chemistry is a subject that has facts, procedures and concepts, and Chemistry is not just solving problems but also students must learn descriptions such as chemical facts, chemical rules, and the material studied in chemistry is very much. The use of multimedia in chemistry learning is expected to make the delivery of difficult
chemistry material easier and can make abstract chemistry material more concrete which can improve student learning outcomes [4].

Multimedia is an intermediary tool in various types of communication activities [5]. Multimedia is a means or device that functions as an intermediary or channel in a communication process between the communicator and the communicant [6]. One of the communication tools that are already owned by students that can be used for learning multimedia is a cellphone with the Android operating system. Android is an operating system for Linux-based mobile devices that includes an operating system, middleware and applications, Android provides an open platform for developers to create their applications for use by various mobile devices [7]. Android is commonly used in smartphones and tablet PCs.

One of the benefits of interactive multimedia based on Android is being able to make it easy for students to access learning anytime and anywhere [8]. Multimedia is also designed to help students understand a material efficiently and pleasantly [9]. In accordance with the current reality that the use of Android has become a trend among students. Most high school students have androids that have been equipped with the best features, so developing a learning media with basic android can be implemented to facilitate the learning process [10]. Developing interactive multimedia using Android, it makes sure that multimedia can support the learning process of students, especially when learning outside of school by providing easy access for students to learn to understand the material through multimedia anytime and anywhere. In addition, the existence of interactive multimedia based on Android can attract students' interest during learning because interesting learning can increase students' learning motivation from the material being taught so it is easy for students to understand [11]. Besides being useful for students, interactive multimedia based on Android is also useful for teachers, where this multimedia can make it easier for teachers to deliver teaching materials to students. In addition, the existence of interactive multimedia based on Android is able to attract students' interest during learning because interesting learning can increase students' learning motivation from the material being taught so that it is easy for students to understand [12]. Besides being useful for students, interactive multimedia based on Android is also useful for teachers, where this multimedia can make it easier for teachers to deliver teaching materials to students. In addition, the existence of interactive multimedia based on Android is able to attract students' interest during learning because interesting learning can increase students' learning motivation from the material being taught so that it is easy for students to understand [13]. Besides being useful for students, interactive multimedia based on Android is also useful for teachers, where this multimedia can make it easier for teachers to deliver teaching materials to students.

In addition, Smart Apps Creator can also create learning media with a simple arrangement without using a programming language and can be changed in the structure we need [14]. Therefore, the researchers carried out the development of android-based interactive multimedia on chemical materials.

2 Method

The type of research used in this research is Research and Development (R&D). The subjects of this study were Medan State University lecturers and teachers. R&D research is a research method used to produce a particular product and test is effectiveness of that product [15]. The product to be developed is a chemistry e-module using the Smart Apps Creator 3.0 software. The development model used is the ADDIE (Analyst, Design, Development, Implementation,
Evaluation) model. Of the five stages of the ADDIE model, only 3 steps were adapted in this study, namely Analyst, Design, and Development. A more complete procedure in this study is presented in Figure 1.

The data collection instrument used in this study was a validation questionnaire sheet based on eligibility standards according to the National Education Standards Agency (BSNP). Questionnaires were given to expert lecturers in the field of materials and media as well as chemistry teachers. The scale used in the android-based interactive multimedia feasibility questionnaire is a Likert scale with a range of 1-4 where the answers given strongly disagree to strongly agree. The data analysis technique used is quantitative descriptive analysis technique and qualitative descriptive analysis technique. Interpret the feasibility category of Android-based interactive multimedia, can be seen in Table 1.

<table>
<thead>
<tr>
<th>Average</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.26 - 4.00</td>
<td>Valid and does not need to be revised (decent)</td>
</tr>
<tr>
<td>2.51 – 3.25</td>
<td>Sufficiently Valid and does not need to be revised (pretty decent)</td>
</tr>
<tr>
<td>1.76 – 2.50</td>
<td>Less Valid, some multimedia content needs to be revised (not feasible)</td>
</tr>
<tr>
<td>1.00 – 1.75</td>
<td>Invalid and need to be revised (not feasible)</td>
</tr>
</tbody>
</table>
3 Results and Discussion

This research is a Research and Development (R&D). This development research process uses the ADDIE model which consists of Analyze, Design, Development.

Analyst

At this stage of analyst, an initial analysis is carried out to collect the information needed for consideration in multimedia development. The initial analysis carried out is a needs analysis by analyzing the curriculum, materials and media used by teachers. Researchers conducted interviews with teachers and analyzed the learning media that are often used in the learning process. The information obtained through interviews is that the implementation of the learning process is currently still face-to-face so updated media is needed, namely Android-based interactive multimedia which includes questions, animation media, and learning videos that can make it easier for students to understand the material presented. Based on the results of interviews in the process of developing learning media, especially android-based, the data obtained that teachers are still experiencing difficulties or obstacles in developing learning media, especially in making android-based learning media. The results of the teacher interview analysis on the development of android-based multimedia are shown in Figure 2.

![Figure 2. Barriers to Media Development](image)

The solution to these problems is that the teacher wants a tutorial in creating, developing and using chemistry learning media so that they are able to make their media. This is related to the number of teachers who have not been able to integrate technology with the learning process to be used as media. In addition, several factors hinder the use of technology in learning such as teachers feeling burdened because they are required to be more creative, require careful preparation and also require the ability to operate the technology. Therefore, the results of interviews and analysis of learning media are the basis for developing android-based interactive multimedia.

Design

At this design stage the researcher collects sources or references related to odd semester class X chemistry and designs the beginning of android-based interactive multimedia, the material that will be included in android-based interactive multimedia in accordance with the learning objectives and achievement indicators that have been determined, the researcher also collects pictures, animations, websites, and videos that will be used in developing interactive multimedia based on Android. After collecting materials and references, at this stage the researcher also designs Android-based interactive multimedia which will be developed and designed as attractive as possible so that students can more easily understand the material.
presented in Android-based interactive multimedia. Researchers designed Android-based interactive multimedia based on existing media,

Development

At this development stage, the product that will be developed is made, namely interactive multimedia based on Android. The activities carried out are making designs, questions and games, compiling material so that it is systematic and in accordance with predetermined indicators, making animated videos and inserting learning videos that have been designed previously. After everything is done, combine all the materials that have been prepared using the Smart Apps Creator 3.0 software so that it becomes an innovative Android-based interactive multimedia. The Android-based interactive multimedia design can be seen in Figure 3.

After the Android-based interactive multimedia has been created, the next step is to conduct a feasibility test of Android-based interactive multimedia for material and media experts and teachers to determine whether the developed Android-based interactive multimedia is feasible or not to be used in odd semester class X chemistry learning and aims to determine one aspect of product quality development is the aspect of validity [16]. At this stage the researcher only carried out the validation test phase by experts, for small group trials, namely the teacher.

Android-based interactive multimedia that has been developed is then validated by material and media experts as well as teachers using a validation questionnaire based on eligibility standards according to the National Education Standards Agency (BSNP). The results of Android-based interactive multimedia validation can be seen in Figures 4, and 5.
Based on Figures 4 and 5 of the validation assessment data analysis criteria, it was found that the review scores by two material experts got the average value of the three aspects that were considered to be in the valid category (93%), according to a media expert's review, indicating a valid category (88%), and according to a review of two chemistry teachers showed the average value of the three aspects that were assessed in the good category (86.67%). Based on the data that has been obtained, the Android-based interactive multimedia developed is valid and suitable for use in chemistry learning. There are several suggestions for improvement from the validator to the Android-based interactive multimedia that was developed including 1) adding the learning objectives to be achieved, 2) wrong writing techniques, and 3) the suitability of the writing color with the background.

Android-based interactive multimedia assisted by Smart Apps Creator 3.0 software can be used as a medium in chemistry learning. Completely designed media, with attractive and adequate illustrations will affect the learning atmosphere so that the learning process that occurs in students becomes more optimal and will stimulate students to utilize learning materials as learning materials [17].
4 Conclusion

Based on the results and discussion, it can be concluded that Android-based interactive multimedia which was developed based on the design (storyboard) that was designed, according to the results of a review by two material experts, got the average value of the three aspects that were considered to be in the valid category (93%), according to the review. a media expert, showed a valid category (88%), and a review of two chemistry teachers showed the average value of the three aspects that were assessed in the good category (86.67%). Thus this interactive multimedia is said to be valid, practical and effective and can be implemented for the learning process.

References


[13] Larasati, Dita, et al. PENGEMBANGAN MEDIA PEMBELAJARAN ISPRING SUITE 9 BERBASIS ANDROID PADA MATA PELAJARAN DASAR LISTRIK DAN ELEKTRONIKA DI SMK NEGERI 3 SURABAYA.


Development of Science Textbooks Based on Science Process Skills to Improve Students' Critical Thinking Skill of Class V SDS PAB 25 Medan

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Abstract. The limitation of student textbooks is an obstacle to KPS-based learning. Teacher companion books and student textbooks that are used as guides in learning are not yet fully complete, this limitation causes KPS not to be effectively evenly distributed, especially for learning with independent learning patterns. This study aims to determine the feasibility and effectiveness of the developed science process skills-based science textbooks. This study uses a 4D (four D) Thiagarajan model development procedure. Data collection using assessment instruments for material experts, design experts, learning media experts and learning outcomes tests. The results of this development research are in the form of textbooks that meet the eligibility requirements with the results of material validation declared feasible, design experts declared feasible and learning media experts declared suitable for use in the field. The results of the study for improving learning outcomes obtained an average pre-test of 62.24 while the post-test was 78.8. This shows that science textbooks based on science process skills are more effective in improving students' critical thinking than conventional textbooks on the subject of Energi dan Perubahannya.

Keywords: Textbooks, Science Process Skills, 4D Model.

1 Introduction

The quality of education in Indonesia greatly affects the process of development of existing education. The low educational process affects the declining learning outcomes. The weak learning process is one of the problems faced in the world of education because students are not encouraged to develop thinking skills. One of the causes of the low quality of education in Indonesia is the low competence of teachers. In addition, student achievement is an indicator of the quality of education in Indonesia which is still in the low category so it can add to problems in the education process in Indonesia. The learning process in the classroom is directed at the child's ability to memorize information, the student's brain is forced to remember hoarding various information without being required to understand the information it remembers to be able to connect it with everyday life.
The abilities possessed by students are not only in terms of knowledge but also skills and attitudes. Skilled in carrying out school assignments indirectly, increasing student knowledge, and training psychomotor abilities. Teachers have an important role to teach skills in the classroom to students, including Science Process Skills (KPS) through planning and regulating teaching and learning activities [1]. Science process skills are a learning approach designed so that students can find facts, and build concepts, and theories in the learning they receive. Students are directed to involve themselves in scientific activities in the learning process. Science process skills are one of the skills used to understand any phenomenon.

Bruner stated that if an individual learns and develops his mind, then in fact he has used his intellectual potential to think and he agrees that through the means of science process skills children will be encouraged internally to form intellectually correctly. Walking with this process builds critical thinking skills in children.

Several things that affect science process skills are a must for students to have. Things that affect science process skills include differences in students' genetic abilities, teacher quality, and differences in teacher strategies in teaching. Science process skills become a learning unit when applied with students being invited to think about finding answers to the problems being studied. One of the subjects that were introduced at the elementary school level to the high school level, among others, is Natural Sciences (IPA).

Science is a science that studies events that occur in nature by observing, experimenting, inferring, and formulating theories so that students have organized knowledge, ideas, and concepts about the natural environment, which are obtained from experience through a series of scientific processes including investigation, compilation, and presentation of ideas [2].

Science learning at the elementary school level emphasizes providing direct learning experiences through the use and development of process skills and scientific attitudes. The learning process so far in schools, especially elementary schools, is more often done passively, meaning that the teacher explains the material and the students listen. Currently, Science Process Skills (KPS) are important for students in learning activities to solve various science problems.

[3] argues "that by developing science process skills students will be able to find and develop their facts, concepts, and principles of science as well as grow and develop the attitude of sila that is demanded". The more active students handle their learning tasks, the more effective the learning will be and the impact on classical student learning completeness.

2 Research Methods

This research is a development research (Development Research). Research and development (Research and Development) is a research method used in order to produce certain products. The teaching materials developed in this research are in the form of science textbooks on Energy and its Changes based on science process skills. The subjects in this study were students of class V SDS PAB 25 Medan.
3 Results and Discussion

Define
Student analysis can be used as a reference in developing science learning textbooks based on science process skills and student ability test questions, so that learning tools and questions developed are in accordance with contextual problems. The results of the analysis of tasks carried out in this development are tasks related to the material of Energy and its Changes. Student activity sheets in the form of finding concepts or knowledge, solving daily problems related to comparative material together in a group, and with teacher guidance.

Design
Activities at this stage are preparation of tests, selection of media, selection of formats, and initial design of learning devices. The developed test is adjusted to the level of cognitive ability. Media selection is carried out to identify the right media according to the characteristics of the learning material. The format used by researchers in compiling textbooks based on science process skills has been adapted to the curriculum used in the school which is useful in improving student learning outcomes.

Develop
Validation is the first step in the development stage. Expert validation focused on the format, content, illustrations, and language of the developed learning tools. The results of the validation of the experts are used as the basis for revising and improving the learning tools. After the learning tools developed have met the criteria for validity according to experts, the learning device in the form of draft II was tested in the field where the research was conducted, namely the fifth-grade students of SDS PAB 25 Medan. Overall, the results of the first trial data analysis are that the learning tools developed have not been effective, because there are still several indicators of effectiveness that have not been achieved, such as the post-test results of mathematical problem-solving abilities in the first trial that have not met the criteria for achieving mastery classically, while the effectiveness indicators what is achieved is the achievement of learning objectives to achieve the specified criteria and the achievement of learning time, namely the learning time used during the trial I is the same as ordinary learning.

Material Expert Validation Results
Science textbooks based on science process skills validated by material experts aim to get criticism, suggestions, and information so that the developed textbooks become quality products in terms of learning material aspects and learning delivery systems based on science process skills. The results of the validation at the first meeting conducted by material experts showed that the textbooks that had been compiled were not yet fully validated. Several aspects need to be revised, such as correcting text that does not match the EYD, list of tables, list of pictures, glossary, and captions on pictures. So that the researchers made revisions, the researchers returned to submit the results of product improvements to be further validated. The validation results in stage II show better validation results. The result material expert validation can be seen in Table 1.
Table 1. Material Expert Validation Results

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Average Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Eligibility</td>
<td>93.75</td>
<td>Very Good</td>
</tr>
<tr>
<td>Presentation Eligibility</td>
<td>90</td>
<td>Very Good</td>
</tr>
<tr>
<td>Average Amount</td>
<td>91.87</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Based on the results of the validation carried out by material experts, the feasibility of the content in the development of science textbooks based on science process skills obtained an average percentage score of 93.75% with very good criteria while in the aspect of presentation feasibility an average percentage score of 90% with very good criteria.

Learning Media Expert Validation Results Data

Learning media experts validate textbook products based on two aspects that are assessed, namely aspects of graphic feasibility and canvas-shaped text themes. The result of learning media validation can be seen in Table 2.

Table 2. Validation Results of Learning Media Experts

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Average Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic Eligibility</td>
<td>93.7</td>
<td>Very Good</td>
</tr>
<tr>
<td>Canva Shaped Text Theme</td>
<td>92</td>
<td>Very Good</td>
</tr>
<tr>
<td>Average Amount</td>
<td>92.85</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Based on the results of the table above, the assessment on the aspect of agricultural feasibility obtained an average percentage score of 93.7% with very good criteria and the Canva-shaped text theme aspect obtained an average score of 92% with very good criteria. Thus, the science process skills-based textbooks that have been developed meet the eligibility requirements for use in the field as science textbooks in class V SDS PAB 25 Medan.

Learning Design Expert Validation Results Data

Learning design experts validate textbook products on aspects of learning design. Learning design experts validate textbook products based on the assessed aspects, namely aspects of the feasibility of presentation, presentation, language, and image selection. The result of the learning design expert can be seen in Table 3.

Table 3. Validation Results of Learning Design Experts

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Average Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Eligibility</td>
<td>100</td>
<td>Very Good</td>
</tr>
<tr>
<td>Presentation</td>
<td>87.5</td>
<td>Very Good</td>
</tr>
<tr>
<td>language</td>
<td>91.66</td>
<td>Very Good</td>
</tr>
<tr>
<td>Image selection</td>
<td>100</td>
<td>Very Good</td>
</tr>
<tr>
<td>Average Amount</td>
<td>94.79</td>
<td>Very Good</td>
</tr>
</tbody>
</table>
**Average Score of Students’ Critical Thinking Ability**

Before learning is done, first the students in the experimental class do a pretest to determine the student's initial critical thinking skills. After applying learning using teaching materials based on science process skills, students are given a post-test that aims to evaluate students final critical thinking skills using validated questions. The results of the pretest and post-test data in the form of scores can be seen in Table 4.

| 15-22 | 65-70 | 8   |
| 23-30 | 71-76 | 4   |
| 31-38 | 77-82 | 8   |
| 39-46 | 83-88 | 5   |
| 47-54 | 89-94 | 4   |
| 55-62 | 95-100| 1   |
| Sum   | 1010  | Sum 1950 |
| Average | 40,4 | Average 78 |
| Std. Deviation | 11,895 | Std. Deviation 7,638 |

**Critical Thinking Ability Gain Test**

The gain test aims to see the improvement of critical thinking skills after using the development of science textbooks. The results of the calculation of the gain test can be seen in Table 5.

<table>
<thead>
<tr>
<th>Total students</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>N-Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>62,24</td>
<td>78,8</td>
<td>0,43</td>
</tr>
</tbody>
</table>

Based on the N-Gain value of 0.43 then the increase in student learning outcomes is classified as moderate and can be used by students in individual trials.

**Disseminate**

The dissemination stage is the final stage in the 4-D development model. At this stage, the learning tools that have been tested in the research class will be re-tested by comparing the developed learning tools with those commonly used by classroom teachers at SDS PAB 25 Medan. This research is a research and development (Research and Development) so that the product of this research is a product that meets the criteria of being feasible and effective. The main purpose of this study is to describe the results of product development of science
textbooks and to describe the differences in student learning outcomes using textbooks developed with conventional textbooks.

**Discussion**

**Product Feasibility of Science Textbooks Based on Science Process Skills**

Validation was carried out on the product development of science textbooks to determine the feasibility of the developed book so that it could be used in learning on the subject of Energy and its Changes. According to [3] "to test the construction validity (construct validity) can be done by asking the opinion of the expert (judgment expert).

Based on the results of material expert validation, an average score of 91.87% was obtained in the very good category. According to [4] that is the main point in validating the content of teaching materials with SK and KD. This is because the material in the developed textbooks is following the substance of knowledge, SK, and KD, the accuracy of the material is by the facts of concepts, principles, and truths of science. The textbooks that have been developed have excellent presentation completeness, this is due to the consistent appearance design with clear pictures and writing.

Based on the results of expert validation of learning media obtained an average score of 92.85% with a very good category. based on the results of the learning design experts obtained an average score of 94.79% with a very good category. The acquisition of the three expert assessments, it shows that the products that have been developed are suitable for use in research.

**Product Effectiveness of Science Textbooks Based on Science Process Skills on Learning Outcomes**

In testing the effectiveness of the results of developing science textbooks based on science process skills, it is carried out in the learning process between teachers and students. [5] argues "that by developing science process skills students will be able to find and develop their own facts, concepts and principles of science as well as grow and develop the required value attitudes".

This means that the teaching materials developed have met the effective criteria. So it can be concluded that the students' learning mastery shows the use of the developed textbooks that meet the effectiveness criteria.

The more active students handle their learning tasks, the more effective the learning will be and the impact on classical student learning completeness. Based on the results of the pretest showed that the initial ability of students obtained an average value of 62.24 and the results of the posttest showed that the initial ability of students obtained an average value of 78.8. This proves that there are differences in student learning outcomes taught by science process skills-based textbooks with students taught using conventional textbooks, this is in line with research.

From the results of the research obtained, it can be stated that science textbooks based on science process skills developed have higher effectiveness than textbooks. So it can be concluded that with science learning based on science process skills students are easier to understand to learn the material.
4 Conclusion

The conclusion of this study is based on the research data by taking into account the formulation of the problem and the research objectives that have been formulated. Feasibility of science textbooks based on science process skills developed based on validation results with very high feasibility. Based on the data obtained from the validation results, the process skills-based textbooks developed are included in the criteria for use. The effectiveness of science textbooks based on science process skills based on learning achievement tests. Based on the results of the data obtained, it is concluded that there is a difference in effectiveness between those who use textbooks and the effectiveness of student learning using textbooks that have been developed.

References

Development of Interactive Media on The Jigsaw Method to Understand The Text of Grade IV Students of SDN Percontohan Pematangsiantar

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Abstract. This research is a development research that aims to produce an interactive media that uses the jigsaw method to improve the discourse understanding ability of grade IV students of SD Pilot in Pematang Siantar. The development model is adapted from the Thiagarajan model known as step 4D, namely define, design, develop and disseminate. Through Step 4D, one interactive medium is generated and then validated by an expert. Validation tests are carried out by material experts, linguists and media experts. After going through an repeated validation process, the validation of the three experts stated that the media was valid with an average score of 4.2 media experts, from material experts 4.3 and from linguists obtained an average score of 4. With these results, the interactive media produced is declared feasible to use. Then an effectiveness test is carried out by conducting trials in the classroom. The object of research at the trial stage was a grade VI student of Pematang Siantar Pilot Elementary School. The trial was carried out twice. In order to find out the effectiveness of the media developed, pretests and posttests are carried out. Student learning outcomes are declared good and improved. Learning media is very effective, as evidenced by the scores obtained by students, namely pretest 6.17 posttest 8.03, and a score gain of 0.8 which is categorized as high. With such results, the resulting learning media is feasible and effective.

Keywords: Interactive Media, Jigsaw Method, Understanding Discours

1 Introduction

Education is an effort to change human identity with awareness and responsibility from children to adults. The aim is to increase knowledge, skills and have a positive character of values in the order of life so that they are able to adapt to the environment [1]. Learning activities at school teachers are required to be able to motivate students by using the right media and methods, so that students are helped in understanding the learning content. Likewise, a teacher as an educator is required to be able to formulate attractive learning activities, as well as provide a fun learning experience in the classroom applying
various learning methods, as an effort to achieve effective and efficient learning activities [2].

An important factor in the ability to read knowledge is being able to understand discourse. Discourse is the largest part of a sentence or series of continuous languages more than sentences [3]. The discourse in question is non-fiction discourse. Indonesian language learning in 4th grade students of Pematangsiantar Pilot Elementary School in the Indonesian language curriculum understands non-fiction discourse [4].

While the results of a brief interview with one of the vice principals and subject teachers, stated that actually the school has provided learning support facilities, such as computers/laptops, projectors as a means of smoothing student learning activities, but the problem is that they are less skilled for media developers. learning, namely interactive media, the teacher only uses books or printed materials that already exist, learning only hears from the teacher.

The fulfillment of these three media aspects is expected to be able to optimize both the activity process and the final achievement of optimal learning objectives [5]. It inspires researchers to make a research to produce innovative media that can be applied in learning activities assisted by Adobe Flash software in order to obtain an interactive media assisted by the Jigsaw method, which is expected to make it easier for students to improve their ability to understand discourse. The stages or steps of development are in accordance with the development procedures systematically. So that the researcher wants to examine the research entitled: "Development of Interactive Media in the Jigsaw Method for the Ability to Understand Discourse Materials for Class IV Students at Pematangsiantar Pilot Elementary School". The formulation of this development research problem is:

How is the feasibility of developing interactive media on the Jigsaw method in the ability to understand the discourse of fourth grade students at Pematangsiantar Pilot Elementary School?

How is the effectiveness of interactive media on the Jigsaw method in the ability to understand the discourse of 4th graders at Pematangsiantar Pilot Elementary School.

Learning Media

Media in general is a tool that is used by someone as an effort to convey messages to several purposes, the media is also a means of delivering teaching materials. [6] Media from the Latin word "Medium" which means "intermediary or introduction". In full, the media is a device for sending information from one individual to another in the hope that the information sent can be received and the content of the message is understood by the recipient.

Interactive Media

[7] explains that interactive media is a structure for the description of teaching material by showing it in the form of sound and video recordings with computer devices. Meanwhile, according to explains that interactive media is a structured form of
presentation controlled by computer devices that are not only seen and heard by respondents, but there is a quick response from voice and video exposure.

Adobe Flash

[9] declare "flash" is software that is applied to design with the integration of text, audio, video, images, bitmap and vector, text and data. In line with the above opinion, [10] states "Adobe Flash is software as a supporter in attractive learning activities".

Based on this definition, it can be concluded that Adobe Flash is an application that has a type of capability consisting of various types of capabilities such as creation, management, manipulation, and animation. Regarding the type of flash used, namely Adobe Flash CS6 in Adobe Flash CS6, there are various features to create media attractive.

Interactive Media on the Jigsaw Method in the Ability to Understand Discourse.

Interactive media are part of several tools that help a teacher in delivering messages conveyed to students as an effort to achieve more optimal learning goals. With the creation of interactive media, it is expected to develop students' desire to learn actively and creatively in continuous learning activities.

The Jigsaw cooperative method is a learning method that prioritizes the division of small groups (4-6 students). In its application, students are given responsibility independently in the tasks or materials given by the teacher as a teacher, and become experts in the assigned material according to their respective duties to be able to explain back to their friends who have different material. In this Jigsaw method, students are faster to build good interactions with one student and another. So that students are motivated to learn and be more creative so that learning outcomes are increasing.

The material on the ability to understand non-fiction discourse at the elementary school level discusses non-fiction discourse texts. Non-fiction discourse is a factual text that actually occurs scientifically. So it is expected that the skills to dig up new information from the texts they read, are able to retell the text in their own words, are able to answer questions based on the texts they have read, are able to make questions based on the texts they have learned.

With the interactive media with the help of the Jigsaw method on the ability to understand discourse, it is hoped that: (1) it helps or makes it easier for students to understand discourse; (2) make the lesson student-centered, (3) make the learning process on the ability to understand discourse more varied; (4) increasing the active role of students in the learning process; (5) increase motivation and student learning outcomes; (6) raise students' awareness of how important it is to improve the ability to understand discourse in Indonesian language learning.

Based on the explanation above, the author will later conduct research in class IV SDN Pematangsiantar Pilot School which will deliver material on the theme of the beauty of diversity in my country. Here the author will first describe the theme of 7 Special Indonesian language lessons. KD 3.7 KD 4.7.
2 Research Method

This research is a type of development research (Development & Development) [11]. In the research, namely interactive multimedia-based learning media with the Adobe Flash CS6 application. The final product will be evaluated based on the quality aspect of the product applied. Thus, the product of this research is a valid, practical and effective media. This research was conducted at Pematang Siantar Pilot Elementary School in the Even Semester of TP. 2021/2022. on "the theme of the beauty of diversity in my country, the sub-theme of the beauty of diversity in my country, the sub-theme of the beauty of the diversity of ethnicities and religions in my country". The subjects in this study were fourth-grade students at SDN Pilot Pematang Siantar. The object of this research is interactive media on the theme " the beauty of diversity in my country, the sub-theme of the beauty of ethnic and religious diversity in my country " on the theme of 7th grade IV in Indonesian language lessons. The development model in this study follows the path [12] The learning device development procedure in this study refers to the device development model according to Thiagarajan and Semmel who say that the 4-D modal (four-D models) consists of 4 stages, namely: (1) the definition stage, (2) the definition stage, planning (design), (3) the stage of development (develop) and (4) stage of dissemination (disseminate).[13].

3 Results and Discussion

Define

The initial and final analysis activities are specifically carried out by observation. Based on observations in the field, the implementation of learning in using learning media has not been suitable for the material presented by the teacher, especially on the ability to understand discourse on the theme of the beauty of diversity in my country, sub-theme of ethnic and religious diversity in my country. The presence of interactive learning media really helps students understand a good concept from abstract to concrete. Where students can demonstrate directly the regional languages that are owned by students. In learning, students become more active and have curiosity, so the teacher can use interactive media and choose the right media according to the learning objectives.

Design

The basis for preparing the test is task analysis and concept analysis described in the specification of learning objectives. As for in this study, researchers determined and selected the software used to create learning media, including Adobe Flash CS6. The selection of this learning media development format aims to design or design the content of the learning materials that will be delivered by the teacher, the media model developed by the researcher. the initial design is done by designing the opening page, the main menu page, designing the media in the learning materials section, designing the developer profile section, designing videos, and designing evaluations.
Develop

Based on expert validation, a score of 48 was obtained with an average value obtained from learning media experts of 2.52 which was declared quite valid (fair enough) for learning media. The results of the media expert's revision can be seen in Table 1.

Table 1. The results of the media expert's revision

<table>
<thead>
<tr>
<th>Comment</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics are explained thoroughly (holistically) into one part of each Culture</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td>Give Interruptions To interact, for example</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td>What do you think about the video?</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
</tbody>
</table>

The expert revision of learning materials carried out by the validator consisted of three aspects of assessment, namely the quality of the content, implementation, visual appearance, which was obtained by a total score of 23 with an average value of 2.3 which was categorized as quite valid (decent) media and obtained several notes that needed to be considered. corrected about the shortcomings of learning materials using Adobe Flash CS6. Based on the results of the validation of linguists, the total score of 34 with an average value of 2.8 was still in the quite valid (decent) category.

Pretest

The results of the first pretest analysis before conducting the first trial using the media developed by the media obtained the results of the student pretest with a total of 28 students there were 11 students who completed with a percentage of 39.2% and and 17 students or 60.7% declared incomplete with this classical completeness percentage (CCP) as big.
Posttest

Based on the post-test results, it was found that 24 students of Pematangsiantar Pilot SDN obtained a complete score with a percentage of 85.71% and 4 students with a percentage of 14.28% did not complete. While the classical completeness percentage (CCP) in the posttest of student learning outcomes using interactive media learning media is 85.71%. Based on the results of the second trial of 28 students, the percentage of classical completeness of 92.85% was declared complete.

N-Gain

In the first trial, the average score of students in the pretest was 6.17 and the post-test was 7.5 so that the n-gain was 0.6 with the "medium" category. This shows that interactive media is effective for use in the second trial. From the results of the effectiveness data obtained from the pretest, posttest and N-Gain scores, the average pretest score is 6.17 and post-test is 8.03 with an n-Gain score of 0.8 categorized as high. So it can be stated from the results of test II that the learning media developed is very feasible to be used in the learning process.

Disseminate

The Dessiminate stage is carried out by conducting research using media that are already valid and effective for further use by teachers and students in learning.

Discussion

Interactive Media Eligibility

Based on the results of expert validation of the interactive media on the developed interactive media, it can be seen that the media validation average of 4.2 is declared valid. The average assessment of material experts is 4.3 in the valid category, the average language expert is 4.0 with a valid category. The overall average of expert judgment is 4.1% with the category of indicator suitability criteria used is valid.

Effectiveness of Interactive Media

Based on the acquisition of pretest and posttest student learning outcomes before and after using the developed learning media can be obtained with an average pretest score of 39.2% and after using the learning media developed in the first trial it is obtained with an average score on the posttest with classical completeness by 85.71%. Furthermore, the effectiveness of the interactive media on the Jigsaw method that was developed was proven from the N-Gain test score at 0.6 with a medium gain criterion. To improve the results of the posttest as well as classical completeness and the effectiveness of the media developed in the posttest II trial after reusing the developed learning media. Then the results of the post-test in the second trial with an average value of 92.85% with the category of students completed. Then obtained classical completeness of 92.85% and N-Gain of 0.8 with a very high category. By increasing the results of testing I and testers II, this proves that interactive media in the Jigsaw method can be declared effectively used.
so that it can improve student learning outcomes on the ability to understand discourse in grades IV-A of Pematangsiantar Pilot Elementary School.

4 Conclusion

The interactive media in the Jigsaw method assisted by Adobe Flash CS6 in the ability to understand the discourse "the theme of the beauty of diversity in my country, sub-theme of ethnic and religious diversity in my country" is considered quite good. This is supported by the acquisition of validation results with an average value of 4.2%, material experts obtained an average value of 4.3% and linguists obtained an average value of 4.0%.

In effectiveness, the use of interactive media in the jigsaw method is known based on the pretest and posttest scores. The percentage of classical completeness (PKK) in the posttest of student learning outcomes using learning media or interactive media was 85.71%, while in the second trial it was obtained from 28 students the percentage of classical completeness (PKK) was 92.85% declared complete. To see the increase in the value of student learning outcomes using N-Gain obtained in the first trial 0.6% (medium) while the second trial 0.8% (very high). So it can be stated that interactive media is very effective.

References


Development of Research-Based Gastropod Diversity Textbooks in Simalungun Regency, North Sumatra

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Abstract. This study aims to develop textbooks on Gastropod diversity topics, determine the feasibility of the books validated by many experts of materials, learning designs, layouts, teachers and students, and assess the effectiveness of using the books to grade X SMA Swasta Teladan Tanah Jawa, Simalungun Regency, North Sumatra. The study implements a four-D (4D) model, namely definition, design, development, and dissemination. A Likert scale was used in the validation test. Data obtained used a questionnaire and analysed by descriptive analysis techniques. The results present a high validation value of 81.34%, showing the textbooks are feasible with a high response from students and teachers (90.50%). The effectiveness test using t-test shows a significant difference between experimental and control class. The N-Gain post-test effectiveness test in the experimental class is 0.63 (medium), describing the Gastropod diversity textbooks applicable for grade X SMA Swasta Teladan Tanah Jawa.

Keywords: Textbooks, Gastropoda, Feasibility of Textbooks, Effectiveness.

1 Introduction

Teachers, as professional educators, are expected to have the ability to develop textbooks based on students characteristics and their social environment taking into account their local potential so that students can more easily understand and achieve the expected competencies. A textbook is one of the keys in achieving learning objectives. Therefore, a teacher must be able to develop learning books as a learning resource.

Biodiversity refers to every living thing, including plants, animals, microorganisms and genes possessed by living things, where they live in a complex ecosystem interacting with each other to form a living environment. In general, three levels of biodiversity are genetic, species and ecosystem diversity. This study focuses on species diversity from the class Gastropod with the learning outcomes include students to explore diversity, abundance, similarity and dominance of the class by direct observations or field studies which help students to make observations, collect data, analyse data, compile reports and present the reports.

The animal kingdom has an important role in terms of ecology, economy and education to be a source of learning. The topic of Gastropod is included in the Invertebrate sub-topic for Senior High School (SMA) grade X. The learning outcome for this topic is students able to distinguish invertebrate animals according to their body layers, cavities, symmetry, and
reproduction. The class Gastropod, the largest group living in terrestrial, marine and freshwater environments, is a group of animals with soft bodies and they use stomachs to walk. In biology textbooks of grade X, the explanation of the differences between each class tends to be general and short in length. This might cause little information and leads to not comprehensive knowledge. Thus, the development of textbooks on the Gastropod topic is expected to be a complete solution and provider of additional information for students.

Learning using the environment as the learning resource (media) provides a positive response to students [1]. Learning media can help students understand what is being studied because they can observe, feel and interact directly with the material. Utilisation of environmental media with field studies is not optimally carried out by the teachers in SMA Swasta Teladan Tanah Jawa. Meanwhile, Simalungun Regency has local culture which can be used as the learning media. One of the examples is a large area of rice fields and plantations. In the plantation area, there are many large and small gastropods with various shapes as well as water areas such as rice fields and watersheds. In land habitats, many snails (Achatina fulica) are found, while in rice fields water snails (Helix pomatia) and gold snails (Pomacea canaliculata) are widely found in the Simalungun area. There are 280 types of land snails in Sumatra, consisting of 27 families and 77 genus with 33 types of which are categorized as endemic [2]. The number of land snails in Sumatra is 90% of the total families recorded in Indonesia. The Cyclophoridae family has the most members of its type, which is 45 categories, followed by Camaenidae 37 categories and Diplommatinidae 25 categories.

Based on the preliminary study in the form of a questionnaire obtained from students in grade XI who had studied Gastropod topic from the available textbooks, as many as 82.61% of students have never conducted field studies related to the Gastropod topic. The result of interviews with the students is they still need a book in which it describes the class Gastopod. Meanwhile, the interview results with Biology subject teachers at SMA Swasta Teladan Tanah Jawa, learning activities on Gastropod topics in the class are still limited, focusing only on the material in the textbook. This is because the school does not yet have supporting media, only using the textbook to describe the structure of Gastropods in general and does not explain in detail each group of animals belonging to the class Gastropod. It is also observed that students’ responses in learning Gastropod topics are less active in the class due to inadequate learning resources. This leads the achievement of classical competence at SMA Swasta Teladan Tanah Jawa in the Gastropod topic to not reach the predetermined minimum completeness criteria (KKM), which is 70, only around 30%. Thus, the research-based Gastropod diversity textbook is expected to be a solution to complete students' knowledge of Gastropod classification at SMA Swasta Teladan Tanah Jawa. This study assesses the effectiveness of textbooks research-based gastropod diversity which was developed in improving students’ understanding.

2 Method

The study was conducted between January and March 2022 in SMA Swasta Teladan Tanah Jawa, on Jalan Sisingamangaraja Nagori Balimbingan, Tanah Jawa, Simalungun Regency, Postal Code 21181. The study design implements a four-D (4D) model, namely definition, design, development, and dissemination. Before launching the textbooks research-based gastropod diversity, a research for identifying the class Gastropod was conducted.
2.1 Gastropod diversity calculation

The location of the research was conducted in three districts in Simalungun Regency, namely Sidamanik, Tanah Jawa, and Dolok Batu Nanggar. Each district has three stations - Sidamanik with three stations (1.1, 1.2, 1.3), Tanah Jawa with three stations (2.1, 2.2, 2.3), and Dolok Batu Nanggar (3.1, 3.2, 3.3). Two techniques in data collection in this research were abiotic and biotic data collection.

Abiotic data collection was carried out directly in the field and simultaneously when collecting biotic data. The abiotic data collection techniques were as follows: (a) substrate observation was conducted by looking directly at the gastropods in it. The substrate type was observed then recorded, and photographed using a cellphone camera; (b) the water temperature was measured using a rod thermometer with units of °C by placing the tip of the thermometer into the water; then recorded the results of the scale reading on it. The temperature measurement was repeated three times at each station, then the average was taken, and (c) the degree of acidity (pH) of the water using a pH-meter by placing the electrode part of the pH meter into a beaker filled with water. Then recorded the results of the scale reading on the pH-meter and repeated three times at each station.

Biotic data collection implemented purposive sampling technique by tracing the habitat of Gastropods using a transect plot. The collection included observations on the animals studied by recording, counting, and measuring the length of the shells of animal species found. The stages of collecting biotic data were as follows: (a) laying of transects and plots. Biotic data collection used a plot transect method with an area of 10m x 10m diagonally, determining five points, which at each point were sampled using a 1m x 1m square plot with 2 repetitions; (b) Gastropod sampling. The number of each species taken was two in each plot and placed in a plastic bottle and labeled the sample. The next stage was to identify the samples found; (c) the identification process was also conducted by photographing each Gastropod specimen using a mobile phone camera. Next, note the characteristics found through observation of shell morphology including shell shape, size, color, surface, apex, aperture, and inner and outer lip. Identification was done by matching the characteristics of the sample using a Gastropod identification book to find the species name, and (d) Gastropod specimens are stored in the form of preservation, which are put into bottles containing 70% alcohol, and shell collections, which were cleaned the inside of the shells and smeared using mineral oil were placed in the places provided. All specimens collected were analysed and calculated using Gastropod density, Frequency of presence and Shannon Wiener Diversity Index formula.

**Gastropod density**

Gastropod density was calculated using the following formula:

\[ D_i = \frac{n_i}{A} (\text{indiv/m}^2) \]  

where:

\( D_i \) = Density of individuals of type i (indiv/m\(^2\))
\( n_i \) = the number of individuals of the first type
\( A \) = Area of the square of sampling (m\(^2\))

**Frequency of presence**
Frequency of presence (FK) was calculated with the following formula:

\[ FK = \frac{\text{number of plots found of a species}}{\text{total plot}} \times 100\% \]  

(2)

Shannon Wiener species diversity index

Shannon Wiener species diversity index is a way to measure the diversity of species in a community. The formula is:

\[ H' = \sum_{i=1}^{s} P_i \ln P_i \]  

(3)

where:

- \( H' \) = the species diversity index
- \( s \) = the number of species (species richness)
- \( P_i \) = proportion of total sample represented by species
- \( i \) = divide number of individuals of species \( i \) by total number of samples.

The index (\( H' \)) is categorised into three groups.

- \( H > 3.0 \) : high diversity
- \( 1.0 \leq H \leq 3.0 \) : moderate diversity
- \( H < 1 \) : low diversity

Textbooks research-based Gastropod diversity

The 4D models used in the study are definition, design, development, and dissemination. The definition stage consists of front analysis, task analysis, concept analysis, and object specification. The design stage consists of test construction, media selection, format selection and initial design. The development stage consists of expert appraisal and developmental testing. The dissemination stage consists of validation testing, packaging, and diffusion.

Definition stage

The purpose of the definition stage is to determine and define learning needs by analysing the objectives and limitations of the material. The stage of defining or analysing needs can be done through an analysis of previous research and literature studies. The activities in this stage are early-late analysis, student analysis, concept analysis, task analysis and specification of learning objectives.

Early-late analysis

The analysis was conducted to determine the problems to be overcome; thus, the development of learning materials was needed. Several things to consider in the initial analysis are learning theories, challenges, and future demands. Learning should place students as subjects in learning. Students should actively carry out activities to gain learning experiences. Future challenges and demands in learning are skills. The needs analysis conducted on students and teachers at SMA Swasta Teladan Tanah Jawa shows that there are misconceptions about the lungs in the class Gastropod. Task and concept analysis is a collection of procedures to determine the content in a lesson. The analysis is also carried out to detail the content of the subject matter in the form of an outline. It includes (1) content structure analysis, (2)
procedure analysis, (3) information process analysis, (4) Concept analysis, and (5) goal formulation.

Student analysis

Student analysis assesses students' characteristics in regards to the design of research-based gastropod diversity textbooks developed. Student analysis is an activity to identify the characteristics of students who are the target for the development of research-based gastropod diversity textbooks. This analysis includes scientific process skills (observation, measuring, predicting, hypothesising, and communicating) and scientific attitudes (curiosity, respect for facts, critical thinking, open-mindedness, and cooperation).

Task analysis

Task analysis aims to identify the skills studied by the researcher for later analysis into additional skill sets that may be needed and determine the content or learning materials. It was conducted by interviewing biology teachers to identify activities occurred during the learning process including assigned tasks and evaluation processes in the class' activities related to Gastropod topic.

Concept analysis

Concept Analysis is conducted to identify the main concepts that will be taught based on material through the development of research-based Gastropod diversity textbooks. In addition to identifying, these concepts are also linked through a learning concept map. This analysis includes basic competency aiming to determine the amount and type of teaching materials and analysis of learning resources, namely the identification of sources supporting the preparation of textbooks.

Formulation of learning objectives

This formulation was done to limit research to be on the track according to needs. Thus, the specification of this objective can be used as a basis for compiling a research-based Gastropod diversity textbook that will be developed, including in the preparation of tests. This stage refers to the formulation to the basic competencies which must be mastered by grade X students. The expected goals through research-based gastropod diversity textbooks include students being able to recognise and describe the morphological structure of the class Gastropod, classify and identify the class Gastropod, recognise species belonging to the class Gastropod class and carry out research/mini research independently.

Design stage

The purpose of this stage is to design a research-based book. There are four 4 steps in this stage, namely the preparation of a standard test (constructing criterion-referenced test), media selection, format selection and initial design.

Constructing criterion-referenced test

In this step, the preparation of test standards is based on the results of learning objectives and student analysis. It is adapted to the students’ cognitive abilities and the creation of a scoring guide including scoring and answer keys to questions.

Media selection
The next step is the selection of media based on the results of concept analysis, task analysis, and the characteristics of students as users.

Format selection

The choice of format in the development of textbooks aims to formulate textbook designs based on the research conducted.

Initial design

The elements contained in the developed research-based book are: front and back cover of the textbook, title of the textbook, preface, table of contents, list of pictures, list of tables, introduction, Opisthobranchia, Prosobranchia, Pulmonata, Gastropod research in Simalungun Regency, Gastropod diversity, student worksheets, glossary, index and bibliography. The description of the relationship and work chain of activities is illustrated by the initial design of the research-based book. The author also pays attention to layoutting on the layout of the images and letters used as well as the size of the writing font so the book is more interesting, readable and easy to understand. The cover of the book is designed to represent the content of the article and is expected to attract readers’ interest from an attractive cover design using Microsoft Word 2016 application.

Development stage

The stage is the process of producing textbooks from the initial design that has been designed by the researcher. Validation was done after the textbook was produced. The purpose of this stage is to produce a revised textbook based on input from experts. It includes: (a) validation of the device by experts by a team of material experts, learning design experts, and layout design experts followed by revision of the validation results, and product trials, (b) simulation includes research activities related to the material content of the book, and (c) product trials with real students through three stages, namely individual product trials, small groups, and limited fields. The results of stages (b) and (c) are used as the basis for revising the product results. The development trial was conducted after the textbook was revised based on suggestions and input from expert lecturers and biology teachers. In this study, trials were conducted on students of grade XI SMA Swasta Teladan Tanah Jawa.

Dissemination

After the development trial, the parts which are not appropriate or not yet valid require to be revised to make the final product of the textbook. Once the feasibility test of the books and instruments has been revised, the next stage is the dissemination stage. It aims to test the effectiveness of the use of research-based gastropod diversity textbooks with the normalised gain test (N-Gain) by comparing the results of the pretest with the results of the post test.

All the stages are concluded in the flowchart below (Fig.1.).
Fig. 1. Flowchart of research process
3 Result and Discussion

3.1 Result

The result of Gastropod diversity calculation

Based on the calculation, the Gastropod density obtained at the three stations has an average of 17.27 Ind/m². The highest value of Gastropod density 2.0 Ind/m² at station 2.2 with a value of 5 with the highest species density found at *Tarebia granifera* at 48 Ind/m² and the lowest total density from all stations was at station 2.3 with a value of 4.4 Ind/m² (see Table 1 & 2).

Table 1. Frequency of presence in the observation

<table>
<thead>
<tr>
<th>No</th>
<th>Species</th>
<th>Jumlah individu</th>
<th>Atribusi lokasi</th>
<th>Frekwansi kehadiran</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td><em>Achatina fulica</em></td>
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<td>218</td>
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<td>0.20</td>
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<tr>
<td>2</td>
<td><em>Lymnaea rubiginosa</em></td>
<td>26</td>
<td>83</td>
<td>0.29</td>
</tr>
<tr>
<td>3</td>
<td><em>Subulina octona</em></td>
<td>13</td>
<td>40</td>
<td>0.20</td>
</tr>
<tr>
<td>4</td>
<td><em>Parnassion maritima</em></td>
<td>2</td>
<td>16</td>
<td>0.13</td>
</tr>
<tr>
<td>5</td>
<td><em>Laevicaulis alvei</em></td>
<td>0</td>
<td>3</td>
<td>0.07</td>
</tr>
<tr>
<td>6</td>
<td><em>Pomacea paludosa</em></td>
<td>117</td>
<td>218</td>
<td>0.53</td>
</tr>
<tr>
<td>7</td>
<td><em>Flabellina javanica</em></td>
<td>0</td>
<td>23</td>
<td>0.20</td>
</tr>
<tr>
<td>8</td>
<td><em>Lymnaea rubiginosa</em></td>
<td>0</td>
<td>100</td>
<td>0.33</td>
</tr>
<tr>
<td>9</td>
<td><em>Tarebia granifera</em></td>
<td>0</td>
<td>240</td>
<td>0.11</td>
</tr>
<tr>
<td>10</td>
<td><em>Gyraulus convexiusculus</em></td>
<td>0</td>
<td>43</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Table 2. Diversity index based on the calculation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>1.1</th>
<th>1.2</th>
<th>1.3</th>
<th>2.1</th>
<th>2.2</th>
<th>2.3</th>
<th>3.1</th>
<th>3.2</th>
<th>3.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species number</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Individual number</td>
<td>43</td>
<td>142</td>
<td>32</td>
<td>104</td>
<td>260</td>
<td>22</td>
<td>26</td>
<td>78</td>
<td>70</td>
</tr>
<tr>
<td>Density/m²</td>
<td>8.6</td>
<td>28.4</td>
<td>6.4</td>
<td>20.8</td>
<td>52</td>
<td>4.4</td>
<td>5.2</td>
<td>15.6</td>
<td>14</td>
</tr>
<tr>
<td>Diversity Index</td>
<td>0.95</td>
<td>0.47</td>
<td>0.59</td>
<td>1.36</td>
<td>0.33</td>
<td>0.82</td>
<td>1.26</td>
<td>1.12</td>
<td>0.60</td>
</tr>
</tbody>
</table>

The highest frequency (see Table 1) is *Pomacea paludosa* with a frequency of presence of 53.33% and 24 times appearing at the time of sampling in each observation plot. A high frequency is also found in *Lymnaea rubiginosa* with a presence frequency of 33% and 15 times appearing at the time of sampling. Meanwhile, the lowest frequency is *Laevicaulis alvei* with a frequency of presence of 6.67%, and appearing only three times in each sampling and *Gyraulus convexiusculus* with a presence frequency of 8.89% and four times appearing.
The result of book development

This study emphasises development of research-based Gastropod diversity textbooks, with the aim of increasing student learning resources, adding insight and deepening subject matter about the Mollusca phylum, in particular the class Gastropod. The textbooks are validated by one Gastropod expert, one layout design expert and assessed by two biology teachers and students at SMA Swasta Teladan Tanah Jawa before the treatment was conducted.

After interviewing the biology teacher at SMA Swasta Teladan Tanah Jawa, students commonly have difficulties to identify living things, taxonomic systematics, habitation and benefits for the environment, while the availability of textbooks and secondary books is still limited to be used as a reference for the learning process. Students also find it hard to understand Gastropod learning because of the complexity of Gastropods and lack of pictures to support the learning. Therefore, alternative teaching materials are required to explain the characteristics and differences of each order in the class Gastropod.

In practicum activities often use organisms surrounding where they are not found in the available books which makes it difficult for students to find information about Gastropods. Based on the results of observations from students, it shows that students' reading interest is low. That can be seen from the fact that there were still many students who were still confused when the teacher asked the students related to the learning materials which actually are contained in textbooks they used as learning resources. Moreover, the students’ results are still below the KKM on Gastropod material. The development of research-based gastropod diversity textbooks will provide practical learning resource innovations so that students are expected to be able to learn independently. The books not only provide material from each order in the class Gastropod, but also combine the results of research on Gastropods in the Simalungun Regency area.

The preparation of the book draft was carried out by considering the learning objectives to be achieved after the students experience the learning process. In general, textbooks must consist of three parts including the initial part, the content, and the final part [6]. Book development begins with conducting literacy studies from various sources and research. The structure of the draft consists of three parts, namely the initial part consisting of the book cover design, the editor of the textbook, the introduction, and the table of contents. The content section consists of the classification of gastropod animals and the results of research on gastropod animals in Simalungun Regency, student worksheets and competency tests, which consists of 7 chapters and the final section contains a bibliography, glossary, index, and book synopsis.

Initial Part Structure

The design of the book’s cover is made attractive and proportional by displaying the Gastropod animals in their respective habitats. The cover is an overview of the book as a whole. It consists of two parts, namely the front and the back. Its size uses A5 paper so that it is easy to carry into the field when students carry out learning activities outside the classroom. The textbook editor contains the identity of the author's name, supervisor, and the title of the textbook. The foreword is the author's thanks to those who have helped in the manufacture of textbooks, either directly or indirectly, as well as a brief description of the contents of the book. The table of contents contains a list of titles and subtitles of the material contained in the textbook. List of Figures and List of Tables contain the titles of Figures and Tables to help the readers easily find out what material is contained in the textbook before opening the whole section of the book.
Content Structure

The content structure of the material contains Gastropod material equipped with an illustrated Gastropod animal classification in each subclass in class Gastropod. In addition, there is a picture of the body structure of class Gastropod and the organ system along with a description of each picture, and examples of the animal. In this textbook, the content of the material displayed is an introduction examining the position of class Gastropod and the shell morphology and anatomy of the Gastropod animal body. Next, examine the three subclasses in class Gastropod including Opisthobranchia subclass, Prosobranchia subclass, and Pulmonata subclass. Each sub-class examines the characteristics, morphology and anatomy, habitat, and its role in everyday life, both beneficial and detrimental to other living things. Research on the diversity of Gastropods examines the steps of the work procedures carried out and processing of Gastropod animal data in the Simalungun Regency area. Gastropod diversity discusses population density, frequency of presence and diversity index. Gastropod diversity also discusses the morphological description of each type of gastropod found by including the classification of the animal. The book also includes a student worksheet on how to make a dendrogram on gastropod animals and includes exercises in the form of questions as an evaluation of the content.

Final Part Structure

The final part consists of a bibliography, an index glossary and a synopsis of the contents of the book. Bibliography in the form of reference sources used to compile material in research-based gastropod diversity textbooks. The glossary is a list of difficult and unfamiliar words with the meaning of each word so that readers can find out the meaning of difficult words contained in the textbook. The index contains important words found on a particular page, thus helping the reader to find them.

At the stage of developing the draft textbook for the Gastropod diversity, it will be validated and tested to obtain textbook results that are expected to be worthy of being used as learning resources for students. There are also stages of validation testing carried out by material experts, learning design experts, biology subject teachers and class X students aiming to identify the feasibility level of the textbook products used and tested this product to students through three stages, namely testing individual trials, small group trials, and limited field trials. The next stage was to carry out a conceptual analysis of information and then revise the Gastropod Diversity textbook. Information from the data is in the form of an evaluation questionnaire which is analysed and then translated using qualitative sentences.

Overall, the validation carried out in the development of Gastropod diversity textbooks, starting from expert validation consisting of material experts, learning design experts, and design experts. After everything is done by reviewing it, the key is that the Gastropod diversity textbook is declared "appropriate" with an average assessment result of the validators of 81.34%. The average percentage of validators can be seen in Table 3.
Table 3. Validator percentage average

<table>
<thead>
<tr>
<th>Validator value</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Expert</td>
<td>85.92%</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Learning Design Expert</td>
<td>83.44%</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Layout Expert</td>
<td>74.67%</td>
<td>Appropriate</td>
</tr>
<tr>
<td><strong>Average percentage</strong></td>
<td><strong>81.34%</strong></td>
<td><strong>Appropriate</strong></td>
</tr>
</tbody>
</table>

The average percentage of responses from biology teachers and students by combining the three stages of product testing resulted in a score of 90.50%, stating that the quality of the textbooks is "very good". The table of the average percentage of biology subject teachers and students at the individual trial stage, small-scale trial, and limited field trial can be seen in Table 4.

Table 4. Average percentage of teacher and student responses

<table>
<thead>
<tr>
<th>Validator value</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>91.89%</td>
<td>Very good</td>
</tr>
<tr>
<td>Individual trial</td>
<td>88.96%</td>
<td>Very good</td>
</tr>
<tr>
<td>Small scale trial</td>
<td>90.64%</td>
<td>Very good</td>
</tr>
<tr>
<td>Limited field trial</td>
<td>90.50%</td>
<td>Very good</td>
</tr>
<tr>
<td><strong>Average percentage</strong></td>
<td><strong>90.50%</strong></td>
<td><strong>Very good</strong></td>
</tr>
</tbody>
</table>

Product effectiveness test data

After testing the feasibility of the book and having revised and declared its feasibility, the next stage is dissemination stage aiming to test the effectiveness of the use of Gastropod diversity textbooks with the normalized Gain test (N-Gain) by comparing the results of the pretest assessment with the results of the post-test assessment. N-Gain can be done if the data is normally distributed and homogeneous then a parametric test is carried out, namely the independent sample t-test to determine whether there is a significant difference between the average post test value of the experimental class group and the class group control.

Descriptive statistics

Descriptive statistics are to describe data clearer and easier to understand including in the variables seen from the mean, minimum value, maximum value and standard deviation [7]. The results of the descriptive statistics can be seen in Table 5 below.
Table 5. Descriptive Statistical Analysis

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest design</td>
<td>26</td>
<td>10</td>
<td>75</td>
<td>38.27</td>
<td>14.761</td>
</tr>
<tr>
<td>Post test design</td>
<td>26</td>
<td>45</td>
<td>95</td>
<td>76.35</td>
<td>11.879</td>
</tr>
<tr>
<td>Pretest Control</td>
<td>31</td>
<td>10</td>
<td>65</td>
<td>34.03</td>
<td>13.442</td>
</tr>
<tr>
<td>Post test Control</td>
<td>31</td>
<td>20</td>
<td>75</td>
<td>44.19</td>
<td>13.235</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Pretest and post test results of experimental group*

Based on Table 5 above, the highest learning score before using the Gastropod diversity textbook in the experimental group (pretest) was 75, while the lowest was 10, the mean was 38.27, and the standard deviation was 14.76. Meanwhile, after using the Gastropod Diversity textbook, namely in the experimental group, the highest post test learning outcome score was 95, the lowest was 55, the mean was 76.35, and the standard deviation was 11.88.

*Pretest and post test results of control group*

The highest pretest learning score without using the Gastropod diversity textbook in the control group was 65, the lowest was 10, the mean was 34.03, and the standard deviation was 13.44 (see Table 5). While the highest post test that was carried out without using the Gastropod diversity textbook in the control group was 75, the lowest was 20, the mean was 44.19 and the standard deviation was 13.24.

*Normality test data*

To find out whether the data is normally distributed or not, the data requires to meet the criteria for probability value (sig.) > 0.05. For more details, the results of the normality test for the experimental group and the control group can be seen in Table 6.
Table 6. Normality test results of the experimental group and control group

<table>
<thead>
<tr>
<th>Klas</th>
<th>Kolmogorov-Smirnov Statistic</th>
<th>df</th>
<th>Sig</th>
<th>Shapiro-Wilk Statistic</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp Pretest</td>
<td>.124</td>
<td>26</td>
<td>.200</td>
<td>.961</td>
<td>26</td>
<td>.413</td>
</tr>
<tr>
<td>Exp Post test</td>
<td>.143</td>
<td>26</td>
<td>.185</td>
<td>.932</td>
<td>26</td>
<td>.254</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Pretest</td>
<td>.143</td>
<td>31</td>
<td>.106</td>
<td>.957</td>
<td>31</td>
<td>.238</td>
</tr>
<tr>
<td>Control Post test</td>
<td>.121</td>
<td>31</td>
<td>.200</td>
<td>.969</td>
<td>31</td>
<td>.498</td>
</tr>
</tbody>
</table>

* This is a lower bound of the true significance.

Based on the table above, all data for the experimental and control groups as well as pretest and post test show that the probability value (sig.) Kolmogorov is > 0.05, which means the data is normally distributed.

**Homogeneity test data**

Before the independent sample t-test was carried out in the two research groups, a homogeneity test had to be conducted. In this study, the homogeneity value was obtained by using the homogeneity of variance test. The results of the homogeneity test of the two sample groups can be seen from Table 7 below.

Table 7. Homogeneity test table

<table>
<thead>
<tr>
<th>Levene Test of Homogeneity of Variance</th>
<th>Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Learning Outcomes</td>
<td>Based on Mean</td>
<td>.131</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Based on Median</td>
<td>.134</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Based on Median and with adjusted df</td>
<td>.134</td>
<td>1</td>
<td>54.077</td>
</tr>
<tr>
<td></td>
<td>Based on trimmed mean</td>
<td>.126</td>
<td>1</td>
<td>55</td>
</tr>
</tbody>
</table>

Based on Table 7 above, the probability value (sig.) based on mean is 0.719 > 0.05, representing the data variants of the experimental post test and control post test classes are the same or homogeneous.

**Hypothesis test data**

Hypothesis testing was carried out using an independent t-test to see whether there was a difference in the post test results between experimental group and control group. The results of hypothesis testing with independent sample t tests can be seen in Table 8 below.
Table 8. Independent test results of t-test sample

<table>
<thead>
<tr>
<th>Group</th>
<th>mean (N=55)</th>
<th>t calculation (N=55)</th>
<th>t Table (N=55)</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp Post test</td>
<td>76.35</td>
<td>9.568</td>
<td>2.004</td>
<td>0.000</td>
</tr>
<tr>
<td>Control Post test</td>
<td>44.19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the calculation of the independent sample t-test, it is found that the value of t count > t-table (9.568 > 2.004) and the probability value (2 tailed) < 0.05 (0.000 < 0.05). It concludes that there is a significant difference between the experimental class using books Gastropod diversity teaching compared to the control class.

Normalized gain test data (N-Gain)

An increase in the value of student learning outcomes can be seen from comparing the pretest and post test scores using the normalized gain test (N-Gain). Based on the results of the N-Gain value using the SPSS 22 application in the form of percentages and descriptive output tables, it can be made Table 9 of the calculation of the Normalized Gain (N-Gain) test as follows:

Table 9. Calculation of normalized gain Test (N-Gain)

<table>
<thead>
<tr>
<th>No.</th>
<th>Data Centering and Dissemination</th>
<th>Experiment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mean</td>
<td>63.33</td>
<td>15.11</td>
</tr>
<tr>
<td>2.</td>
<td>Median</td>
<td>63.96</td>
<td>13.33</td>
</tr>
<tr>
<td>3.</td>
<td>Minimum value</td>
<td>85.71</td>
<td>0.00</td>
</tr>
<tr>
<td>4.</td>
<td>Maximum value</td>
<td>80.00</td>
<td>50.00</td>
</tr>
<tr>
<td>5.</td>
<td>Range</td>
<td>46.83</td>
<td>50.00</td>
</tr>
<tr>
<td>6.</td>
<td>Deviation standard</td>
<td>13.28</td>
<td>13.09</td>
</tr>
</tbody>
</table>

It can be seen that the average value for the experimental class using the Gastropod diversity textbook is 0.3 ≤ 0.63 ≤ 0.7 or 56% ≤ 63% ≤ 75% is in the moderate or sufficient category. Meanwhile, for the calculation of the N-Gain test, it can be seen that the average value for the control class using the Gastropod diversity textbook is 0.15 < 0.3 or 15% < 30% which is included in the low or ineffective category. So it can be concluded that the use of textbooks on gastropod diversity in the experimental class is quite effective in improving student learning outcomes on gastropod material in class X SMA Swasta Teladan Tanah Jawa. Meanwhile, the control class is not effective in improving student learning outcomes on Gastropod material in class X SMA Swasta Teladan Tanah Jawa.

3.2 Discussion

Gastropod diversity research results

This study managed to collect as many as 777 individuals. Its composition consists of 10 families and 10 species of Gastropods. The types of gastropods found in Simalungun Regency are *Achatina fulica*, *Bradybaena similaris*, *Subulina octona*, *Parmarion martensi*, *Laevicaulis alte*, *Pomacea paludosa*, *Filopaludina javanica*, *Lymnaea rubiginosa*, *Tarebia granifera*, *
Gyraulus Convexiusculus. The number of species varies from 2 to 5 species per station. The number of species varied, from Laevicaulis alte with only one individual to Tarebia granifera with 240 individuals and Pomacea paludosa with 117 individuals. Likewise with the distribution, starting from Gyraulus convexiusculus and Tarebia granifera were only found at one point to Pomacea paludosa and Lymnaea rubiginosa which were found at 6 points. Several species of snails have a narrow distribution so that they are only found in one station, namely Tarebia granifera (in Tanah Jawa District), and Gyraulus convexiusculus (in Dolok Batunanggar District).

Population density of an organism can be influenced by the area of the habitat and how many records are made in the study. Tarebia granifera had the highest density value only at station 2.2 and was not found at other stations, a high density was also found in Pomacea paludosa species with a value of 23.4 Ind/m² and was found in almost all stations. Gastropods at station 2.3 have the highest density value because of the optimum habitat conditions for gastropod life, so they can breed.

Diversity index differs at each station due to the differences in topography and habitat at each station. The diversity of gastropods classified as moderate is found at station 2.1 with an H' value of 1.36 in the medium category. This is because at station 2.1, high food source consisting of an old oil palm plantation environment so that it provides sufficient food sources. The lowest gastropod diversity is obtained at station 3.3 with a value of H' = 0.68. This occurred because of the lack of food sources in the irrigation flow where it does not provide food supplies.

Development of textbook results

Preliminary research results

Research on the research-based textbooks’ development on Gastropod topic used qualitative data analysis obtained from interviews with biology teachers at SMA Swasta Teladan Tanah Jawa and quantitative data obtained from the results of the questionnaire scores of material experts, learning design experts, layout design experts, teacher response questionnaires, biology and students of class XI SMA Swasta Teladan Tanah Jawa. The development of textbooks used the Four D (4D) development model starting from definition, design, development, and until dissemination stages.

Definition stage

In this stage, the researcher identified the root of the problem by conducting interviews and questionnaires to collect data. The interview was conducted with the biology teacher teaching class X at SMA Swasta Teladan Tanah Jawa. The results of the interviews showed that the classification of living things, in particular, in understanding concepts in classifying living things was difficult material in class X. Students are not well acquainted with animals encountered when doing practical work in the field or gastropod animals brought to the laboratory because the learning resources used do not display the classification and animal shape which are classified as gastropods. There were still few textbooks available in the field, thus, the researchers developed the textbook on gastropod diversity emphasising gastropod classification founded around the students' environment and combined it with the results of studies on the existence of gastropods and their role.
In the learning process in Gastropod material, students are required to be able to directly recognize various living things. That requires students to interact directly with objects, in particular, those in the surrounding environment so that the learning process is more meaningful. Learning by utilizing the environment as a learning resource obtains a positive response from students [1]. Learning media is able to help students understand what is being learned, because students will observe, feel and interact directly with the object being studied. Teachers have also used various models, media, and learning resources in learning Gastropods material that is able to activate students. The teacher has conducted learning with a variety of methods such as practicum, projects and discussions so that the lecture method is not monotonous.

**Design stage**

At this stage the researcher formulated the learning objectives to be achieved as well as the limitations of the material to be discussed in the developed book to make easier for students to understand the Gastropod material. The learning objective is expected to be able to make a dendrogram based on the principle of living thing classification in animals using gastropods available in the environment. The material limitation taken is the subject of each material content including morphological and anatomical characteristics of the class Gastropod. Some examples of subclasses in the Gastropod class include: *Opisthobranchia*, *Prosobranchia* and *Pulmonata* subclasses. Each subclass discusses its description, characteristics, morphology, anatomy, classification, and role in the environment and is combined in several studies contained in the contents of the developed book material. The developed textbook also contains questions in the assessment used to determine the level of understanding of students on Gastropod material.

**Development stage**

Initial draft of the book was prepared based on existing literacy sources as an initial basis. Designing an interesting and clear book can explain the comparison of the characteristics of each group in the class Gastropod. The arrangement of the developed textbooks is designed to contain the following components: (1) Front and back cover of the textbook, (2) Textbook title, (3) Preface, (4) Table of contents, (5) List of pictures, (6) List of tables, (7) Introduction, (8) *Opisthobranchia* subclass, (9) *Prosobranchia* subclass, (10) *Pulmonata* subclass, (11) Gastropod research in Simalungun Regency, (12) Gastropod diversity, (13) Student worksheets, (14) Book index, (15) Glossary, and (16) Bibliography.

Research on gastropod diversity was conducted in Simalungun Regency, at 3 stations, namely in Sidamanik, Tanah Jawa and Dolokbatunanggar Districts. The initial draft of the book is prepared based on the level of quality of the content and learning design. It includes the making of detailed data for the questionnaire indicators for validation of material experts, learning design experts, layout experts, questionnaires for teacher and student responses to product trials used in the development stage. After the initial draft of the book was formed, a validation stage was conducted to test feasibility and quality so that appropriate and quality textbooks are produced. Experts' opinions (experts' judgements) can be used to test validity [8].

**Validation of material experts**

Three main aspects, namely content feasibility (aspects of the suitability of the material with core competencies and basic competencies), presentation feasibility and linguistic feasibility,
were validated by material experts. Of the three aspects of validation by material experts on textbooks, an average percentage of 81.26% in the "appropriate" category is used as textbooks in high schools. Material expert validators provide input for researchers to add material about students' concern for the environment and personal and environmental safety. Furthermore, the researcher added the material according to the advice of the material expert validator.

Validation of learning design experts

From the results of the validation carried out by learning design experts on six main aspects, namely content feasibility (aspects of suitability of the material with core and basic competencies), presentation feasibility, linguistic feasibility, effects for learning, evaluation and product assessment. Of the six aspects of validation by learning design experts on textbooks, an average percentage of 83.44%) in the "eligible" category is used as a textbook in SMA Swasta Teladan Tanah Jawa.

The learning design expert validator gave input to the researcher in order to improve the book cover so that it was not too crowded and images were colored with a high quality. Also, it is suggested to improve the content by adding material on the role of each gastropod in life, avoid monotony in writing to respond and motivate students to think critically, and add questions or case studies related to the material.

Validation of layout design experts

The validation results were carried out by layout design experts on five aspects, namely book format, cover design, layout, typography, and illustrations/pictures of the contents of the book. An average percentage of the five aspects are 74.67%, representing the "feasible" category to be used as textbooks in high school schools. The experts provide input to improve images that are still lacking in contrast and proportion in their layout, make illustrations which are easy to understand, use standard language, and avoid conjunctions as objects (main sentences). These suggestions have been added in the textbook.

Teacher assessment results

Based on Table 4, the average teacher responses to textbooks on the three aspects of interest, material presentation and language obtained an average score percentage of 91.89% in the "very good" category. Language has the highest proportion. The quality of textbooks can be seen from the aspect of language [9]. To boost students learn independently and master the learning process is to use simple language because they only use textbooks when studying independently. Furthermore, the language aspect in textbooks must match the students’ language, which is effective, simple, polite and interesting. An effective sentence is able to convey information, ideas, feelings, in accordance with the author's intent [10].

Students' assessment results

The aspects of assessing student responses both in small group tests, small-scale trials and limited field group trials consisting of aspects of interest, material presentation, and language have the "very good" category (see Table 4), showing the quality of the textbooks developed has a "very good" category to be used as learning material for students. There are eight aspects that determine the quality of textbooks, namely a) having a basic principle and point of view based on linguistic theory, developmental psychology, and learning material theory; b) have a clear concept; c) relevant to the applicable curriculum; d) according to the interests of students; e) growing motivation to learn; f) stimulate, challenge, and excite the activities of
students; g) Have appropriate and attractive illustrations; h) easy for students to understand, effective sentences, avoid double meaning, simple, polite, and interesting; i) can support other subjects; j) respecting individual differences, abilities, talents, interests, economy, social, and culture, and k) strengthening the moral values that apply in society. Furthermore, conceptually the feasibility of a textbook is its criteria for the feasibility in accordance with the objectives of the curriculum [11].

Effectiveness test results

The next stage was the dissemination stage. At this stage, measurement of the goal achievement was conducted to determine the effectiveness of the textbooks being developed. Data analysis from a quantitative test of the textbook effectiveness was used to analyse the results of student learning achievement on the Gastropod material. The effectiveness test was conducted using one experimental class using the Gastropod diversity textbook and a control class using the K13 biology textbook. In the early stage, a pretest assessment was carried out in both experimental and control classes done at the beginning of the learning process. At the end of the learning process, posttest assessment was conducted both in experimental and control classes.

Based on Table 6, it is obtained that normality data with a significance value (Sig.) for the Kolmogorov Smirnov test data more than 0.05, representing the pretest and posttest values were normally distributed. The probability value based on mean is more than 0.05, concluding the data variants of experimental and control post test classes are the same or homogeneous. The pretest-post test value data were normally distributed and homogeneous.

An independent sample t-test was conducted to find out a significant difference between the increase in the average pretest-posttest score in experimental and control classes. Based on Table 5, there is a significant difference between experimental class compared to control class. In Table 6, there is an increase in the average of students’ learning outcomes in experimental class using Gastropod diversity textbooks, which is higher than control class, including in the moderate or quite effective category. This can be concluded that the use of textbooks on Gastropod diversity is relatively efficient in improving learning outcomes in Gastropod material for students grade X of SMA Swasta Teladan Tanah Jawa.

The textbook developed can have a significant impact on student learning outcomes. The textbooks have the same or even greater influence than even qualified teachers in the teaching and learning process. In this textbook, students are asked to observe and record the characteristics of animals in the gastropod group that they observe, the type of their food and their habitat. Learning by utilising the environment brings students to do activities outside the classroom through direct observation [13]. Through direct observation, students can identify questions, conduct experiments and conclude experiments based on what they observe. Furthermore, through discussion on student worksheets and good communication can train in decision making for problem solving so that improves students' critical thinking skills [14].

4 Conclusion

After some assessments conducted, this study concludes that research-based gastropod diversity textbook which has been developed has good quality. The use of textbooks on Gastropod diversity is relatively efficient in improving learning outcomes in Gastropod
material for the students. Therefore, it is recommended to use the textbook for learning gastropod topics in grade X SMA Swasta Teladan Tanah Jawa

References

Developing Problem-Based E-Module Using Moodle In Solubility And Solubility Product Constant Learning Material For High School

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Abstract. This study aims to determine the feasibility of a developed problem-based e-module using the Moodle application on Ksp learning material based on BSNP. This paper is a research and development (R&D) using the ADDIE model. The subjects are material expert lecturer, media expert, and chemistry teacher. The data were collected using questionnaires and a Likert scale. The data analysis technique used descriptive quantitative and qualitative descriptive analysis techniques. The results revealed that the developed e-module was valid, with an average score of 95% in material feasibility and 96% in media eligibility. It was classified as very feasible based on predetermined criteria and can be used for further research.

Keywords: research and development, e-model, moodle.

1 Introduction

The development of science and technology is the result of information and communication technology (ICT) development. ICT is the application of education [1]. As facilitators, teachers must be creative in innovating the teaching materials using technology to achieve learning objectives. One of the which to attain good learning conditions for students is by developing learning resources [2]. A module is a teaching material that is part of learning resources. Modules are so that students can learn independently without or with teacher guidance. Thus, a module must contain learning instructions, targeted competencies, content, exercise, work instructions, evaluation, and feedback. A module that utilizes technology is called an e-module [3].

E-module is a complete unit consisting of a specific learning sequence presented using electronic devices. They can contain images, text, videos, animations, and others. The use of electronic modules is not only practical but can improve critical thinking skills and give
positive impressions to students [4]. Moreover, E-modules can boost motivation, reduce dependence and accomplish learning outcomes following the teacher's indicators of learning tools [5]. One of the platforms that can be used to develop e-modules is Moodle. Moodle is a learning management system that is gradually gaining popularity in education. Moodle software is designed to assist teachers in developing learning materials using technology. It has a flexible design, easy to use, and prioritizes student-centered learning. Using Moodle, educators can input images, text, graphics, animation, video, audio, and simulations to be accessed through the internet using a computer, laptop, or smartphone[6].

Besides media and teaching materials, various innovative learning models are also essential. One of the innovative learning models is a problem-based learning model. It requires students to be active through group discussions in finding and solving problems, making it easier for them to understand the subject and motivating them to learn [7].

This study aims to determine the feasibility of a problem-based e-module developed using the Moodle application on solubility and solubility product constant learning material.

2 Methodology.

2.1 Research Design

This study used the Moodle application to develop e-modules on problem-based solubility and solubility product constant learning material. The ADDIE model was used only until the development stage.

2.2 Population and Sample

The research population is Chemistry Lecturer, IT Expert, and Chemistry Teacher. The research sample is a chemistry e-module.

2.3 Research Procedure

The stages carried out in this study are: (1) Analysis stage, consisted of needs analysis, curriculum analysis, and textbook analysis on textbooks used in schools using the BSNP instruments. (2) Design stage, the design process of the developing e-module based on the results of the previous analysis. The design stage consisted of making a draft module and collecting reference materials for e-modules. Researchers also determined the instruments used to assess the developed e-modules by assessing the content feasibility, language feasibility, presentation feasibility, and media feasibility. (3) Development stage, the making process of the problem-based e-module using the Moodle application on the solubility and solubility product constant material following the previous stage's design. Expert validators then validated the e-module based on the feasibility aspect points and gave suggestions and comments regarding the e-module, which was then used as a benchmark for correcting and improving the e-module.
2.4 Data Analysis Technique

The analysis technique used in this study was descriptive quantitative and descriptive qualitative. Qualitative data were obtained from corrections and input from lecturers and expert teachers on the developed learning e-modules. Meanwhile, quantitative data was from the scores given by expert lecturers and teachers on e-modules through questionnaires. The overall product quality is reflected in the average score of all aspects of the assessment from all validators. This formula determines the percentage of product quality:

\[
\text{Percentage} = \frac{\text{total score of assessment}}{\text{highest score}} \times 100\% \tag{1}
\]

The results were then analyzed using descriptive quantitative, presented as scores and percentages, then categorized following the predetermined rating scale.

<table>
<thead>
<tr>
<th>Average</th>
<th>Validity Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.26 – 4.00</td>
<td>Valid and does not need correction (very feasible)</td>
</tr>
<tr>
<td>2.51 – 3.25</td>
<td>Sufficiently valid and does not need revision (feasible)</td>
</tr>
<tr>
<td>1.76 – 2.50</td>
<td>Invalid, some of the module contents need to be corrected (less feasible)</td>
</tr>
<tr>
<td>1.00 – 1.75</td>
<td>Invalid and need a total correction (not feasible)</td>
</tr>
</tbody>
</table>

3 Results and Discussion

3.1 Analysis Stage

The analysis in this stage used Moodle regarding the use of printed textbooks that still has many abstract concepts. Some sources believe that technology-based teaching materials must be applied in schools because students do not always have to learn using printed textbooks and must keep up with the technologies. Several researchers have proven that technology in education can improve teaching and learning[1].

Besides, Ksp material can be arranged following the curriculum and syllabus by implementing problem-based learning. Based on the analysis of teaching materials, the textbooks used in class XI SMA are suitable for use (valid and do not need to be corrected). However, the material contained in the book is limited and does not contain multimedia links as additional references that can enrich student's insight and make them understand the material easier.

3.2 Design Stage

At this stage, the researchers designed the e-module by making Moodle a learning medium.

Designing Teaching Material

At this stage, the e-module design has been analyzed beforehand. The problem-based e-module design stage used Moodle on the solubility and the solubility product constant material.
The problem-based KSP e-module design followed the problem-based learning syntax, where the problems were presented as a case study after a brief description of the material. The syntax of problem-based learning was included in the description of the case studies in the developed e-module. The illustration of the problem and its stages can be seen in Figure 2.

![Figure 2. Problem presentation in the case study](image)

Then, the developed e-module also consists of comprehensive material content with additional URLs or sources that can be accessed, chemistry info, crossword puzzles, independent exercises, assessment criteria, self-reflection, summaries, evaluations, glossary, index, and other appendices. The display of the design of teaching materials is shown in Figure 3.
Figure 3. Display of Teaching Materials
Moodle Web Design

In addition to teaching materials in modules, researchers also made e-learning-based learning media using Moodle. Moodle is software that can be installed. It needs hosting and a domain to be accessed online. The user can make a personalized Moodle link to be accessed easily and quickly. The Moodle link for the e-module is maribelajarikimia.online. After the link is created, students can log in by entering their username and password. It can be accessed through Google Chrome using electronic devices by downloading the app on Playstore. After that, enter the link, and students can learn easily and practically. Moodle web display and Moodle app are presented in Figure 4 below.

Figure 4. Moodle Homepage

3.3 Development Stage

This stage develops problem-based e-modules (products) on Ksp material. The developed e-module can be seen in Figure 4:

Figure 5. Problem-based electronic module using the Moodle application

Moodle-based teaching materials were validated using the modified National Education Standards Agency (BSNP) eligibility standards at this stage. The assessment was carried out by three validators, a material expert lecturer, a chemistry teacher, and a media expert lecturer from educational technology. The developed e-module that must be assessed for feasibility based on BSNP are content feasibility, language feasibility, and presentation feasibility. The results of the e-module assessment by material expert validators can be seen in Figure 6:
The evaluation of the e-module revealed a result of 95%, which indicates that the developed e-module is very feasible. The result was acquired from the average value of e-module validation on content feasibility (3.7), language eligibility (3.8), and presentation feasibility (3.87), with an average (3.74) with valid criteria and does not need correction. The assessment of e-module media using the Moodle application can be seen in Figure 7.

The percentage of e-module assessment is 96%, showing that the developed e-module using Moodle web media is very feasible. It means the developed e-module, both in material and media, is suitable for use and continued for the following research stage.

Likewise, the research conducted by Santosa et al. (2017) showed promising results in developing the e-module based on a problem-based learning model using the Moodle application on network administration subjects for class XII of computer and network engineering at the Bali Global Singaraja IT Vocational School. It can be concluded that problem-based e-modules using the Moodle application are effective in learning [8].
4 Conclusion

Based on the research, it can be concluded that: this research and development produced a product of a problem-based electronic module of solubility and solubility product constant using Moodle. The development used the research and development (R&D) with the ADDIE model (analysis, design, development, implementation, and evaluation). The developed e-module went through the validation stage by two experts as validators, a chemistry lecturer, a teacher, and a media expert, with a score of 95% for material validation and 96% for media validation. Thus, the problem-based e-module using the Moodle application on the solubility product constant and solubility product learning material developed is very feasible to use and does not need revision.

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References

Development of Environmental-Based Differentiated Learning Designs to Improve Student Learning Outcomes at Elementary Schools Kecamatan Palipi Kabupaten Samosir

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Abstract. This study aims to describe the level of feasibility and effectiveness of the development of Environmentally Based Differentiated Learning Designs to Improve Student Learning Outcomes. This research was conducted at the Elementary School in Palipi District, Samosir Regency. The subjects of this study were all fourth grade students of the Palipi District Elementary School, Samosir Regency for the 2021/2022 academic year, totaling 30 students. This research method is Thiagarajan 4-D development research. The results showed (1) Based on the results of the validity of linguists 86.53%, and instructional design experts 83.33%. ; (2) Environmentally-Based Differentiated Learning Designs are categorized as practical ; (3) the Environmentally-Based Differentiated Learning Design is said to be effectively used in learning with the assumption that the value of student learning is higher when using the development of Environmentally-Based differentiation based on a practical environment and suitable for use in the learning process.

Keywords: learning design, environment, learning outcomes.

1. Introduction

Education is an ethical endeavor of humans, for humans and for human society. Education aims to develop one's potential and abilities to an optimal level within the limits of individual nature, with the aim of increasing human and community development and continuously increasing higher dignity. Education is an element that cannot be separated from human beings. Starting from the womb to growing up and then old humans experience the educational process. Education is a light that guides humans in determining the direction, purpose, and meaning of this life.

Educational institutions are the agency's strategy in order to improve the quality of human resources. Through this educational institution, efforts to prepare the younger generation to face and face developments in the global era began. Therefore, education must be carried out as well as possible by taking into account all aspects of the development to be achieved through the education so that the educational process carried out is of high quality and can improve the quality of human resources.
The implementation of education that can be carried out in Indonesia from time to time uses
the classical mass approach, namely quantity on quantity to be able to serve as many students
as possible. The apparent weakness of this kind of education is that it does not accommodate
the individual needs of students outside the normal student group, while the true nature of
education is to enable students to develop their intelligence potential and talents more
optimally [1]. In addition, the affective and psychomotor components will also not develop in
a positive direction if the learning systems and methods do not run in accordance with the
national curriculum and education system [2].

Several learning theories that have existed so far have actually had a positive impact on the
implementation of the learning process. Like the Humanistic learning theory, where in
practice this theory describes that the learning process must originate and lead to humans
themselves. According to this theory, the purpose of learning is to humanize humans. The
learning process is considered successful if the learning has understood the environment and
itself [3], [4].

In today's millennial era, teachers face much bigger challenges than the previous era, because
today's education is different from Japanese education, today's teachers are millennial
teachers, not colonial teachers, technology has changed everything, including people's needs
for education, that's what happened in the era of the industrial revolution now. Teachers face
very diverse students, very complex and difficult learning materials, standard learning
processes and also demands for the achievement of students' higher thinking abilities.
Teachers are required not only to be able to teach and manage classroom activities effectively,
but also to be able to build effective relationships with students and the school community
using technology to improve quality, as well as reflect and improve learning practices
continuously.

But of course there are other things that must also get special attention in the process of
implementing learning to get maximum results. We cannot deny that the learning process has
a uniqueness that differs from one student to another. There are students who are fast in
catching lessons and can complete learning activities faster than expected and there are also
students who are slow in learning so they often fall behind in lessons and take longer than
expected for normal students [5], [6].

The current learning material in the field only emphasizes the presentation of knowledge
separately and moreover prioritizes theory which makes students often feel bored and this
makes it difficult for students to get a concept or experience. meaningful learning as expected
in the concept of integrated learning [7]. Not to mention the added problem that there are still
many students who do not understand the material presented because the breadth and depth of
teaching materials are not in accordance with the level of student development which is a
challenge in itself.

There are still many talented students whose achievements in school do not reflect their
outstanding intellectual potential. One of the causes is the external conditions or learning
environment that are less supportive, less challenging for them to realize their abilities
optimally. For this reason, it is necessary to develop alternative educational strategies to
produce superior students through the provision of attention, treatment and educational
services based on their talents, interests and abilities. It is intended that the education that has
been given to students achieves optimal targets, so learning must be aligned with the potential
of students. Differentiated Instruction is learning that is tailored to the needs of students with the aim of maximizing the potential of each student. Educators try to accommodate the needs of each student to be grouped in order to get appropriate learning. This suitability includes: learning readiness, interests and student profiles [8].

Learning design is a systematic development effort based on certain learning and learning theories to ensure the quality of education, so that the term learning design model can be understood as a systematic concretization of learning development theory by using certain learning theories to ensure the quality of learning that contains principles, constructs, objectives, and steps. From the various explanations above, it can be found that learning design is a development of learning design both in terms of material, delivery and media used which were developed specifically by teachers as educators with the main aim that the learning delivered can be accepted and mastered well by students [9].

Differentiated Instruction is learning that is tailored to the needs of students with the aim of maximizing the potential of each student. Educators try to accommodate the needs of each student to be grouped in order to get appropriate learning. This suitability includes: learning readiness, interests and student profiles [8]. Suggests that differentiation learning means mixing all differences to get information, create ideas and express what they learn. In other words, differentiation learning is creating a diverse class by providing opportunities to capture content, process an idea and improve the results of each student, so that students will be able to learn more effectively. So it can be argued that differentiation learning is learning that focuses more on the different potentials and abilities possessed by each student so that the learning process will be designed and designed in such a way that all students can receive the learning provided properly.

2. Method

This research is a development research (Development Research). In the development method there are several types of models. The development model used is the 4D model development approach (Four-D model) developed by Thiagarajan. Location This research was conducted at the Elementary School in Palipi District, Samosir Regency. The research subjects were teachers and 30 students at the elementary school in Palipi District, Samosir Regency. Analysis of the data used using the N-gain score to see the comparison of learning outcomes.

3. Finding and Discussion

3.1 Finding

Product Feasibility Test

a. Learning Language Expert

The results of the assessment by a linguist which includes the attractiveness of the physical appearance, the accuracy of the use of the design, the suitability of the format, the presentation with the target characteristics, the clarity of the media instructions, the clarity of the material
exposure, and the suitability of the evaluation with the material as a whole, it can be concluded that the level of achievement of the score is 86.53 where the range is at the level of achievement of a score of 85–100 categorized as “Very Good”. The results of the assessment of linguists on the development of environmental-based learning designs received several comments, including: (a) Simplify sentence structures, (b) make sentences effective, (c) pay attention to spelling and word writing, (d) organize sentences. The conclusion from the assessments, comments and suggestions by linguists that the design of environment-based learning is worth trialling in the field with revisions.

b. Instructional Design Expert

The results of the assessment by instructional design experts on learning design which include aspects of media display design, media programming design, and media content design as a whole it can be concluded that the level of achievement of the score of the design expert is 83.33 where the range is at the level of achievement of a score of 70-84 categorized "Good". The results of the instructional design expert's assessment of learning design in the development of environmental-based learning designs received several comments, including: (a) improve the lesson plan format. (b) use methods/models that are appropriate to the student's environment. and the suggestion is that all data from the results of the design expert's review are used as a basis for revising in order to improve the learning design content before being tested on students as users of development products. Conclusions from the assessments, comments and suggestions by learning design experts that environmental-based learning designs are worthy of being tested in the field with revisions.

Product Effectiveness Test

a. Small Group Trial

Analysis of small group trial data that includes aspects of design and language in environmental-based learning design as a whole reached 85.42% included in the "Very Good" category. The responses from several students said that "the media that is seen is very interesting and suitable for learning, the display is in accordance with the students who use it, the selection of colors and layouts for environmental-based learning designs, by providing real images, it would be nice if all subjects used this design as a reference in learning.

The results of the assessment and responses to the environmental-based learning design in the individual trials carried out, showed that the product developed was feasible to use and there was a suggestion for improving the appearance to make it more attractive to students in individual trials of environmental-based learning design development products. development continued in small group trials with revisions.

Data on individual learning completion results obtained based on students' abilities, it can be seen that from 6 children there are 2 students who are "Unfinished" and there are 4 students who are "Completed". the following is a diagram of the results of the learning design development experiment.
b. Large Group Test

Based on the classical learning completeness data above, there are 90% in the very effective category with student achievement reaching KB 70%. After the students' mastery in individual and classical learning is analyzed, the results of the pre test and post test are calculated using a gain score. To see an increase in the value and effectiveness of the learning design developed between before and after using the normalized gain score formula.

Table 1. Large group study completion table

<table>
<thead>
<tr>
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<th>Pos test</th>
<th>Description</th>
</tr>
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<td></td>
<td>X</td>
<td>F</td>
<td>X*F</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>20</td>
<td>BT</td>
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<td>Standar Deviasi 3,8</td>
<td>Standar Deviasi 2,7</td>
<td></td>
</tr>
</tbody>
</table>
3.2 Discussion

The validity criteria were obtained through the assessment of experts and practitioners on the environmental-based learning design developed. The acquisition of a valid learning design is caused by several factors, including: (1) the environmental-based learning design developed has met content validity. This means that in the development of environmental-based learning designs, it is in accordance with the demands of the existing curriculum. The demands of this curriculum are related to Core Competencies (KI) and Basic Competencies (KD) that must be achieved by students in learning activities that are adapted to the material or content of the lessons provided and adapted to environmental-based learning design steps. This is in line with Gronlund's opinion [10] that content validity is the accuracy of a measuring instrument in terms of the contents of the measuring instrument. A measuring instrument is said to have content validity if the content or material or material of the measuring instrument is truly a representative material for the learning materials provided. That is, the content of the measuring instrument is estimated according to what has been taught based on the curriculum.

Second, the environmental-based learning design developed has met the construct validity. That is, in the development of environmental-based learning design, it is in accordance with existing concepts and indicators and then combined with the surrounding environment. The learning designs developed were arranged to complement each other between lesson plans, student books, and worksheets that were adapted to the student's environment in order to improve student learning outcomes regarding rights and obligations. The fulfillment of a good validity aspect as stated above is in line with which states that the validity aspect refers to the extent to which the design of the developed device is based on content validity and construct validity.
Based on the results of the research and opinions above, that the results of the development of the learning design carried out have met the valid criteria. This learning design is declared valid because the final result on material validation is 86.53.

And the validation of the instructional design is 83.33 so that the development of the learning design is declared valid. Validity is illustrated from the results of the validator's assessment that each validator states both based on content (according to the curriculum), construct (according to the characteristics/principles of learning) and language (in accordance with the applicable language rules, namely enhanced spelling). Language validation is seen from how well students understand the language style used, which is in accordance with student needs. There are several aspects that are assessed on language validation including: Straightforward, communicative, in accordance with language rules, and easy for students to understand, so that the development of this learning design has a positive influence on improving student learning outcomes that are adapted to the environment and the experiences that students go through.

At the end of the learning activity and using an environment-based learning design, a post test was carried out to see student learning outcomes. Based on the results of the post-test carried out, it can be seen that the post-test results of students reached an average of 17 with a standard deviation of 2.7. Minimum completeness criteria.

Based on the results of students' classical mastery in table 4.11, it can be seen that the average classical learning mastery data reached 17 students who had reached KB 70%. After students' mastery in individual and classical learning is analyzed, the results of the pre-test and post-test are calculated with a gain score to assess the increase in the effectiveness of environmental-based learning designs between before using and after using the results of 0.81 so that the student's gain score is high. Based on the results above that there is an increase from before and after using. Besides being based on learning outcomes, the effectiveness of the media can also be seen by using a student response questionnaire using an environment-based learning design that strongly agrees as much as 73.3% and students who agree with the interactive media developed by researchers. Based on student responses, it is concluded that the learning media developed is said to be effective.

Based on the purpose of development research, namely to determine the feasibility and effectiveness of environmental-based learning designs, this can be said to be effective and suitable for all students. Because based on the data obtained, it shows that this environment-based learning design is effective in improving student learning outcomes. This learning design has advantages in making learning more optimal because learning needs are met. So that learning is adjusted to the readiness to learn, talents and learning styles of students which in turn has an effect on learning outcomes.

4. Conclusion

The development of an environment-based learning design using the Thiagarajan, Semmel and Semmel development model aims to improve student learning outcomes in terms of rights and obligations. From the results of research that has been done, the conclusions that can be described in this study are: environmental-based learning design tools in improving student
learning outcomes increased from small-scale trials with an average posttest of 75, while in large-scale trials with an average value of 85 with a percentage of 13.3%, it was concluded that this study experienced an increase on learning; and the learning tools developed have met the effective criteria.

References

Development Of Creative And Entrepreneurship Teaching Materials Using Adobe Animate Application Based On Projects To Improve Student Learning Outcomes Class XI SMK Raksana 2 Medan

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Abstract. This study aims to determine the feasibility and effectiveness of PKK teaching materials using the project-based Adobe Animate application. Types of research development and experimentation at SMK Raksana 2 Medan class XI OTKP. Teaching materials developed using the ADDIE model. Teaching materials were assessed by material experts, design experts, PKK teachers and 3 tests by obtaining an overall average percentage of 88.51% very feasible criteria. The results showed that the experimental class obtained learning test results with an average value of 79.80, while the control class obtained an average value of 58.60 and the results of the t-test calculations obtained t_count 32.682 > t_table 1.671. Based on the results of the study, it was shown that project-based PKK teaching materials using the Adobe Animate application were feasible and effective in improving student learning outcomes for class XI OTKP SMK Raksana 2 Medan in PKK subjects.

Keywords: development of creative product and entrepreneurship teaching materials (PKK), project-based adobe animate application, learning outcomes

1 Introduction

The development in technology have increased, almost all activities are carried out by utilizing existing technology. It's just that the use of technological developments that occur is sometimes underutilized for self-development. For example in the world of education, technology is still often underutilized by educators to improve the skills or skills of their students. Technology should be used to create quality education that can make students more developed and have the ability to deal with changes following the times. Therefore, there is a need for appropriate new breakthroughs to support this, both in learning innovations which include the development of renewable teaching materials and supporting infrastructure, so that learning is carried out effectively.

The use of technology in education cannot be separated from the role of teachers who must be able to take advantage of the developing technology. In addition, the creativity of teachers related to the
use of technology in learning will greatly affect the quality of students in particular and improve the quality of education in general. The learning carried out by the teacher must be able to create students who have the skills and excel in facing change which is the goal of learning. As according to Isman, (2011:136) states that learning objectives are the responsibility of the teacher which must be chosen and determined carefully to create a meaningful learning process. The interest of students to take part in learning that is able to improve their skills and knowledge is influenced by the ability of educators to make the teaching and learning process not feel boring.

Teaching materials are one of the most important parts or components in the delivery of a material that teachers do to their students at school. According to Hamdani (2011), teaching materials are materials that are processed in a structured manner by students before carrying out teaching and learning activities. Teaching materials have various types of forms or classifications that can be chosen by educators as needed. As Lestari (2013: 6) classifies teaching materials in terms of their shape, they are divided into four: (1) printed teaching materials which include handouts, books and modules, (2) audio teaching materials which include radio, cassettes, vinyl records, (3) teaching materials audiovisual which includes films and video compact discs, (4) interactive CD interactive teaching materials.

Teaching materials that utilize technology or in more detail software that continues to develop at this time can be implemented in one of the existing vocational subjects such as Creative Products and Entrepreneurship (PKK) subjects. Creative Products and Entrepreneurship subjects have a role and contribution to foster students' interest in entrepreneurship, because PKK subjects are not only about applying theory and materials, but in the learning process it is expected that educators are also able to teach how students practice directly, train courage. students and cultivate their mentality and entrepreneurial interest in accordance with the majors they take at school.

Students' abilities related to the material that has been studied can be seen based on daily scores or practice values obtained from the results of calculating the overall score. Students are declared to have mastered the material and can continue to the next material if students have achieved the Minimum Completeness Criteria (KKM). Students who get scores below the KKM should be given remedial or even re-learning. Values below the KKM in subjects can be caused by several factors as the results of Ediza's research (2014), namely: 1) lack of student motivation in learning; 2) lack of mastery of teaching materials and media by teachers; 3) economic conditions and how to educate parents. From the results of these studies that one of the causes of low student learning outcomes is that the teaching materials used are difficult to understand. In this case, it is clear how the creativity of educators in making teaching materials and the methods used greatly affect the learning outcomes of students to achieve KKM.

Based on the results of observations and interviews conducted at SMK Rakasana 2 Medan to PKK Subject Teachers, the teacher concerned said that the learning carried out was still using teaching materials, namely textbooks. The available textbooks do not contain learning that raises problems or projects that can improve students' skills in analyzing or understanding the material. As according to Tian Belawati (2003:95) one of the weaknesses of printed books is the difficulty of providing guidance to readers who have difficulty understanding certain parts of the printed book, in addition to one-way presentation because printed books are not interactive so they tend to be used passively, without proper understanding. This certainly has an impact on students who are
less able to master the material both in terms of increasing knowledge and skills. Thus the learning objectives of the learning process on PKK subjects will not get maximum results where it is highly expected that students have broad skills and insights to compete in the business world and the industrial world.

Based on the daily test scores of students from the two classes that were the subject of the study, the researchers found that the PKK subject scores were more dominant under the KKM with the calculated percentage reaching 73% of the 30 students for the first class, while the second class reached 77% below the KKM of 30 students. The achievement of these values certainly must be the concern of educators so that they can be improved as much as possible through learning evaluations, especially the improvement and adjustment of the teaching materials used.

The teaching and learning process in PKK subjects applied at SMK Raksana 2 Medan is expected to be able to make teaching materials that give a pleasant impression, easy to understand so that students are enthusiastic about participating in learning which has an impact on satisfying learning outcomes and PKK learning objectives can be achieved. The solutions offered and can be used to achieve the intended learning objectives need project-based interactive teaching materials that make it easier for students to understand the material and improve skills by utilizing technology.

Teaching materials by utilizing technology are now quite diverse by bringing up visuals, images, videos and animations that aim to convey learning messages to students. The teaching material referred to as the solution offered is the use of the Adobe Animate Creative Cloud Application. Adobe Animate CC is a development of Adobe Flash Professional with several additions to its features. For this reason, Adobe Animate is no different from the Adobe Flash Professional application, where this application can be used to create animations accompanied by images, videos, text, charts, and sounds. Adobe Animate is one of many software that is able to produce new features to be used in the field of education, namely by combining the concept of learning with audiovisual technology. The use of teaching materials with Adobe Animate software can improve student learning outcomes and provide a very good response to student learning.

Adobe Animate makes it easy for students to obtain and utilize learning resource references with a time and place that is free to use both during class hours and outside learning hours. In addition, Adobe Animate is able to import almost all image files and audio files so that presentations with Adobe Animate can be more lively, animations can be created, run, and controlled. So that the application of teaching materials using the Adobe Animate application is believed to be useful for clarifying the delivery of PKK subject matter. Ahmadi, Alfian Khuswaidinsyah, (2018) with research results showing that Adobe Animate CC is able to improve student learning outcomes in class XI IPS 1 MAN1 Lamongan. The results of the pretest before getting treatment got an average score of 58 while the posttest after getting treatment got an average score of 80. There is a significant difference in student learning outcomes after using Adobe Animate cc as a learning medium. Meanwhile, the acquisition of students’ learning motivation responses using Adobe Animate cc as a learning medium obtained an average result of 92% with a very good category. With the literature study on the results of research using the Adobe Animate application, it is hoped that it can be a reference for researchers in developing Teaching Materials Using the Adobe Animate Application in the Subjects of Creative Products and Project-Based Entrepreneurship to Improve Student Learning Outcomes of Class XI SMK Raksana 2 Medan"
2 Literature review

Learning outcomes are student scores as long as these students carry out the learning process. The learning process is a process of changing behavior by providing experiences and activities for students. Syah (2012:44) explains learning outcomes, namely the stages of changing a person's behavior that remains from the results of interacting activities in their environment using cognitive aspects. Changes in this behavior for example behavior due to physical maturity and the development of understanding of the experience. In line with the opinion of Gagne and Briggs (1979) learning outcomes are one's ability after the learning process. Furthermore, Dahar (1998:95) explains more specifically that learning outcomes are the formation of concepts, namely the categories that we give to stimuli in the environment, which provide an organized scheme to assimilate new stimuli and determine relationships within and between categories. Here the learning process has an important role to get an assessment of students. The process of assessing learning outcomes can provide information for teachers regarding the development of students and the level of knowledge of students after participating in learning which includes development and mastery of cognitive, affective and psychomotor. Learning outcomes are the level of success of students' mastery of learning materials obtained by students from the teaching and learning process. The delivery of learning materials at the time of learning is adjusted to the objectives so that the results obtained can shape changes in students' attitudes and behavior optimally.

Optimal learning outcomes indicate the success of learning through a process that tends to be optimal. Such learning outcomes certainly have characteristics that need to be understood as Slameto (2013) that student learning outcomes with learning activities have the following characteristics:

A sense of satisfaction and a nation that raises student learning motivation

Add a sense of self-confidence. Students will know their own abilities that are not the same as their friends

Learning outcomes will give new meaning to students in shaping behavior and making it easier to develop creativity during learning

Student learning outcomes as a whole.

Optimal learning outcomes with the characteristics described above are certainly influenced by the learning process carried out by educators who provide appropriate teaching materials as a way to make it easier for students to understand the material presented. Because teaching materials are important things that will facilitate and help students understand the material. Lestari (2013) explains that teaching materials are a set of learning tools or tools that contain learning materials and methods, as well as evaluations that are designed systematically in order to achieve the expected learning objectives. In line with this right, Farida (2017) explains that teaching materials have a role in making students learn independently, anywhere and anytime, students can learn according to the speed of each individual. Thus it can be concluded that teaching materials are a set of tools/materials that contain learning materials used by teachers during learning that will
support in achieving learning objectives that affect the achievement of scores above the KKM by students.

Quality teaching materials will make it easier for students when learning and make it easier for teachers when giving the material. The Ministry of National Education (2008) develops teaching materials using the following principles: (1) starting easy things to understand difficult things, from concrete things to understanding difficult things. (2) repeating to strengthen the understanding that is absorbed. (3) Positive feedback strengthens students' understanding. (4) High motivation as part of the factors that determine student success (5) getting goals such as climbing which must be done step by step. (6) Knowing the results will motivate students in achieving goals. Based on this principle, the researcher believes that the teaching materials based on the Adobe Animate application are very suitable for use in learning. Because the Adobe Animate application provides a variety of animation features that make learning can be designed to increase students' enthusiasm for learning and facilitate understanding of the material. As Chun (2017) states that Adobe Animate CC is a comprehensive application in creating sophisticated animation and interactive applications with many media published from various platforms.

The teaching materials developed do not only focus on the use of the Adobe Animate application, but the teaching materials developed include the delivery of project-based materials. It is intended that students not only understand in terms of theory, but also understand in terms of skills or practice presented in the form of animation. As according to Morsund in Wena, (2013: 147) explains the advantages of PjBL, namely:

Increase students’ motivation to learn and do important things.

A learning environment that causes students to be active in solving complex problems.

Group work on development projects and practice skills in communication.

PjBL provides conditions for students to be able to quickly obtain information through information sources, so as to improve the skills of students to seek and obtain information.

Provide learning opportunities to develop based on real world conditions.

Improved thinking skills.

A pleasant learning environment.

Based on the advantages of project-based learning, the researcher believes that the teaching materials developed have a very significant impact on the achievement of the KKM scores by students in PKK subjects.

3 Method

The type of research used by the researcher is a type of development research known as Research and Development (R and D) using the ADDIE teaching material development model. The ADDIE model was developed by Reiser and Mollenda in 1990 (Rohaeni, 2020:123). The product resulting from this development will be continued with experimental research using a quantitative approach.
In this study, the researcher wanted to know how to improve student learning outcomes with the developed teaching materials. The research method used is to use a t-test in the form of a post-test for the experimental class using the developed teaching materials and the control class without using the developed teaching materials.

The population in this study is class XI OTKP with a total of 2 classes consisting of 60 students and 1 teacher who teaches PKK subjects. Based on the sample, the researcher determined the sample using Random Sampling, namely 1 class with 30 students as the experimental class and 1 class with 30 students as the control class.

The data analysis technique in testing the feasibility of the product developed is using feasibility analysis, namely validation analysis obtained from material experts, design experts, PKK learning practitioners (individual testing, small group testing, field trials) and feasibility trials based on questionnaire sheets which were analyzed using descriptive analysis technique. The data analysis technique used to test the effectiveness of the product on improving student learning outcomes is the average difference test or t test (independent sample t test) because the data are homogeneous and normally distributed. In decision making, Ho is accepted if the significance value is more than 0.05.

4 Results and discussion

4.1 Product development feasibility results

PKK Teaching Materials Using Project-Based Adobe Animate Applications on creative product lessons and entrepreneurship with learning materials Design concepts and product/service product packaging that have been researched and developed with reference to the ADDIE development model. The ADDIE development model consists of 5 main stages, namely: (A) analysis, (D) design, (D) development, (I) implementation, (E) evaluation.

<table>
<thead>
<tr>
<th>Category</th>
<th>Average Score (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design expert assessment</td>
<td>90</td>
<td>Feasible</td>
</tr>
<tr>
<td>Material expert assessment</td>
<td>89,3</td>
<td>Feasible</td>
</tr>
<tr>
<td>PKK teacher's response</td>
<td>91,76</td>
<td>Feasible</td>
</tr>
<tr>
<td>Individual Test</td>
<td>85</td>
<td>Feasible</td>
</tr>
<tr>
<td>Small group test</td>
<td>86</td>
<td>Feasible</td>
</tr>
<tr>
<td>Limited Field Test</td>
<td>89</td>
<td>Feasible</td>
</tr>
<tr>
<td><strong>Average Score</strong></td>
<td><strong>88,51</strong></td>
<td><strong>Feasible</strong></td>
</tr>
</tbody>
</table>
Based on the table of the results of the feasibility study on the developed teaching materials, the percentage of the average overall score of 88.51% is included in the "very feasible" category, which means the development of Creative and Entrepreneurial Product Teaching Materials (PKK) Using the Project-Based Adobe Animate Application. has been developed that is proven to be suitable for use in the teaching and learning process.

4.2 Results of testing the effectiveness of the developed product

Setelah dilakukan uji prasyarat analisis data terpenuhi baik normalitas dan homogenitas data, maka dapat dilanjutkan pengajuan hipotesis menggunakan hasil belajar siswa dan melakukan pengujian uji t. Dalam melihat seberapa besar perbedaannya hasil belajar kelas eksperimen dan kontrol tersebut dapat dilihat pada tabel berikut:

<table>
<thead>
<tr>
<th>Tabel 2. Statistic Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
</tr>
<tr>
<td>Student learning outcomes</td>
</tr>
<tr>
<td>Control</td>
</tr>
</tbody>
</table>

Based on the results of the statistical group calculations above, it is clear that the average student learning outcomes of the experimental class are 79.80 and the control class is 58.60. This explains that the average learning outcomes in classes that apply creative and entrepreneurial products (PKK) teaching materials using the project-based Adobe Animate application are greater than those in the classrooms where student handbooks use conventional methods.

Judging from the results of the independent test sample output above, it was taken from homogeneous data by looking at the equal variance assumed that the significance value (2-tailed) obtained was 0.00 < 0.05 with statistical tests using the t test with test results showing t count 32.682 > ttable 1.671 with 0.05 and df = 58 or. Based on the difference in the value of learning outcomes and the t-test carried out, it can be concluded that the PKK teaching materials developed are effective in improving student learning outcomes.
5 Conclusions

Based on the formulation, objectives, results, and discussions in the research on the development of Creative and Entrepreneurial Product Teaching Materials (PKK) with Adobe Animate Application-Based Projects for creative products and entrepreneurship for class XI OTKP SMK Raksana 2 Medan, it can be concluded that: 1) Development Creative Products and Entrepreneurship Teaching Materials (PKK) with Adobe Animate Applications Based on Creative and entrepreneurship product subjects with learning materials for product/service product design and packaging concepts in class XI OTKP SMK Raksana 2 Medan are eligible and suitable for use by conducting an assessment of the category – a predetermined category by obtaining an average percentage result of 88.51% with very feasible criteria. 2) The use of Creative Products and Entrepreneurship Teaching Materials (PKK) with the Project-Based Adobe Animate Application that was developed effectively improves student learning outcomes who are taught to use Creative and Entrepreneurial Product Teaching Materials (PKK) with the Project-Based Adobe Animate Application for creative product subjects and entrepreneurship that developed is higher than the average of student learning outcomes who are taught without the developed teaching materials have an average of 79.80.

Based on the findings that have been described at the conclusion of the research results on the development of teaching materials, the following suggestions are proposed, namely: 1) For students, the teaching materials that have been developed have been proven to improve student learning outcomes in learning activities so that the use of teaching materials for creative product subjects and entrepreneurship really need to be supported by more adequate facilities. 2) Teachers should be more creative in making teaching materials and need to learn how to make interesting teaching materials, and must follow technological developments in the learning process so that they are not monotonous and boring. 3) Principals should encourage teachers to be creative in making project-based teaching materials by utilizing technology that is much needed as teaching materials in the learning process. 4) For other research, in order to make teaching materials more interesting because basically teaching materials really could help students in following the learning process. Product developments could be further developed with broader materials or materials that have never existed based on the characteristics of students and subjects.

References

The Effect of the Modellus-Based PBL Model on the Critical and Creative Thinking of Class IX High School Students on Wave Material

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Abstract. This study aims to describe students' critical and creative thinking skills using the problem-based learning (PBL) learning model based on modellus software on wave physics material. After conducting quasi-experimental research with two group pretest-posttest designs, the results of the modellus-based problem-based learning model significantly affect students' critical and creative thinking skills. The results of the multivariate analysis of variance pretest critical and creative thinking obtained Fcount = 0.207 and significant = 0.814. As for the posttest Fcount = 32.42 significant = 0.000 at the level of 0.05. The statistical test for the N-Gain of students' critical thinking skills in the experimental class was 41% and the control class was 35%. In the experimental class, the N-Gain of creative thinking skills is 41% and the control class is 29%.

Keywords: Model problem-based learning (PBL), Modellus software, critical and creative thinking

1 Introduction

Education in school has goals that are in line with the goals of national education. The 2013 curriculum targets to increase the creativity of students as optimally as possible so that they are able to innovate to answer future challenges [1]. Students will be able to innovate if they have creative thinking [2-4]. Creative thinking can be demonstrated through the ability to build and create ideas, discover new things that have never existed, plan something new, and display it. Concept understanding is the basis for students to develop and connect concepts with one another so that they are able to solve problems in physics. The wave material in learning has material characteristics that can be delivered with existing concepts in everyday life so that it is easy for students to understand. According to the characteristics, actually wave material can be found and occurs in everyday life, so there are many problems related to waves that can be used as references or guidelines in learning. Understanding physics material requires thinking and reasoning in order to solve physics problems. The same opinion was expressed by Kuswana...

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(2012) who states that the development of thinking skills is the basis for building one's knowledge, attitudes, and motor skills. So also with Jones et al (2012) mentions that one's thinking skills are used to detect, analyze and evaluate possibilities that occur in the future which are very important to be developed in education. Education should make the ability to think as the main goal of education by providing facilities for developing thinking skills that are larger in portion. Critical thinking is needed in learning physics, including the topic of waves. Judging from the context of improving the quality of education, the problem-based learning (PBL) model is one of the learning models that can be used to improve the learning system [5]. We realize that so far the ability of students to be able to solve problems has not been noticed by every teacher in learning. The problem-based learning (PBL) model places problems as the keyword of the learning process. Use The problem-based learning (PBL) learning model aims to guide students to become individuals who have thoughts like adults so that they can students are able to develop their abilities and be able to think critically (Sugiharto, 2015). Critical thinking according to Soyomukti (2015) is a cognitive skill that allows a person to investigate a situation, problem, question, or phenomenon in order to make an assessment and decision [6]. Related to the problem that happened in learning physics in school, the researcher needs to apply an appropriate learning media and could resolve the difficulty of students in the study. Based on the problem above so need to be conducted something method for resolving the problem then that is as using an integrated PBL problem-based learning model with software-based media that can help students to more creative, critical, and easier to understand draft physics for solving physics problems in everyday life [7-8]. In Thing, this writer chooses to use the device soft modellus. Election use this software because this software is capable answer phenomena in physics in connection with mathematics. By using the features contained in the modeler's software media characteristics of the material waves can be visualized and simulated by mathematics well so that the mastery of the students' material is increasing. Besides could simulation modelus software also can be used to present results in the form of animation objects, tables and charts [9].

### 2 Methods

The research design used was a quasi-experimental design with a two-group pretest-post-test design. The data analysis technique used in this research is the descriptive quantitative data analysis technique. The quantitative descriptive analysis technique was obtained from a descriptive questionnaire which was then quantified in order to get the results in the form of numbers. The population in this study were all students of XI MIPA Semester 2 (two) Chandra Kumala High School for the Academic Year 2021/2022. The sample in this study consisted of two classes selected by cluster random sampling technique, namely each population class has the right to have the opportunity to become the research sample. Samples were taken from the population in as many as two classes. One class is used as an experimental class (a class that is taught by applying a problem-based learning (PBL) model. Modellus media-based and another class is used as a control class ((classes taught by applying the problem-based learning (PBL) model) without using modellus media).
### Tabel 2.1 Two Group Pretest t – Posttest t Design

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Postes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment class</td>
<td>T1</td>
<td>X</td>
<td>T2</td>
</tr>
<tr>
<td>Control class</td>
<td>T1</td>
<td>Y</td>
<td>T2</td>
</tr>
</tbody>
</table>

Information:

- T₁ = Pretest given to the experimental and control classes before treatment
- T₂ = Posttest given after treatment in the experimental class and control class
- X = Teaching with problem based learning model- based on media modellus
- Y = Teaching with a problem-based learning model based on without media modellus

### 3 Results

Results obtained in a study describing start from data acquisition pretest and posttest think a critical and creative student at Chandra Kumala High School Deli Serdang. Instrument tests are given to students there are two types of instrument that is instrument think critical and instrument think creative. Instrument think critical consists of five questions and instrument consists of five questions think creative who has validated. As for the results study, this description starts from data acquisition pretest and posttest think critical and creative students. Results Calculation of science process skills pretest data and ability solving problem physics student showed on Table following.

### Table 3.1 Test of normality Data Pretest Critical and Creative Thinking

<table>
<thead>
<tr>
<th></th>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Statistic df Sig.</td>
<td></td>
</tr>
<tr>
<td>Pretest Results</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical Thinking Pre-</td>
<td></td>
<td>.24 15 .01</td>
<td>.91 15 .13</td>
</tr>
<tr>
<td>Test Score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical Thinking</td>
<td></td>
<td>.21 15 .06</td>
<td>.89 15 .08</td>
</tr>
<tr>
<td>Control Pre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creative Thinking Pre-</td>
<td></td>
<td>.16 15 .20</td>
<td>.93 15 .31</td>
</tr>
<tr>
<td>Tets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creative Thinking</td>
<td></td>
<td>.28 15 .02</td>
<td>.88 15 .06</td>
</tr>
<tr>
<td>Control Pre-Tets.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.1 Test Normality

Pretest Test pretest normality are helped with application SPSS 25.0 for windows with use level significant 0.05 and condition testing if score significant on column Kolmogorov-Smirnov bigger from 0.05 so data considered distribute normally. Results testing normality could be seen in Table 3.1.

Based on the results test pretest normality using test Kolmogorov-Smirnov value significance ability thinks critical namely 0.014 and 0.069. Whereas the ability thinks creatively namely 0.200 and 0.002. This data show that score significance ability thinks critical and creative student bigger from level 0.05, which means class pretest score control distribute normally.

Based on the results of test normality that’s can conclude that the second sample distribute normally. Calculation test normality pretest also could prove through histogram which showed on the Figure.

![Fig. 3.1 Test Normality Think Critical](image1)

![Fig. 3.2 Test Normality Creative](image2)

3.2 Test Homogeneity

Homogeneity test is used to determine the sample is homogeneous or not. Testing the homogeneity of the two variances between the experimental class and the class control with Levene’s test assisted test SPSS 25.0 for windows application. Condition homogeneity test if
the significance value is greater than 0.05 then the data considered homogeneous. Results testing homogeneity showed on table following

**Table 3.2** Test Homogeneity Pretest

<table>
<thead>
<tr>
<th>PreTest Score</th>
<th>Kolmogorov-Smirnov (^a)</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistics</td>
<td>df</td>
</tr>
<tr>
<td>Thinking PreTest Critical</td>
<td>0.21</td>
<td>15</td>
</tr>
<tr>
<td>PreTest Control Think Critical</td>
<td>0.23</td>
<td>15</td>
</tr>
<tr>
<td>Pre Drops thinking Creative</td>
<td>0.16</td>
<td>15</td>
</tr>
<tr>
<td>Pre Drops Control thinking Creative</td>
<td>0.23</td>
<td>15</td>
</tr>
</tbody>
</table>

Based on results test homogeneity pretest use Levene's test obtained score significance critical thinking skills is 0.711 and score significance ability creative thinking is 0.786. Score significance which obtained is greater than the level value of 0.05, it can be concluded that students control class and experimental class come from the same variant population or with another meaning that both class the homogeneous.

**3.3 Test Similarity Data Pretest**

After knowing the pretest data is normally distributed and homogeneous, then the variance similarity test was carried out. Pretest data similarity test works for see similarity knowledge critical thinking and creative physics students. The variance similarity test was carried out with multivariate analysis of variance help application SPSS 25.0 for windows. Results test similarity of pretest data showed in the following table.

**Table 3.3** Results test Similarity Data Pretest thinking critical and creative

<table>
<thead>
<tr>
<th>Effect</th>
<th>Multivariate Tests (^a)</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>df error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>Pillai's Trace</td>
<td>0.99</td>
<td>1597,304 (^b)</td>
<td>2,000</td>
<td>27,000</td>
<td>0</td>
</tr>
<tr>
<td>Wilks ' Lambda</td>
<td>0.08</td>
<td>1597,304 (^b)</td>
<td>2,000</td>
<td>27,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hotelling's Trace</td>
<td>118,31</td>
<td>1597,304 (^b)</td>
<td>2,000</td>
<td>27,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Roy's Largest Root</td>
<td>118,31</td>
<td>1597,304 (^b)</td>
<td>2,000</td>
<td>27,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Pillai's Trace</td>
<td>0.01</td>
<td>.207 (^b)</td>
<td>2,000</td>
<td>27,000</td>
<td>0.81</td>
</tr>
<tr>
<td>Wilks ' Lambda</td>
<td>0.98</td>
<td>.207 (^b)</td>
<td>2,000</td>
<td>27,000</td>
<td>0.81</td>
<td></td>
</tr>
</tbody>
</table>
Based on the table of results of the multivariate tests of the pretest data of students critical and creative thinking skills, it was obtained that the F count was 1.59 and the significance as big as 0.000 on level < 0.05. Score significance which obtained on critical and creative thinking skills more than 0.05. Based on results concluded that no there is difference early ability science process skills and problem solving skills students in class experiment with class control.

### 3.4 Test requirements analysis data

Test requirements analysis data more formerly conducted as condition for testing statistics inferential. Test requirements consist from test normality and homogeneity. Test normality use test Kolmogorov-Smirnov at a significance level of 0.05 and homogeneity test using the method Levene's test on level significance 0.05, measurement use help application SPSS 25.0 for window. Results summary calculation normality posttest skills process science and solving ability problem is shown in the following table.

<table>
<thead>
<tr>
<th>Table 3.4 Tests of Normality Postest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postest Results</td>
</tr>
<tr>
<td>Statistics</td>
</tr>
<tr>
<td>Thinking Post Test Critical</td>
</tr>
<tr>
<td>PostTest Control Think Critical</td>
</tr>
<tr>
<td>Post Drops thinking Creative</td>
</tr>
<tr>
<td>Post Drops Control thinking Creative</td>
</tr>
</tbody>
</table>

Based on results test normality with test Kolmogrov-Smirnov with $\alpha=0.05$ on table obtained score significance for posttest critical thinking ability in the experimental class is 0.21 and the control is 0.23. Score significance ability creative thinking class the experimental class is 0.16 and the control class is 0.23. Based on the value that the significance obtained from the normality test above is known to be greater of 0.05, it is concluded that the posttest data of science process skills and ability solving problem physics student in on is distribute normal. Chart normality data posttest Skills process science and ability solving problem can also seen in the following figure.
3.5 Test Homogeneity Posttest

Test homogeneity on study this use 2 requirements which required conducted before use test analysis manova that is test homogeneity variant covariance and test homogeneity variant. Test homogeneity matrix variant covariance this for see is variable bound think critical and creative second class sample is same. Results from test homogeneity matrix variant covariance this showed on table.

<table>
<thead>
<tr>
<th>Table 3.5 Box's Text of Equality of Covariance Matrices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box's M</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>Sig.</td>
</tr>
</tbody>
</table>

Results calculation box's test of equality of covariance on table obtained score F that is 0.31 and score sig that is 0.81. Provision condition test homogeneity matrix variant covariance that
is if score \( \text{sig} > 0.05 \) so \( H_0 \) received. The significance value obtained based on the calculation is \( 0.81 > 0.05 \), it can be concluded that the covariance matrix of the dependent variable is same.

The second stage of homogeneity test is a mandatory requirement before using multivariate analysis (manova), namely the homogeneity test of variance with use Levene's test. Test homogeneity variant for see the variables of science process skills and problem solving abilities are the same for the treatment variables. The results of the homogeneity of variance test are shown in table.

**Table 3.6 Test Homogeneity**

<table>
<thead>
<tr>
<th>Levene's Test of Equality of Error Variances</th>
<th>Levene Statistics</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Based on Mean</td>
<td>0.26</td>
<td>1</td>
<td>28</td>
<td>0.71</td>
</tr>
<tr>
<td>Based on Median</td>
<td>0.04</td>
<td>1</td>
<td>28</td>
<td>0.84</td>
</tr>
<tr>
<td>Based on Median and with adjusted df</td>
<td>0.04</td>
<td>1</td>
<td>27.45</td>
<td>0.84</td>
</tr>
<tr>
<td>Based on trimmed mean</td>
<td>0.10</td>
<td>1</td>
<td>28</td>
<td>0.75</td>
</tr>
<tr>
<td>Creative Thinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Based on Mean</td>
<td>0.12</td>
<td>1</td>
<td>28</td>
<td>0.78</td>
</tr>
<tr>
<td>Based on Median</td>
<td>0.23</td>
<td>1</td>
<td>28</td>
<td>0.63</td>
</tr>
<tr>
<td>Based on Median and with adjusted df</td>
<td>0.23</td>
<td>1</td>
<td>27.05</td>
<td>0.63</td>
</tr>
<tr>
<td>Based on trimmed mean</td>
<td>0.06</td>
<td>1</td>
<td>28</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Based on table obtained results test homogeneity variant with Levene's test have score significance to posttest critical thinking that is 0.264 and creative thinking that is 0.125 with level \( \alpha = 0.05 \). The result of Levene's test significance value > 0.05 indicates the variance matrix the covariance on the critical thinking variable and individual creative thinking ability is same for variable treatment. Based on results calculation each test normality and homogeneity to critical thinking and students' creativity is normally distributed and homogeneous. Continue to view the influence and relationship of students' critical and creative thinking in the experimental and control classes used Manova analysis. On study this results calculation analysis manova use help application SPSS 25.0 for windows.

**3.6 Influence Model Problem Based Learning help modellus software on students' critical and creative thinking skills.**

Test hypothesis first one done in study this includes value data posttest science process skills and ability solving problem physics students. Test process hypothesis using multivariate analysis of variance (manova) with the help of SPSS 25 for windows. Test analysis manova have two stages that is use test multivariate test with use Pillai's Trace test, Wilks ' Lambda, Hotelling's Roy's Largest Root and Test Of Between Subject Effect. Results Pillai's Trace test Wilks ' Lambda, Hotelling's Roy's Largest Root used for see difference influence model problem based learning to Skills process science and ability solving problem physics students. Results test manova Step first showed on table.
Table 3.7 Test Multivariate

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>df error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>Pillai's Trace</td>
<td>0.99</td>
<td>7045,766 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td></td>
<td>Wilks' Lambda</td>
<td>0.00</td>
<td>7045,766 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td></td>
<td>Hotelling's Trace</td>
<td>521.90</td>
<td>7045,766 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td></td>
<td>Roy's Largest Root</td>
<td>521.90</td>
<td>7045,766 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td>Class</td>
<td>Pillai's Trace</td>
<td>0.70</td>
<td>32,422 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td></td>
<td>Wilks' Lambda</td>
<td>0.29</td>
<td>32,422 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td></td>
<td>Hotelling's Trace</td>
<td>2.40</td>
<td>32,422 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
<tr>
<td></td>
<td>Roy's Largest Root</td>
<td>2.40</td>
<td>32,422 b</td>
<td>2,000</td>
<td>27,000</td>
</tr>
</tbody>
</table>

Results test manova step second that is test between-subject effect for knowing influence model problem based learning to Skills science process and ability solving problem by univariate use test of between-subject effect. Results analysis helped Between subject effects test application SPSS 25.0 shown on table.

Based on results test hypothesis Step first use statistical test Pillai's Trace, Wilks' Lambda, Hotelling's Roy's Largest Root test obtained F= 7045 and score 0.000 significance with level 0.05 significance. Score significance < 0.05 then Ho is rejected. Results test manova Step second that is Between-Subjects Effects for knowing the influence of the problem based learning model based on the software modellus to ability think critical and creative students.

Table 3.8 Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>Think critically</td>
<td>480,000 a</td>
<td>1</td>
<td>480,000</td>
<td>15,101</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Think creative</td>
<td>1,267,500 b</td>
<td>1</td>
<td>1,267,500</td>
<td>50,700</td>
<td>0</td>
</tr>
<tr>
<td>Intercept</td>
<td>Think critically</td>
<td>211,680,000</td>
<td>1</td>
<td>211,680,000</td>
<td>6,659,596</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Think creative</td>
<td>189607.5</td>
<td>1</td>
<td>189607.5</td>
<td>7,584,300</td>
<td>0</td>
</tr>
<tr>
<td>Class</td>
<td>Think critically</td>
<td>480,000</td>
<td>1</td>
<td>480,000</td>
<td>15,101</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Think creative</td>
<td>1,267,500</td>
<td>1</td>
<td>1,267,500</td>
<td>50,700</td>
<td>0</td>
</tr>
<tr>
<td>Error</td>
<td>Think critically</td>
<td>890,000</td>
<td>28</td>
<td>31,786</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Think creative</td>
<td>700,000</td>
<td>28</td>
<td>25,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Think critically</td>
<td>213050</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Think creative</td>
<td>191575000</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>Think critically</td>
<td>1,370,000</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Think creative</td>
<td>1,967,500</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the calculation of the test of between-subject effects are obtained the F value for critical thinking is 480 and the F value for critical thinking is 15.10 at a significance level of 0.05. Test results on the test of between subject effect which shows the value of sig < 0.05 then H<sub>0</sub> is rejected and H<sub>1</sub> is accepted which have meaning there is influence which significance
Among class which using a problem based learning model based on modellus software on students' critical and creative thinking skills.

### 3.7 Percentage Enhancement N-gain

Based on results pretest and posttest found that there are difference average score thinking critical student in class experiment and class control. The difference between the average pretest and posttest scores of thinking critical student so that need determined percentage enhancement N-gain thinking critical. The increase in students' can be calculated with N-gain normalized on second class sample. Something learning said to be more effective if it produces a score gain higher with see more students. The results of the percentage calculation enhancement N-gain thinking critical shown on table.

<table>
<thead>
<tr>
<th>Thinking Critical</th>
<th>Pretest</th>
<th>PostTest</th>
<th>Gain %</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Experiment</td>
<td>46.67</td>
<td>88</td>
<td>41.33</td>
<td>Currently</td>
</tr>
<tr>
<td>Class Control</td>
<td>45.33</td>
<td>80</td>
<td>36.75</td>
<td>Low</td>
</tr>
</tbody>
</table>

Based on the calculation of the percent increase in science process skills in experimental class by 55% and in the control class by 41%. Calculation percentage enhancement N-gain Skills process science student on class experiment more tall compared with class control so that could concluded that class experiment could taught use model problem based learning more good compared with class control which taught use learning conventional. Calculation enhancement The next science process skill is analysis per item. This analysis it is useful to see the N-gain on the indicators of students' science process skills from instruments that have been given to the experimental and control classes. Average gain per indicator process skills science showed on table.

<table>
<thead>
<tr>
<th>Thinking Creative</th>
<th>Pretest</th>
<th>PostTest</th>
<th>Gain %</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Experiment</td>
<td>45.00</td>
<td>86</td>
<td>41.00</td>
<td>Currently</td>
</tr>
<tr>
<td>Class Control</td>
<td>44.00</td>
<td>73</td>
<td>28.67</td>
<td>Low</td>
</tr>
</tbody>
</table>

### 4. Conclusion

Based on research after conducting quasi-experimental research with two group pretest-posttest designs, the results of the modellus-based problem-based learning model significantly affect students' critical and creative thinking skills. The results of the multivariate analysis of variance pretest critical and creative thinking obtained Fcount = 0.20 and significant = 0.81. As for the posttest Fcount = 32.42 significant = 0.00 at the level of 0.05. The statistical test for the N-Gain of students' critical thinking skills in the experimental class was 41% and the control class was 35%. In the experimental class, the N-Gain of creative thinking skills is 41% and the control class is 29%.
References

Development of Thematic Teaching Materials Based on Local Wisdom Values to Improve Fourth Grade Student Learning Outcomes in Elementary Schools

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{ Ester.nainggolan27@gmail.com }

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Abstract. This study aims to describe the level of feasibility and effectiveness of developing thematic teaching materials based on local wisdom values to improve the learning outcomes of fourth grade students. This research was carried out in an elementary school in Palipi District, Samosir Regency. The subjects of this study were fourth grade students, totaling 30 students. This research method is development research from Borg and Gall. The results of the study show (1) the learning design developed is included in the very good criteria and is suitable for use; (2) the development of thematic teaching materials based on practical local wisdom values used to improve student learning outcomes; and (3) effective teaching materials are used to improve student learning outcomes. The results of the effectiveness of teaching materials of 92% are in the very good category.

Keywords: Thematic teaching materials, local wisdom, learning outcomes

1. Introduction

This study is a development study. There are several types of models for development methods. The development model used is approach. One of the programs aimed at achieving the country's educational goals is the organization and implementation of what is commonly known as Basic Education Units or Elementary Schools. Education is always evolving. One of them is to continuously improve the curriculum to improve the quality of education. Furthermore, the ever-evolving technological developments indirectly influence the development of current educational curricula [1], [2]. However, changes or curriculum developments implemented by the government are still of a general nature. So far, there is no curriculum in which the learning materials correspond to the student's environment, culture and local customs. Using materials that are appropriate to the student's situation, culture, and local customs is intended to make it easier for students to understand the material, and allows students to sort the material from the simplest and simplest to the most general.

It is intended to make students interested in understanding even the most complex and complicated things [3]. Interest in learning, or what is called interest in learning, is one of the most important factors for a student's learning success. In reality, we have to admit that there
are still many students who are not interested in actively participating in the process of learning activities that they are experiencing. Octaviani’s research found that fourth-graders still tend to be indifferent to learning and passive in learning activities [4]. The effect of apathy on the student learning process is characterized by a perceived low student interest in learning and poor acquisition of learning outcomes.

Her one aspect of successful learning is when students have a high interest in learning and are ultimately able to produce satisfactory learning outcomes. Studies like those conducted by Tinja, Towaf and Hariyono showed that students’ learning interest and learning activities increased after implementing thematic materials based on local wisdom [5]. Based on the results of research and development, teachers can use thematic teaching materials based on local wisdom as a source of learning. In order to overcome the difficulty of lack of teaching materials, teachers need to develop teaching materials that match the characteristics of students and the situations in which teachers teach. The availability of appropriate teaching materials based on local wisdom is expected to make learning more efficient and effective, ultimately improving student learning outcomes.

This is in line with research conducted by Halim, whose findings indicate that the local wisdom-based thematic materials developed in this study are highly effective in improving student learning outcomes. [6]. This is reflected in increased student learning outcomes after studying with thematic materials based on local wisdom. Significant improvements in learning outcomes demonstrate that the use of local knowledge-based thematic materials influences student learning outcomes.

Local wisdom is the view and knowledge of life and various life strategies in the form of activities that local communities undertake to address various problems and meet their needs[7]. The use and development of local wisdom as one of her learning materials trains each student to gain hands-on experience, discover for themselves the different knowledge they have learned, and connect them with other concepts. It can be done through learning activities. understood. This can be achieved through thematic learning. H. Blended learning uses themes to connect multiple subjects and provide a meaningful experience for students [4]. Furthermore, Octaviani states that subject-based learning engages students actively in the learning process, empowering them to solve problems and be creative when needed [4].

Through the development of thematic teaching materials combined with local knowledge, the aim is for students to directly experience new knowledge related to the situation, culture and customs of their hometowns, and to remember the local culture and customs. They and each student are interested in knowing the customs, cultures and customs of their respective regions, which is expected to increase their interest in the learning process[8].

A material is a set of materials systematically arranged to create an environment or atmosphere in which students can learn. Teaching materials serve as a vehicle for transmitting information and knowledge from teachers to students [9]. Materials are all materials (both information, tools, and texts) organized systematically to provide a complete mapping of the competencies acquired by students and used in the learning process.

Materials are systematically organized materials or learning materials used by teachers and students in the learning process of a school. Materials are all materials (both information, tools and texts) that are systematically arranged to reflect the competencies acquired by students.
and used in the learning process for the purpose of planning and checking the performance of learning. Here is the complete mapping [10].

Its materials are learning resources intentionally designed for learning purposes. Teaching materials need to be developed to help teachers and students. Therefore, teachers should be able to adjust the process appropriately according to the student's needs. One of her student needs is facilities in the form of teaching materials[11].

According to Mr. Kosasih, teaching materials are divided into two types according to their usage: developed materials and used materials. (1). Design materials are materials that are specially designed as part of the classroom, enabling formal and systematically planned teaching and learning activities. For example, textbooks, reference books, picture books, newspapers, etc. Created and designed specifically to meet educational goals (2). Materials that are used for educational purposes or are not specifically designed for educational purposes, but are available and accessible because they already exist in nature or the environment and can be used for educational purposes.

The local knowledge found in some groups/indigenous peoples in Indonesia contains many noble values of the national culture that are still strong as national character identities. On the other hand, the value of local wisdom is often ignored because it is considered outdated. In fact, noble values can be nurtured from local wisdom, which serves as a model for the development of Indonesian culture[12].

Local wisdom is customs that are firmly embedded in the life of a particular community and contain elements of high cultural value. Explain that local wisdom is the local knowledge that a community uses to survive in an environment of integrated belief systems, norms and cultures, expressed in long-held traditions and myths. Local knowledge is a product of past cultures and should be used continuously as a guide for life. Local knowledge is part of community life that has been passed down from generation to generation. Local wisdom is part of a community for survival according to environmental conditions, following needs and beliefs that are ingrained and difficult to remove[13]–[16].

On this occasion, the researchers specifically discussed the local wisdom surrounding the place where this research was conducted, namely 10 Sigaol Simbolon State Elementary School in Samosir area. Many local wisdoms of the Samosir region can be practically combined and used as thematic materials to offer to students.

2. Method

This research is development research (Development Research). In the development method there are several types of models. The development model used is the borg and gell model development approach. Location This research was conducted at the Elementary School in Palipi District, Samosir Regency. The research subjects were teachers and 30 students at the elementary school in Palipi District, Samosir Regency. Analysis of the data used using the N-gain score to see the comparison of learning outcomes.
3. Finding and Discussion

3.1 Finding

Product Feasibility Test

a. Learning Material Expert Validation Results Data

Overall, the results of the expert evaluation of the learning materials show that the attainment of the content feasibility and presentation feasibility rating points is 75, and the attainment points of the "good" rating range from 70 to was. 84". The results of environmental material assessments where students live near developed dormitories have been commented on several times, including: (a) each document was shown to KD, (b) an illustration of the document was presented visually, (c) the out-of-region case was suboptimal, (d) the glossary of the document did not yet exist, (e) Student engagement still exists in the form of exercises and it is proposed to improve them according to the results of the discussion. The conclusion from the expert evaluations, comments, and suggestions of the learning materials is that thematic materials based on local wisdom values deserve revision and real-world testing.

b. Learning Design Expert Validation Results Data

Learning layout professionals who cowl factors of splendor of bodily appearance, accuracy of layout use, conformity of format, presentation with goal characteristics, readability of media instructions, readability of fabric exposure, and suitability of assessment with the fabric as an entire may be concluded that the extent of rating fulfillment is 85. forty one wherein the variety is at the extent of fulfillment a rating of 85-a hundred is classified as "Very Good". The outcomes of the evaluation of gaining knowledge of layout at the improvement of thematic coaching substances based on local awareness values acquired numerous feedback, including: (a) the media need to be made according with gaining knowledge of strategies/methods/models, (b) every assembly need to show KI, KD, signs and gaining knowledge of objectives, (c) gaining knowledge of layout consists of initial, core, and last activities, (d) on the quit of the coaching substances a word list need to be made, and the concept is to revise the coaching substances in step with the feedback. The end from the evaluation, feedback and tips with the aid of using gaining knowledge of layout professionals is that thematic coaching substances primarily based totally on neighborhood awareness values need to be examined withinside the subject with revisions

c. Linguistic Expert Validation Result Data

Overall, the results of the Language Design Professional's evaluation of the word use and language use aspects of the production of teaching materials allow us to conclude that the Language Professional 1 Grade performance level is 77.77. The second linguist has a proficiency level of 90.38, which ranges from 85 to 100 with a score proficiency level classified as "good", which is "very good".

After Linguist 1 evaluated the content of thematic materials based on the local wisdom score, several comments were received, including:
(a) The language used is good and the presentation is appropriate for the student's level. (b) the type of characters in the material; Please fix this as the font used is not attractive. (c) use realistic and appropriate images; (d) Adjust punctuation. We also suggest that the data from the results of the Language Expert exam be used as a basis for revisions to improve the teaching materials before testing them on students as users of the developed product. Conclusions from evaluations of linguists, opinions and suggestions that thematic materials based on the value of local wisdom are worth testing in the field, and results of evaluation of materials for the development of thematic materials by linguists. We received several comments about the value of wisdom, including:

(a) use a space in the word "school"; (b) put a period in each sentence; and (c) correct each word that requires the first sentence to be capitalized. (d) use language that students can easily understand; The conclusion from the linguists' reviews, comments, and suggestions is that thematic materials based on local wisdom values deserve revision and real-world testing.

**Product Effectiveness Test**

a. Limited Trial

This limited experiment was conducted in Class IV-A of 22 Sigoal Marbun State Elementary Schools. The class consisted of her six students, two high performers, two intermediate performers, and two low performers. Limited, to find shortcomings, weaknesses, and contributions in the form of criticisms and suggestions to the presentation of thematic materials based on the values of local wisdom used in learning, including media presentations and context-based interactive aspects. an attempt was made. Media content about where I live.

The total evaluation and limited trial response results for the development of thematic materials based on the value of local wisdom was 90.42%. Responses to the limited research, therefore, overwhelmingly responded very well to the quality of topical materials based on local wisdom values.

Analysis of limited experimental data (including aspects of media presentation and contextual interactive media content on topics in my neighborhood) is rated 90.42% overall in the "very good" category. Good for learning. The display is tailored to the student. The choice of colors and the design of the learning media are very interesting. By providing real pictures, it would be good if all subjects used these media for reference learning.

As a result of evaluating and answering the theme-specific teaching materials based on the local wisdom value in a limited trial by 6 students, the developed product was feasible, and suggestions for improvement were made by using a language suitable for the students. of the limited trial version of the product. In order to develop thematic teaching materials based on the values of local wisdom, we will continue limited trials while making modifications to our development activities.

Individualized learning completion data obtained based on student ability showed that 2 of the 6 students were 'not completed' and 4 were 'completed'. increase.

b. Extensive Trial

This extensive experiment was conducted in class IV-A of 9 Sigor Mabun State Primary Schools, consisting of 30 students. Extensive experiments were conducted with the aim of
finding shortcomings, weaknesses and contributions in the form of criticisms and suggestions for the presentation of thematic educational products based on local wisdom values. Based on the observations, it can be concluded that the evaluation and response results for the large-scale thematic educational material development experiment based on local wisdom values are 92% in total. Responses to the limited research, therefore, overwhelmingly responded very well to the quality of topical materials based on local wisdom values.

The results of the assessment and response of the wide trial to the development of thematic teaching materials based on local wisdom values obtained as a whole are 92%. Thus the response to the dominant broad trial gave a very good response to the quality of thematic teaching materials based on local wisdom values.

The analysis of limited trial data which includes aspects of media display and contextual-based interactive media content on the theme of the area where I live, overall, 92% are included in the "Very Good" category. Used as learning, the display is in accordance with the students who use it, the selection of colors and the layout of the learning media is quite interesting, by providing real pictures, it would be nice if all subjects used this media as a reference in learning.

The results of the assessment and responses to thematic teaching materials based on local wisdom values in a limited trial conducted by 30 students, indicate that the product developed is feasible to use and there is a suggestion for improvement by using appropriate language for students in a limited trial of product development of thematic teaching materials based on local wisdom values, so that development activities are continued in limited trials with revisions. We can see that out of the 20 questions given, the average student answered 17 questions with a score of 85. From this, we can conclude that large studies have improved the average learning outcomes of students. From the data of individual learning completion according to the student's academic achievement, we know that she has 3 students who are "incomplete" and 27 students who are "completed".

### Table 1. Large group study completion table

<table>
<thead>
<tr>
<th></th>
<th>Pre test</th>
<th>Pos test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>F</td>
<td>X*F</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>28</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>36</td>
<td>17</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>78</td>
<td>18</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>251</strong></td>
<td><strong>509</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>8,4</td>
<td><strong>Average</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>Standar Deviasi</strong></td>
<td>3,8</td>
<td><strong>Standar Deviasi</strong></td>
<td>2,7</td>
</tr>
</tbody>
</table>
3.2 Discussion

The validity carried out in the validity check stage is theoretical validity, i.e. validity by a competent expert in the field, based on theoretical and logical reasoning. The material examines his three parts: material, design and language. The materials developed should be feasibility-tested so that they are suitable for use in learning. In the validation phase, researchers use a discussion technique to conduct evaluations by presenting design experts, teaching material experts, and linguists with initial designs of thematic teaching materials based on the value of local wisdom. I did. In addition, researchers provide validation sheets to validators to obtain theoretical validation results. Experts scored according to validation sheets provided by researchers.

Based on material expert validation, we know the validation score is 84.09%, which is consistent with valid criteria, but there is still room for material expert improvement. Material experts suggest correcting simple words so that students can understand them. After correcting the percentage to her 92.11% efficacy with highly valid criteria. Validator also recommends using materials that are appropriate for the local culture. After discussions with material experts, thematic materials based on the values of local wisdom are created based on the inputs and suggestions of the reviewers.

It received a 78.57% rating in the Good category based on learning design expert validation of content, presentation, presentation language, and content aspects. The reviewers suggested making the covers of the teaching materials used clearer and increasing the size of the images so that all students could see them clearly. After revision, it is suitable for student use.

Also, a feasibility study of thematic teaching materials based on local wisdom values yielded 81.67 percentage results in a limited test and 88.42 percentage results in a large-scale experiment with 25 people in the very good and very good categories. achieved results. It has
been commercialized and the final percentage is 82%. This was due to the positive and enjoyable student overall response when testing the product's feasibility, and the teacher's evaluation of the product development of the local knowledge-based material on the second trial. Consistent with what it describes as being suitable.

The effectiveness of the material is measured using pre- and post-test results at the beginning of learning and at the end of the learning activities conducted. Based on pretest results equivalent to 20 essay questions for her 25 students in the student pretest data, student learning outcomes remain low, with an average of 71 and a standard deviation of 13.7. It's a point. This is consistent with the description that materials can support the learning process and enhance student success.

At the end of the learning activity, a post-test was conducted to check the learning outcomes of the students using thematic materials based on the values of local wisdom. Based on the results of the administered post-tests, we can see that the students' post-test scores averaged 71 with a standard deviation of 13.7. Starting with the minimum completion standards for PPKn subjects, we can see that learning outcomes are improving, and we can say that the student's learning outcomes meet the minimum completion standards. Based on the results of students' extensive test completion, we can see that the average classical learning proficiency data reached her 90 students and achieved KB 96%. After analyzing the student's personal and classical learning proficiency, the pre-test and post-test results are calculated as win points, indicating the increased effectiveness of the model before and after use. 0.73 gives the student a higher winning score. Based on the results above, there is an increase before and after use, consistent with what was reported in the journal. In addition to learning outcomes, the effectiveness of teaching materials can also be measured through a survey of students who used the teaching materials, 73.3% of students who strongly agree, and students who agree with research-developed teaching materials. Based on student responses, it was concluded that the developed module was effective. Based on the diary, we can see the enthusiasm of the children from the data of the student response questionnaire [9].

Based on the above learning outcomes and students' responses, it can be said that the thematic teaching materials developed based on the values of local wisdom are effective[5]. It is designated as high quality because it meets the quality criteria of perfection, i.e. the effectiveness and feasibility of thematic materials based on the value of local wisdom. In addition, based on the researchers' previous research and the research of previous researchers, it can be said that it is necessary to change the learning design. It can support the learning process and help students become more active in the learning process.

4. Conclusion

The conclusions of this study are based on research data findings, and the systematic presentation takes into account the formulated research goals. Conclusions based on validity results include 75% materials experts, 85.41% design experts, and 90.38% language experts. Thematic materials based on local wisdom values are classified as practical because of the increased coefficients derived from student responses from limited and large-scale trials.
References


Innovation of Learning Resources Using Project-Based Multimedia on Chemical Equilibrium Class XI Odd Semester

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Abstract. This study aims to analyze the feasibility of project-based innovative learning resources that have been developed on chemical equilibrium materials in accordance with the National Education Standards Agency (BSNP). The type of research used is research and development using the Analysis Design Development Implementation Evaluation (ADDIE) model. The innovative learning resources produced were validated by 4 validators, namely 3 material expert validators consisting of 2 chemistry teachers and 1 lecturer, and 1 media expert validator. The data collection method used is a questionnaire with a Likert scale. The analysis technique uses quantitative descriptive analysis techniques and qualitative descriptive analysis techniques. The results showed that the innovative project-based learning resources that had been developed on chemical equilibrium materials were valid and could be used for further research.

Keywords: Innovation, Chemical Equilibrium, innovative learning resources

1. Introduction

The development of science and technology in the world of education is very rapid in experiencing many challenges in order to design quality human resources that are awaited, the situation of the community being able to compete in continuous rapid development. Educators act as facilitators who promote more creative learning, namely designing the development of innovative learning resources carried out in technological or contextual aspects that are applied in the aspect of achieving learning objectives [1]. Learning success is not only determined by teachers and students, but is also influenced by learning media and teaching materials used during the learning process [2]. Learning is made completely and properly. Teaching materials that are made completely and properly will affect learning so that the learning process that occurs in students becomes more leverage [3]
Innovative learning resources are needed to stimulate learning motivation and improve students' higher-order thinking skills. Innovative learning resources are developed through the integration of laboratory activities and out-of-school activities which are arranged systematically and simply to support the theory of each sub-topic. To complement the learning resources, contextual case examples, picture illustrations, and examples of questions and solutions are provided.

Innovation is also carried out by combining interactive learning media, videos and animations combined in macromedia flash and utilizing online information technology [4]. One of the efforts made in innovating learning resources is integrating media and learning models. One model that can be integrated is PjBL (Project Based Learning). In-depth investigation of a topic from the real world. A well-designed project asks students to tackle real problems and important issues that occur in life, especially in the learning process. Thus, the projects carried out by students are based on direct observation so as to produce a product [5].

2. Methods

The type of research used is research and development, namely research methods used to produce certain products and test the effectiveness of these products. The development model in this study uses the Analysis-Design-Development-Implementation-Evaluation (ADDIE) model. This research focuses on the stages of analysis, design, and development. The product developed is a project-based innovative learning resource. The subjects in this study were four validators consisting of one Material Expert Lecturer, one Media Expert Lecturer, and two Chemistry Teachers. While the object of this research is a learning resource using project-based multimedia on chemical equilibrium material. The data collection technique uses a questionnaire that is arranged based on a Likert scale.

The data analysis technique used descriptive quantitative and qualitative descriptive analysis techniques. Qualitative descriptive data obtained from corrections and input from expert lecturers and teachers on the developed learning media. While the quantitative descriptive is based on the score given by expert lecturers, and the teacher on the media obtained through a questionnaire.

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>4</td>
</tr>
<tr>
<td>Well</td>
<td>3</td>
</tr>
<tr>
<td>Not good</td>
<td>2</td>
</tr>
<tr>
<td>Not very good</td>
<td>1</td>
</tr>
</tbody>
</table>


To determine the overall quality of the product, it can be done by determining the average score of all aspects given by all validators. The percentage of product quality can be determined by the formula:

\[
\text{Quality of each aspect} = \frac{\sum \text{the average score obtained}}{\sum \text{ideal average score}}
\]

(1)
The data collected was analyzed by quantitative descriptive analysis presented in the form of distribution of scores and percentages against categories with a predetermined rating scale.

<table>
<thead>
<tr>
<th>Average</th>
<th>Validity Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.26 – 4.00</td>
<td>Valid and does not need revision (very feasible)</td>
</tr>
<tr>
<td>2.51 – 3.25</td>
<td>Sufficiently valid and no revision needed (pretty decent)</td>
</tr>
<tr>
<td>1.76 – 2.50</td>
<td>Invalid, some of the module content was revised (less feasible)</td>
</tr>
<tr>
<td>1.00 – 1.75</td>
<td>Invalid and need a total revision (not feasible)</td>
</tr>
</tbody>
</table>

3. Results and Discussion

3.1. Analysis Stage (Analysis)

The basis used in the product development of this research development is the determination of materials and needs analysis carried out in the early stages of the research process. Needs analysis was carried out through interviews with the school where the research was conducted. The researcher conducted interviews with the chemistry teacher of class XI. The data and information obtained by the researcher indicate that there are problems, namely learning chemistry in class XI is difficult to understand because it is in the form of theoretical explanations by the chemistry teacher. The teaching materials used are only printed books, and there is no use of Project Based Learning-based teaching materials in chemistry learning focused on Chemical Equilibrium material. Curriculum analysis is carried out to see the suitability of the teaching materials discussed with the core competencies of the subjects, learning objectives, reviewing the syllabus, and suitable learning strategies, and reviewing the literature that matches the teaching materials. In addition, there is potential, namely students have a high curiosity and enthusiasm for learning.

3.2. Design Stage (Design)

At this stage, the design of project-based innovative learning resources is carried out which is a description of learning resources in the form of learning materials, learning videos, practicum videos. Then the selection of material for high school chemistry subjects for class XI is carried out, where the material chosen is chemical equilibrium. This material was chosen because it is in accordance with the author's competence. Chemical equilibrium material contains the introduction, the concept of chemical equilibrium, factors - factors that affect equilibrium, chemical equilibrium constant in concentration (Kc), chemical equilibrium constant in partial pressure (Kp), and chemical equilibrium in industry.

3.3. Development Stage (Development)

The basic form of project-based innovative learning resource development products on chemical equilibrium material can be presented objectively, clearly, and thoroughly including: (a) Cover, (b) Introduction, (c) Table of Contents, (d) Instructions for use, (e) Core
Competencies and Basic Competencies (f) learning indicators (g) Concept Maps (h) keywords (i) Learning Activities, (j) Summary, (k) Glossary, and (l) Bibliography. Innovative project-based learning resources are created with project packages, project creation guidelines, and project report writing formats. In addition, interactive learning videos are made as a medium for delivering the contents of learning resources to students which are equipped with practical videos.

Data regarding the feasibility of this project-based innovative learning resource was obtained by conducting validation from material experts and media experts. The instrument used is a questionnaire or questionnaire. Material expert validation was carried out by one chemistry lecturer and two chemistry teachers. The validation results from the three material experts can be seen in the following diagram:

From Figure 1 it can be observed that the content feasibility is 3.64 for validator 1, 3.45 for validator 2 and 3.45 for validator 3. Where the results show that project-based innovative learning resources developed on chemical equilibrium materials are feasible to use. Then based on the explanation above, it can be seen that the analysis of the chemical equilibrium learning media that has been developed referring to the modified BSNP in the aspect of content feasibility has an average value of 3.51 and it can be concluded that project-based innovative learning resources are very feasible to use and do not need to be revised.

Figure 1. Graph of Feasibility Analysis Results Contents of innovative project-based learning resources

Figure 2. Graph of Feasibility Analysis Results of project-based innovative language learning resources
From Figure 2 it can be observed that the feasibility of the language is 3.5 for validator I, 3.4 for validator 2 and 3.4 for validator 3. Where the results show that project-based innovative learning resources developed on chemical equilibrium materials are feasible to use. Then based on the explanation above, it can be seen that the analysis of chemical equilibrium learning media that has been developed referring to the modified BSNP on the language feasibility aspect has an average value of 3.4 and it can be concluded that project-based innovative learning resources are very feasible to use and do not need to be revised.

Figure 3. Graph of Feasibility Analysis Results Presentation of project-based innovative learning resources

From Figure 3 it can be observed that the feasibility of the presentation is 3.5 for validator I, 3.3 for validator 2 and 3.3 for validator 3. Where the results show that project-based innovative learning resources developed on chemical equilibrium materials are feasible to use. Then based on the explanation above, it can be seen that the analysis of the chemical equilibrium learning media that has been developed referring to the modified BSNP in the aspect of presentation feasibility has an average value of 3.37 and it can be concluded that project-based innovative learning resources are very feasible to use and do not need to be revised.

Figure 4. Graph of Graphic Analysis Results of Project-Based Innovative Learning Resources
From Figure 4 it can be observed that the feasibility of the language is 3.75 for validator I, 3.5 for validator 2 and 3.25 for validator 3. Where the results show that project-based innovative learning resources developed on chemical equilibrium materials are feasible to use. Then based on the explanation above, it can be seen that the analysis of chemical equilibrium learning media that has been developed referring to the BSNP which has been modified in the graphic aspect has an average value of 3.5 and it can be concluded that project-based innovative learning resources are very feasible to use and do not need to be revised.

This media expert validation was carried out to find out like a product in the media field, there was one media expert validator who was a lecturer at the State University of Medan. The obtained results of media expert validation are 86% with very feasible criteria.

4. Conclusion

Based on the research results from the description of the research results, conclusions can be drawn from the research, namely: This research and development produces Project-Based Innovative Learning Resources products with Chemical Equilibrium material for Class XI students. Development is carried out using Research and Development and the development model in this study uses the Analysis-Design-Development-Implementation-Evaluation (ADDIE) model. The teaching materials developed have gone through the validation stage of the validators, namely by three material experts and one media expert with the results of obtaining scores on each aspect, namely: the content feasibility aspect has an average score of 3.51, the language feasibility aspect has an average the average value is 3.4, the presentation feasibility aspect has an average value of 3.37, the graphic aspect has an average value of 3.5 and the acquisition of media expert validation results is 86%, so it can be concluded that project-based innovative learning resources are very feasible to use and do not need to be revised.

References

Development of Design and Implementation of Hybrid Learning About Vibration and Waves Using Understanding by Design (UbD) Approach

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Abstract. The purpose of this study was to analyse the design of Understanding by Design approach with backward design and find out its effectiveness on the Vibration and Waves during hybrid learning. The product development using research and development ADDIE concept. As the testing of this product, researcher use quasi experiment with the 2 groups pretest-posttest design with a sampling technique of cluster random sampling. The instrument used is an instrument of conceptual understanding that has been validated by experts. The data analysis technique used in this research is descriptive quantitative data analysis technique. The quantitative descriptive analysis technique was obtained from a worksheet which was then quantified in order to get the results in the form of numbers. The results obtained indicate that there is a significant effect on students’ conceptual understanding using Understanding by Design (UbD) approach on vibration and wave.

Keywords: Understanding by Design (UbD), Hybrid Learning, conceptual understanding.

1 Introduction

The main task of a teacher is to teach. Teaching is making learning happen [1]. This can be done when there is an attempt to use different strategies, methods and techniques to achieve certain competencies/learning outcomes, namely changing from incapable to capable [2]. Competencies that must be mastered by students are stated in the learning objectives [3]. Learning objectives can be achieved if the learning designer creates a conducive learning environment so that students feel comfortable and involved in the learning process. This is one of the main tasks of a teacher [4].

As long as the author is teaching often finds in the lesson plan that the evaluation of learning and learning activities is not in line with the learning objectives, so the learning objectives are not achieved optimally. There are even teachers who teach without implementing the lesson
plans that have been prepared. Learning process plans usually only apply as a supplement to administration.

Susan Clayton wrote in her journal article "Understanding by Design: Learning Design, Assessment, and Teaching for Understanding" that a Singaporean teacher found that the challenge was that today's learning attitude is a millennia-old cultural aspect that has placed the teacher at the center of the educational process [5].

In the evolving world of education, Wiggins and McTighe introduced a new approach to instructional design, called understanding by design by Wiggins and McTighe. Understanding by design is an approach to planning and implementing learning that views learning as a means to improve student understanding or can be called "teaching for understanding" [6]. In this approach, lesson plans are designed to achieve the desired results, which in designing learning are guided by backward design. The backward design means a design that is compiled from behind, which begins with determining the desired end result, evaluating evidence, and learning steps to achieve these results.

The principle of Understanding By Design emphasizes long-term understanding (Enduring Understanding) with contextual learning. Basically, teaching follows a student-centered design approach, in which students are actively involved in learning. Therefore, the UbD method will help students understand the lesson by actively participating in the learning process.

On March 2, 2020, the Indonesian government announced that the first case of Corona Virus Disease (Covid-19) had been found in Indonesia. The COVID-19 pandemic has really changed all aspects of people's lives. Various things that are usually carried out face to face now have to meet via the screen. This also applies to the education sector. The government stipulates 100% online learning during the Enforcement of Community Activity Restrictions (PPKM). Over time, after the community started getting vaccines, slowly but surely the PPKM was relaxed, and the education sector was allowed to carry out limited face-to-face learning while still paying attention to health protocols referring to the 4 Ministerial Decree. The technical implementation of this limited face-to-face learning uses hybrid learning. Hybrid learning is a learning model that combines face-to-face activities (offline) and internet-based (online) [7]. The hybrid learning process at SMP Surabaya Grammar School utilizes Moodle as an application to support online learning.

Implementing a hybrid learning process is certainly different from face-to-face. Teachers must be able to design a learning process that can be understood by all students, both face-to-face and on the internet. With the UbD approach, teachers can design lesson plans that can help improve students' understanding of physics lessons.

2 Methods

This type of research includes development research using the ADDIE development model. The research model used is quantitative research. The trial was divided into 2 stages, namely one-on-one evaluation by experts and field testing using a quasi-experimental with the 2 groups pretest-posttest design with a sampling technique of cluster random sampling. The instrument used is an instrument of conceptual understanding that has been validated by experts. The data analysis technique used in this research is the descriptive quantitative data
analysis technique. The quantitative descriptive analysis technique was obtained from a worksheet which was then quantified in order to get the results in the form of numbers. The research was carried out in a Junior High School which implemented hybrid learning using Zoom and Moodle.

3 Result and Discussion

3.1 Implementation of the lesson plan

Analysis of the implementation of the Lesson Plan in 3 meetings:

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Execution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14/14</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>13/14</td>
<td>92.85%</td>
</tr>
<tr>
<td>3</td>
<td>13/14</td>
<td>92.85%</td>
</tr>
<tr>
<td><strong>Average implementation of lesson plan</strong></td>
<td><strong>95.23%</strong></td>
<td></td>
</tr>
</tbody>
</table>

3.1 T-test Independent Group Pretest for both classes

Based on the results of the pretest of the two classes, the mean is obtained as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Standard error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Kontrol</td>
<td>20</td>
<td>40.81</td>
<td>10.26629</td>
<td>1.78713</td>
</tr>
<tr>
<td>Eksperimen</td>
<td>20</td>
<td>40.33</td>
<td>15.05197</td>
<td>2.35072</td>
</tr>
</tbody>
</table>

Table 1. Comparison of the mean of the two classes.

<table>
<thead>
<tr>
<th>Pretest</th>
<th>3.390</th>
<th>.070</th>
<th>.393</th>
<th>72</th>
<th>.695</th>
<th>0.47619</th>
<th>3.07345</th>
<th>4.91787</th>
<th>7.33576</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Uji T Independent Group kedua kelas.
3.3 T-test Independent Group Posttest both classes

Based on the results of the posttest of the two classes, the mean is obtained as follows:

**Table 3.** Comparison of the mean posttest of the control class and the experimental class.

<table>
<thead>
<tr>
<th>Code</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Standard error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kontrol</td>
<td>20</td>
<td>62.35</td>
<td>13.89272</td>
<td>2.41841</td>
</tr>
<tr>
<td>Eksperimen</td>
<td>20</td>
<td>82.55</td>
<td>16.53742</td>
<td>2.58271</td>
</tr>
</tbody>
</table>

**Table 4.** Uji T posttest Independent Group kedua kelas.

<table>
<thead>
<tr>
<th>Levene’s test for equality of variances</th>
<th>t-test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>---</td>
<td>------</td>
</tr>
<tr>
<td>Pretest</td>
<td>Equal variances assumed</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
</tr>
</tbody>
</table>

3.5 Completeness of learning outcomes

The following is the percentage of complete learning outcomes in both classes.

**Table 5.** Percentage of completeness of both classes.

<table>
<thead>
<tr>
<th>Class</th>
<th>Percentage Complete</th>
<th>Percentage Incomplete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>Experiment</td>
<td>85%</td>
<td>15%</td>
</tr>
</tbody>
</table>

3.6 Analysis of the level of understanding of the two classes
Table 6. Percentage of understanding criteria in both classes.

<table>
<thead>
<tr>
<th>Student Understanding Criteria</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Controls</td>
</tr>
<tr>
<td>So low</td>
<td>15.16</td>
</tr>
<tr>
<td>Low</td>
<td>28.13</td>
</tr>
<tr>
<td>Enough</td>
<td>24.49</td>
</tr>
<tr>
<td>High</td>
<td>18.32</td>
</tr>
<tr>
<td>Very high</td>
<td>13.90</td>
</tr>
</tbody>
</table>

Based on the table above, we can conclude that concept understanding using UbD approach in experiment class is better than control class.

4 Conclusion

Based on the results of research and discussion that have been described in this study, it can be concluded that there is a significant effect on students’ conceptual understanding using Understanding by Design (UbD) approach on vibration and wave.

References

Development of Spiritual Values Integrated Chemistry Practicum Guide for MA Students in Class XI Odd Semesters

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Abstract. This study aims to find out the feasibility level of the integrated spiritual chemical practicum guide to the reaction rate material developed based on BSNP. This research is research and development research. The development model used is the Addie model which is limited to 3 stages, namely analysis, design, development. Validation subjects consist of expert validators, namely 2 lecturers at Medan State University and 2 chemical teachers. The results of the study obtained aspects of content feasibility of 94.6%, language feasibility aspects of 91.6%, the feasibility aspect of presentation of 94.6% and the feasibility aspect of crafters of 95%. So that the average feasibility of 93.95% with the criteria is very good or feasible.

Keywords: Development, Integrated Practicum Guide Spiritual Values, Spiritual Values

1 Introduction

Chemistry is a science that is mostly considered abstract, because students cannot see the real concepts they learn. For this reason, efforts are needed to improve the chemistry learning process. The results of the study show that one of the important accesses to education in improving student learning outcomes requires supporting innovation. One of the efforts to improve the quality of education is through the procurement of quality subject matter. Quality learning to improve chemistry knowledge with practical activities[1]. The implementation of the practicum that requires a practicum guide, where the practicum guide is used to make it easier to find practical steps. In addition, the practicum guide must also be able to develop scientific learning abilities and critical thinking skills of students[2].

From the results of observations that have been made, there are still many problems found in the implementation of the practicum. First, the students' skills are not good and the available practicum guides are not in accordance with the 2013 curriculum. Second, the practicum approach used today is a conventional practicum approach. Similarly, in the implementation of practicum in the laboratory, most students only do what they are told without knowing the purpose and meaning of the material being practiced. Another problem that is often encountered is that some teachers still find it difficult to teach chemistry, especially in teaching practicum in the laboratory. There are still many teachers who only teach theory
without doing practical work that should be done based on the syllabus. In order for learning activities to be more interesting and to train skills and attitudes in learning, it is necessary to develop a chemical practicum guide that is in accordance with the 2013 curriculum.

According to (Depdiknas, 2010) the 2013 curriculum consists of two main competencies, namely core competencies and basic competencies. Core competence-1 (KI-1) for core competence of spiritual attitude, core competence-2 (KI-2) for core competence of social attitudes, core competence-3 (KI-3) for core competence of knowledge, Core competence-4 (K1 -4) for core competency skills[3]. Of the four competencies above, spiritual competence is a very important competency for students. Spiritual competence is a religious value, in other words, a person's thoughts, words and actions must be based on divine values or based on religious teachings. With the spiritual competence, students are expected to be able to become human beings who have noble character and are obedient to the religious values of their teachings.

In the implementation of education in Indonesia, it is usually only oriented towards the goal of making students human beings who are knowledgeable, especially cognitive knowledge, while the spiritual values of students do not receive attention from educators. some of the factors that cause it are 1) the apathy of science teachers towards religion, some teachers do not like to talk about science and religion because they are considered two very different things, different, where religion begins with "belief" while science begins with "unbelief". 2) Some teachers think that science is value-free. 3) In general, thinkers, planners, curriculum implementers, especially teachers, are unable/sufficient to understand how to prepare and teach science material based on religious moral values that can lead students to become believers and devoted to God Almighty. This is because they also never get it during school. 4) Very limited references, either in the form of books or experts that can be used as references or models in moral-based science learning that can lead students to become possible believers and devoted to God Almighty[4].

In connection with the inclusion of a character education curriculum in the school curriculum and one of the goals of education, it is necessary to think about strategic efforts to instill character education related to the competence of spiritual attitudes to students. Therefore, it is very important to make efforts to create a chemistry practicum guidebook that can include religious elements in chemistry learning so that it can raise questions about how chemistry learning can contribute to the achievement of faith and piety to God Almighty while chemistry learning (science) sterile from religious values.

According to Darmana (2014) that presenting the spiritual aspect in teaching materials will not reduce the quality of the scientific level of chemistry itself, it is even a truly appropriate effort because it can restore students' understanding that all phenomena including scientific discoveries that have been found are destiny that ordained by God about what happened[5]. In addition, the integration of spiritual values into teaching materials can help teachers to increase students' spiritual understanding, because according to research(Darmana et al, 2013) and (Aini, 2014) that the level of spiritual intelligence of chemistry teachers is still in the sufficient category[4][6]

According to (Darmana et al, 2013) shows that the socialization of the internalization of the value of monotheism through thermochemical material is very effective, it can also motivate groups of students who have low thermochemical cognitive abilities so that they cannot be
distinguished from groups of students who have high cognitive abilities in terms of contributing to the average gain[4]. high level of internalization of the value of monotheism. Research (Harahap & Darmana, 2020) shows that there are differences in learning outcomes and students' spiritual attitudes before and after being taught with integrated teaching materials of spiritual values[7]. According to (Harahap, Sarib, Pane, & Nuraini, 2019) shows that the chemistry practicum guidebook is in accordance with the BSNP and is feasible to use but needs to be developed according to the 2013 curriculum, considering that the practicum guidebook still uses the KTSP curriculum[8]. This research was conducted to determine the feasibility level of developing an integrated spiritual value practicum guide on the reaction rate material based on BSNP.

2 Research Method

The spiritual value integrated chemistry practicum guide in this study will be developed using the ADDIE development model which consists of five stages which include analysis, design, development, implementation and evaluation. This research was only carried out until the development stage. The steps of ADDIE development research are:

Analysis

In the early stages of the ADDIE model to be carried out is an analysis of the syllabus and content standards including the assessment of Core Competencies (KI) and Basic Competencies (KD) as reference materials for developing practical guides in this study. At this stage, an analysis of the SMA/MA chemistry practicum guides circulating in several schools will also be carried out to determine the characteristics, materials and components of the practicum guides. The assessment of the practicum guide includes practicum materials, tools, materials used, as well as the advantages and disadvantages of the practicum guide, as well as assessing the feasibility level using a chemistry lab guide validation instrument in accordance with BNSP.

Design

At the design stage, the researcher will design a chemistry practicum guide for class XI MIPA MA for odd semesters. The design stages that will be carried out include compiling the framework of the practicum guide that will be developed, determining the systematics of developing the practicum guide, determining the spiritual values that will be included in each material and designing an evaluation tool that will be used in the practicum guide.

Development

The practicum guide that will be developed is designed based on the results of the analysis of the Syllabus, KI, KD and the analysis of the outstanding practicum guides. The results obtained at the analysis stage are used to adjust the practicum objectives with the indicators to be achieved based on the K-13 syllabus. Furthermore, it will be continued by developing an integrated practical guide for spiritual values. The practicum guide that will be developed is validated by an expert validator consisting of 2 lecturers at Medan State University and 2 chemistry teachers.
Media Eligibility Assessment

The assessment of the feasibility of an integrated spiritual value practicum guide is obtained from qualitative data of assessment and revision until a product is produced. Qualitative data were analyzed using descriptive analysis. Descriptive analysis is used to describe the percentage of each variable. The rating scale used in the National Education Standards Agency (BSNP) eligibility questionnaire is 1 to 4, where 1 is the lowest score and 4 is the highest score. The calculation in the feasibility assessment of this practicum guide by using the percentage formula and the percentage of the feasibility assessment of the practicum guide is presented in Table 1.

\[
\text{Percentage of eligibility scores} = \frac{\text{score obtained}}{\text{max score}} \times 100\% \quad (1)
\]

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage Rate (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81 – 100</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>2</td>
<td>61 – 80</td>
<td>Worthy</td>
</tr>
<tr>
<td>3</td>
<td>41 – 60</td>
<td>Decent enough</td>
</tr>
<tr>
<td>4</td>
<td>21 – 40</td>
<td>Not feasible</td>
</tr>
<tr>
<td>5</td>
<td>0 – 20</td>
<td>Very Unworthy</td>
</tr>
</tbody>
</table>

3 Results and Analysis

Analysis

Before developing a product in the form of a chemistry practicum guide, the researcher conducted an analysis of several chemistry practicum guidebooks circulating in several schools, syllabus analysis and content standards. The purpose of this analysis is to see whether the circulating chemistry lab manuals have integrated spiritual values or not. The integration of spiritual values in the practical guidebook is a manifestation of the Core Competencies (KI-1) contained in the 2013 curriculum.

From the results of the analysis conducted on several chemical practicum guidebooks, there is no practical guide that applies the spiritual values from Qur’an verses contained in Core Competencies (KI-1) in accordance with the 2013 curriculum. This is because the practicum guides compiled and published are distributed to students with various religious backgrounds in different schools[9]. So it is necessary to develop a chemical practicum guide that integrates the verses of the Qur’an.

The integration of the verses of the Qur’an into the developed practicum guide aims to bridge students to grow gratitude for the gift of Allah SWT in life through the chemical materials taught[5]. Because chemistry is not a collection of formulas and reaction equations that must be memorized and then forgotten after graduating from school, but a science that studies the beauty of the regularity of divine laws in the universe. And also students who have high spiritual intelligence will tend to be responsible for their work[10]. So it is necessary to
develop practical guidelines that seek to achieve KI-I with the mandate of the National Education Goals[11].

**Design**

After conducting a needs analysis on several chemistry practicum guidebooks from different publishers, the next step is to design an integrated chemistry practicum guide with spiritual values for odd semester MA students. At this stage, indicators are explained based on KI and KD in the 2013 curriculum. The next stage is determining the basic framework in writing a chemistry practicum guide which begins with the design of the cover and components of the chemistry practicum guide content which consists of 3 parts, namely the introduction, core and closing. The introductory section contains the introduction, table of contents, laboratory rules, safety in the laboratory, symbols of hazardous chemicals, laboratory equipment and their uses, preparation of practical solutions and core competencies. The core section contains material related to the verses of the Qur'an and the meaning of the verses of the Qur'an which can be seen in Figure 1, practicum procedures, chemical information about practicum materials and aphorisms which can be seen in Figure 2. The closing section contains the MSDS, glossary, periodic table of elements and bibliography.

![Figure 1](image1.png)  
**Figure 1.** Practical experiments that are integrated with the spiritual values contained in the verses of the Qur'an

![Figure 2](image2.png)  
**Figure 2.** Chemistry info and hadith reflections

The chemistry practicum material designed is adapted to the verses of the Qur'an to be integrated in the practicum guide book. The material developed in the form of a practicum guide in accordance with the 2013 curriculum syllabus contains 9 Basic Competencies which are divided into four subjects, namely Hydrocarbons, Thermochemistry, Reaction Rates and Chemical Equilibrium.
The process of writing the chemistry practicum guide framework also underwent several changes in accordance with the suggestions and directions from the supervisor and validator, including the determination of the module outline, placement of images, sentences, color combinations, use of grammar and adjustment of the verses of the Qur'an with chemical material. It aims to produce a practicum guiding framework that is in accordance with the objectives of developing the practicum module.

Development

Assessment of the feasibility of an integrated spiritual value practicum guide

To determine the feasibility level of the spiritual value integrated chemical practicum guide developed, a validity test was carried out. This validation stage aims to get recognition or ratification of the suitability of the product developed with needs so that the product can be said to be feasible and suitable for use in learning[12]. The validity test uses an instrument in the form of a validation sheet based on the National Education Standards Agency (BSNP), namely the feasibility of content, language, presentation and graphics.

The analysis of the feasibility standards for the practical guide that was developed was carried out by 2 chemistry lecturers at the State University of Medan and 2 chemistry teachers at MAN Lubuk Pakam. Based on the results of the assessment by the expert validators, there are several notes that must be considered, then based on the suggestions and input from the validators, revisions are made to perfect the spiritual value integrated chemistry practicum guide developed. The results of the validation by expert validators on the spiritual value integrated chemical practicum guide that was developed can be seen in table 2 and figure 3.

Table 2. Feasibility Assessment of Spiritual Values Integrated Practicum Guide by Expert Validators

<table>
<thead>
<tr>
<th>Aspects of Assessment</th>
<th>Amount</th>
<th>Score</th>
<th>Percent Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Eligibility</td>
<td>14</td>
<td>53</td>
<td>94,6</td>
</tr>
<tr>
<td>Language Eligibility</td>
<td>6</td>
<td>22</td>
<td>91,6</td>
</tr>
<tr>
<td>Serving Eligibility</td>
<td>9</td>
<td>34</td>
<td>94,4</td>
</tr>
<tr>
<td>Graphic Eligibility</td>
<td>10</td>
<td>38</td>
<td>95,0</td>
</tr>
</tbody>
</table>

![Bar chart showing the percentage rates for different aspects of the assessment.](attachment:figure3.png)

Figure 3. The results of the expert validator's assessment
Based on Table 2 and Figure 3, the results of the assessment of the Integrated Chemical Practicum Guide to Spiritual Value developed based on BSNP on the 94.6% content feasibility aspect with excellent criteria, 91.6% aspects of language feasibility with excellent criteria, 94.6% aspects of feasibility presentation with excellent criteria that are very good and the graphic feasibility aspect is 95% with excellent criteria. So that the feasibility of the integrated chemical practicum guide that has been developed has an average of 93.95% with very good or feasible criteria.

4 Conclusion

The conclusion obtained from this study is that the spiritual value integrated chemistry practicum guide obtained an average eligibility percentage of 93.95% with very feasible criteria by the validator consisting of a chemistry lecturer at the State University of Medan and a chemistry teacher at MAN Lubuk Pakam so that it is suitable for use for learning chemistry.

References


Development Of Synectic Learning Model To Improve Explanation Text Writing Ability

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Universitas Negeri Medan ¹,²,³

Abstract. The results showed that (1) developing a synectic learning model using a 4D model (2) a product in the form of a synectic learning model that had been developed with nine. The results of material validation by material experts, namely with a score of 3.25 or 81.25% categorized as "good" and design validation with a score of 3.64 or 91% categorized as "very good" (3) the effectiveness of developing synectic models on explanatory text material is effectively used so as to improve student learning outcomes with an average score of 65.37 at the pretest. After being implemented, the average value becomes 77.77, meaning that it reaches the KKM, which is 76. Student motivation in a limited group with a percentage score of 89.89% and activities in learning get a percentage score of 80%. Learning motivation in the group was expanded with a score of 89.90% and student activity with a percentage score of 91.33%.

Keywords: research and development, synectic model, explanatory text

1. Introduction

The learning model in the classroom has many variations. However, not all learning models are suitable for teaching text-producing skills and not all models are suitable for all grade levels. One of the learning models designed for writing skills is the synectic model. The synectic learning model has a characteristic that emphasizes higher-order thinking processes. The relationship between creativity and the synectic process can lead to a creative process leading to awareness and developing real capacities for individuals and groups [1].

Synectics model is one of the models that belong to the personal family or personal models in the form of non-directive teaching, awareness training, conceptual systems, and class meetings. It is intended to create a teaching model oriented to individual self-development that focuses on individual psychology and creativity development through self-actualization, mental health, and creativity development. In addition, the synectic model can also be said as one of the efforts made to encourage the creativity of students.
The synectic model is one of the learning models designed to develop students' creativity. The synectic model is based on four ideas that challenge conventional views, namely about creativity [2]. First, creativity is important in daily activities. Second, the creative process is not mysterious, but it can be explained and it is possible to directly train people to increase their creativity. Third, creative findings are characterized by intellectual processes. Fourth, individual and group discovery is the same through creative thinking.

Gordon emphasizes creativity as part of his daily activities and leisure life. The model is designed to improve problem-solving skills, creative expression, empathy, and insight into social relationships. For most people creativity is associated with art, whereas in science the emphasis is on discovery. Synectic is a teaching and learning pattern designed to train students to develop (1) creative problem solving skills, and (2) personal creativity. The synectic model is also suitable for developing sympathy, and the ability to make insight into social relationships[3].

Explanatory text is one of the text genre materials in Indonesian language learning. Explanatory text is an essay that contains complete explanations of a topic related to various phenomena, both natural phenomena and social phenomena that occur in everyday life [4].

2. Theoretical Basis

2.1 Synectic Learning Model

This synectic learning model was first introduced and tested by William J.J. Gordon to improve company performance through personal development that interacts with competent personalities. [5] Synectic model is oriented towards personal development and individual uniqueness, preferably emphasizing the process of helping individuals in shaping and organizing a unique reality. Another advantage of this model is that it shows a lot of emotional life in students.

[6] We need to empathize because maybe we are too forced to use a "logical" solution that requires us to look at other, more creative possibilities. Synectics is designed to guide students to develop thoughts and ideas to describe things logically. In this case, synectics is applied to help students develop "fresh" ways of thinking (not just logical, but can develop empathy for a conflict that occurs.

2.2 Advantages and Disadvantages of Synectic Learning Model

[7] Synectic learning model has advantages, including:

This model is useful because it is to develop a new understanding in students about a problem so that they are aware of how to behave in certain situations.

This model is useful because it can develop clarity of understanding and internalization in students about new material.

This model can develop creative thinking processes, both for students and for teachers.
This model is implemented in an atmosphere of intellectual freedom and security of dignity among students.

This model helps students find new ways of thinking in solving a problem.

In addition to the advantages described above, the synectic learning model also has the following disadvantages:

This learning model is difficult to implement for teachers and students who are used to implementing conventional learning patterns because this model focuses on reflective and imaginative thinking. In activities that occur in certain situations, there will be a possibility that students lack mastery of facts and procedures in carrying out skills.

This model requires teachers to be able to position themselves as initiators and mentors, but many teachers certainly do not have this.

It takes quite a long time because students have to respond step by step to these learning steps.

<table>
<thead>
<tr>
<th>Synectic Model Syntax Before Development</th>
<th>Synectic Model Syntax After Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first stage</td>
<td></td>
</tr>
<tr>
<td>Describe the current state</td>
<td>The first stage &quot;Idea generation&quot;</td>
</tr>
<tr>
<td>The teacher asks the students to describe the situation or topic they see today</td>
<td>Students explore ideas by remembering and rethinking the things that happen around them.</td>
</tr>
<tr>
<td>Second stage “Direct analogy” (1)</td>
<td></td>
</tr>
<tr>
<td>Students put forward a direct analogy of one selected, developed.</td>
<td>Second stage “Direct analogy I”</td>
</tr>
<tr>
<td></td>
<td>Students make connections about what they observe by exploring more deeply.</td>
</tr>
<tr>
<td>The third stage “Personal analogy”</td>
<td></td>
</tr>
<tr>
<td>Students “become” the analogy they selected in the second phase (personal analogy)</td>
<td>The third stage “Personal analogy”</td>
</tr>
<tr>
<td></td>
<td>Students describe the events/objects they observe.</td>
</tr>
<tr>
<td>Fourth stage “Condensed conflict”</td>
<td></td>
</tr>
<tr>
<td>Based on the second and third phases, students raise conflicts (conflicts) and one is selected to be raised as a topic (conflict suppression stage).</td>
<td>Fourth stage “Mapping and discussion”</td>
</tr>
<tr>
<td></td>
<td>Students are grouped based on the selected ideas then between students in groups give each other suggestions.</td>
</tr>
<tr>
<td>Fifth stage “Direct analogy” (2)</td>
<td></td>
</tr>
<tr>
<td>Students develop and select another direct analogy based on the conflict in stage four.</td>
<td>Fifth stage “Idea screening”</td>
</tr>
<tr>
<td></td>
<td>Students filter the ideas needed to create a text outline</td>
</tr>
<tr>
<td>Sixth stage “Reviewing the task that should be”</td>
<td>Sixth stage “Solid conflict”</td>
</tr>
<tr>
<td>The teacher asks students to review the actual task and problem using the analogy of the final solution so that it enters as a synectic experience.</td>
<td>Each student makes a text framework based on the analogy that has been made.</td>
</tr>
<tr>
<td>Seventh stage “Direct analogy 2”</td>
<td></td>
</tr>
<tr>
<td>Students add other analogies to enrich the content of the text and develop it into a full text.</td>
<td></td>
</tr>
</tbody>
</table>
2.3 Explanation Text

Explanatory text is one of the text genre materials in Indonesian language learning. Explanatory text is an essay that contains complete explanations of a topic related to various phenomena, both natural phenomena and social phenomena that occur in everyday life [8].

[9] Explanatory text is a text that explains the relationship of events or the process of something happening (in full). In relation to the text genre, explanation is a text that explains a process or event about the origin, process, or development of a phenomenon that can be natural, social, or cultural.

In connection with the above, explanatory text is also a text that contains an explanation of processes related to natural, social, scientific, cultural, and other phenomena. The explanatory text comes from the author's questions regarding 'why' and 'how' a phenomenon occurs [10].

3. Research and Methods

The research used is the type of research development or Research and Development (R & D). Research and development model or Research and development (R & D) is a research model used to produce certain products and test the effectiveness of these products. The development research model used in this study is the 4-D model. Abbreviation for Define, Design, Develop, and Disseminate.

4. Result and Discussion

The synectic learning model that has been developed in this study is then implemented to test the effectiveness of the synectic learning model in the explanatory text. At the implementation stage, it was carried out at XI IA 5 SMA Negeri 1 Tanjungbalai. Prior to implementation, students were given a pretest to see the effectiveness of the synectic learning model in the explanatory text, after that the synectic learning model was implemented in the explanatory text and at the end of the lesson a posttest was given. The results of the data obtained for the pretest and posttest can be seen in Table 4.16 below:
Based on the results of the pretest and posttest scores of the explanatory text writing both before and after the implementation of the synectic learning model in the explanatory text, the average score obtained by students at the time of the pretest was 65.37 and the post-test average was 77.77. The lowest pretest score was 51 and the highest score was 79, while at the posttest the lowest score was 67 and the highest score was 90. At the time of the pretest the student's score had not yet reached the KKM, which was 76 while the average score of students was still 65.37. However, after the implementation of the synectic learning model in the explanatory text class XI IA 5 SMA Negeri 1 Tajungbalai, the average student score was 77.77 past the KKM score of 76, then the synectic learning model in the explanatory text was effectively used in the explanatory text in class XI IA 5 SMA Negeri 1 Tanjungbalai.

4.1 Description of Pretest Data on Learning Outcomes Before Using Synectic Learning Model in Explanatory Text

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<td>82</td>
<td>73</td>
<td>73</td>
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</table>

<table>
<thead>
<tr>
<th>Total score</th>
<th>1961</th>
<th>2333</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>65.37</td>
<td>77.77</td>
</tr>
<tr>
<td>High Value</td>
<td>79</td>
<td>90</td>
</tr>
<tr>
<td>Lows Value</td>
<td>51</td>
<td>67</td>
</tr>
</tbody>
</table>
Based on the pretest score obtained before the implementation of the synectic learning model in the explanatory text, it was 65.37. The assessment of the writing of the explanatory text is seen from several indicators consisting of the content of the explanatory text, the organization of the writing of the explanatory text, vocabulary, language use, and mechanics.

Determination of the distribution of pretest scores before the implementation of the synectic learning model in the explanatory text is presented in Table 4.17:

Frequency Distribution of Student Pretest Results on Explanatory Text Materials Before Using Synectic Learning Models on Explanatory Texts

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 – 55</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>56 – 61</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>62 – 67</td>
<td>4</td>
<td>13.33%</td>
</tr>
<tr>
<td>68 – 73</td>
<td>8</td>
<td>26.67%</td>
</tr>
<tr>
<td>74 – 79</td>
<td>6</td>
<td>20%</td>
</tr>
</tbody>
</table>

Based on the frequency distribution table of the pretest scores, it can be seen that students scored 50-66 totaling 6 people or 20%, scores 56-61 totaling 6 people or 20%, scores 62-67 totaling 4 people or 13.33%, scores 68-73 totaling 8 people or 26.67%, and a score of 74-79 totaling 6 people or 20%, and For clarity, the frequency distribution table in the pretest can be described in the form of a histogram in Figure 4.4:

4.2 Description of Post-test Result Data Learning Outcome Values After Using Synectic Learning Model in Explanatory Text
After the implementation of the synectic learning model in the explanatory text, the student's value has increased. Students get a score of 77.77, which means that the value has increased from the pretest score. Assessment of explanatory text writing based on the content of the explanatory text, the organization of the explanatory text writing, vocabulary, language use, mechanics.

The implementation of the synectic learning model is very effective in improving student learning outcomes in writing explanatory texts seen from the content of the text is very good and perfect because students are able to understand and develop ideas from existing facts according to the problems that occur, based on the organization of the text are able to express ideas using development patterns explanatory text, supported in a clear, concise, systematic, and coherent manner, from vocabulary it is also good because the use of vocabulary is accurate, the use and selection of causal or chronological conjunctions is effective, uses the right type of words, uses the appropriate language barrel, the use of language is also good it can be seen from the effective construction of complex and simplex sentences, a few mistakes about sentence elements, sentence types, numerals, word order/functions, particles, pronouns, and prepositions, and mechanics, which shows mastery of EBI and paragraphs.

The results of the posttest data obtained by students after using the development of synectic learning models in explanatory text learning have a frequency distribution that can be seen in table 4.18:

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>67 – 71</td>
<td>5</td>
<td>16.67%</td>
</tr>
<tr>
<td>72 – 76</td>
<td>8</td>
<td>26.67%</td>
</tr>
<tr>
<td>77 – 81</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>82 – 86</td>
<td>9</td>
<td>30%</td>
</tr>
<tr>
<td>87 – 90</td>
<td>2</td>
<td>6.67%</td>
</tr>
</tbody>
</table>

Based on the frequency distribution table of the pretest scores, it can be seen that students scored 67 – 71 totaling 5 people or 16.67%, scores 72-76 totaling 8 people or 26.67%, scores 77 – 81 totaling 6 or 20%, scores 82 – 86 totaling 9 people or 30% and 87 90 totaling 2 people or 6.67%

For clarity, the frequency distribution table in the pretest can be described in the form of a histogram in Figure 4.5:
Based on the results of research and discussion in research on the development of synectic learning models to improve the ability to write explanatory texts in class XI students of SMA Negeri 1 Tanjungbalai as follows:

The process of developing a synectic learning model improves the ability to write explanatory texts in class XI students of SMA Negeri 1 Tanjungbalai using the 4D development model (Define, Design, Develop, and Disseminate) or (definition, design, development and dissemination). Based on the initial stage or the definition of students who gave responses as much as 83.33% needed a learning model to improve the ability to write explanatory texts and 2 teachers or 100% needed a synectic learning model in explanatory text learning.

The product designed is a synectic learning model that has been developed with nine syntaxes, namely idea generation, direct analogy I, personal analogy, mapping and discussion, filtering ideas, solid conflict, direct analogy II, text writing, editing and publishing. The feasibility of developing a synectic learning model is seen from the feasibility of the material and design. The results of material validation have a score of 3.25 or 81.25% categorized as "very good" and the results of design validation have a score of 3.64 or 91% categorized as "very good", so that the development of synectic learning models in learning to write explanatory texts is feasible to be used in learning explanatory texts for students. class XI SMA Negeri 1 Tanjungbalai.

The effectiveness of developing synectic learning models on explanatory text material is effectively used in learning. Based on the results of a limited trial in class XI IA 5 with a total of 12 students, student motivation in a limited group with a percentage score of 89.89% and student activity in learning with the synectic model obtained a percentage score of 80%. Learning motivation in the group was expanded with a score of 89.90% and student activity with a percentage score of 91.33%. The implementation of the development of the synectic learning model to improve the ability to write explanatory texts for students of class XI IA 5 SMA Negeri 1 Tanjungbalai has increased. Student learning outcomes at the time of the pretest had an average score of 65.37 students, after the implementation of the synectic learning model on the explanatory text material, the average value of students was 77.77 at the time of post-test past the KKM score of 76.

5. Conclusion

This learning model provides convenience in delivering material so that the learning process carried out seems to be more interesting and fun for students. In addition, the implementation of the development of a synectic learning model to improve the ability to write explanatory texts for students of class XI IA 5 SMA Negeri 1 Tanjungbalai has increased. The synectic learning model
developed can be used as an alternative learning so that teachers and students understand the learning material, especially in the explanatory text material.

**References**

Feasibility Analysis of Chemistry Practicum Guide Book for Class XI Based on BNSP Integrated Green Chemistry

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The Education Chemistry Study Program of Postgraduate School of Universitas Negeri Medan, Indonesia 2022¹,²,³

Abstract. This study aims to determine the feasibility of the chemistry practicum guide for class XI circulating according to the BNSP integrated green chemistry. This research method uses descriptive qualitative method. The samples used in this study were several practical handbooks circulating in schools. The research instrument is in the form of a feasibility sheet based on the BNSP integrated green chemistry. The results of this study are the books used by the school are in accordance with the curriculum and according to the BNSP standards for integrated green chemistry. Where the average value is 77.3% with a decent and valid category for use by students. Where each percentage of the content feasibility category is 59.17%, language eligibility is 90.63%, presentation eligibility category is 70.83%, and graphic eligibility category is 88.54%.

Keywords: Practical guide, Chemistry, BNSP Integrated green chemistry

1 Introduction

Law chapter 1 article 1 number 1 which states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by himself, society, nation and state (1). Besides that, in accordance with the Indonesian Curriculum, namely the 2013 Curriculum (K-13), learning is required to be more oriented to the character development of students. This study aims to determine the feasibility of a chemistry practicum guide for class XI circulating according to the National Education Standards Agency (BSNP) integrated green chemistry, after determining the time for the practicum which will be carried out at the practicum place, a green chemistry-based guide book with the BNSP integrated green chemistry will be made.

Chemistry is a science that studies matter, its properties, structure, and reactions or changes that occur and are abstract in terms of concepts, principles, and calculations related to everyday life. Chemistry cannot be learned simply through reading, writing, or listening.
Mastery of chemistry is measured through the ability to master a collection of chemical knowledge and skills to do scientific work (2).

The implementation of the practicum is expected to provide evidence of the truth of the theory or concept that has been studied by students so that the theory or concept becomes more meaningful in its cognitive structure (3). Practicals carried out by almost all schools, especially high schools (SMA) are conventional chemistry practicum methods. The process carried out is generally found in textbooks and uses industrial synthetic chemicals. This practicum uses the principles of chemical reactions, such as the formation of precipitates, the occurrence of color changes, the formation of gases, or the occurrence of changes in temperature (4).

Practical activities are part of learning that aims to give students the opportunity to prove theories in real situations by testing and conducting experiments directly. Experiment-based teaching and learning activities need to be carried out in chemistry learning. Chemistry learning emphasizes the process skills possessed by students. Experiment-based activities make it easier for students to understand the material being studied because students can be directly involved in the learning process (5). The teaching and learning process with the practicum method will provide opportunities for students to experience for themselves a process of observation, analysis, proof and drawing conclusions. Thus, students are required to experience for themselves, seek the truth, or try to find a law or proposition, and draw conclusions from the process they experience (6).

Hayat and Anggraeni state that in the teaching and learning process with the practicum method students are given the opportunity to experience themselves or do it themselves, follow a process, observe an object, analyze, prove and draw their own conclusions about an object, state or process of something (7). The evaluation of the practical guide learning was analyzed consisting of four parts, namely content feasibility, language feasibility, presentation feasibility and graphic feasibility. The results of the feasibility analysis of the chemical practicum guide distributed based on the standards of national educational (8).

Meanwhile Rahman, et al explained the results of case study analysis conducted in a number of high schools in Medan that, the area of chemical laboratories in several schools in Medan met the BSNP standards, but there were still science laboratories used for chemistry laboratories (9). In addition to having many benefits, the implementation of the practicum has several consequences, including the disposal of waste from the results of the practicum and work safety in the laboratory. In general, students do not know the rules while in the laboratory, the properties of practicum materials, the dangers of chemicals, and symbols contained in the laboratory, how to use laboratory equipment, and proper waste disposal. If this problem is left unchecked, it will not be controlled and can endanger the safety of students. Therefore, students need a safe and environmentally friendly practicum for the emergence of dangerous diseases and accidents when doing practicum.

Green Chemistry provides twelve principles for designing chemical processes by default. Green Chemistry supports the goal and covers a larger scope including teaching, laboratories and the chemical industry. Green Chemistry has 12 principles, namely: “(1) prevention; (2) atomic economy; (3) less hazardous synthetic chemicals; (4) designing safer chemicals; (5) safer solvents and auxiliaries; (6) design for energy efficiency, (7) use of renewable raw materials; (8) lowering the derivative; (9) catalysis; (10) design for degradation; (11) real time
analysis for pollution prevention; and (12) chemicals that are inherently safer for accident prevention” (10).

According to Green Chemistry, the chemicals used in addition to being safe for users (teachers and students), must also be friendly to the environment. This means that the waste generated from chemical processes such as experiments in laboratories or practicums must be harmless to creatures and the environment. Waste must be easily degraded by microorganisms that exist in nature. These materials can be obtained easily and cheaply. Thus, students can also save the environment from environmental pollution caused by plastic waste (11).

2 Research Method

This research method uses a qualitative descriptive method. The sample used in this study were several practical guide books circulating in schools. The research instrument is a feasibility sheet based on BNSP integrated green chemistry. The data in this study are the results of the analysis of 4 chemistry practical guide books for class XI based on BSNP integrated green chemistry. The research data uses data on the analysis of chemical practicum guidelines based on BSNP integrated green chemistry.

At this stage, an analysis of the practicum guides circulating in several schools will also be carried out to determine the characteristics, material and content in the guides that are often used by teachers to carry out practicum. The assessment of the practicum guide includes practicum materials, tools and materials used, the feasibility level is assessed using a chemical practicum guide validation instrument in accordance with BNSP. descriptive analysis by paying attention to aspects including display format, material, and language presentation. The considerations in assessing this practicum guide use the comparison formula in Equation 1 and the comparison of the practicum guide in Table 1.

\[
\text{Percentage of eligibility scores} = \frac{\text{score obtained}}{\text{max score}} \times 100\% \quad (1)
\]

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage Rate (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81 – 100</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>2</td>
<td>61 – 80</td>
<td>Worthy</td>
</tr>
<tr>
<td>3</td>
<td>41 – 60</td>
<td>Decent enough</td>
</tr>
<tr>
<td>4</td>
<td>21 – 40</td>
<td>Not feasible</td>
</tr>
<tr>
<td>5</td>
<td>0 – 20</td>
<td>Very Unworthy</td>
</tr>
</tbody>
</table>

3 Results and Analysis

The main activity in this research is to analyze the practicum guide books circulating in schools. The use of practicum guides that are not in accordance with BNSP integrated green chemistry is a major concern. Based on the results of the BNSP assessment sheet on practicum books circulating in schools, it can be analyzed and obtained the following results.
### Table 2. Result Content Eligibility

<table>
<thead>
<tr>
<th>No</th>
<th>Content Eligibility</th>
<th>Score Max</th>
<th>Score Get</th>
<th>Percentage (%)</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Book Organization Practical Guide</td>
<td>8</td>
<td>5</td>
<td>62.5</td>
<td>Worthy</td>
</tr>
<tr>
<td>2</td>
<td>Material Coverage</td>
<td>12</td>
<td>9</td>
<td>75</td>
<td>Worthy</td>
</tr>
<tr>
<td>3</td>
<td>Concept Truth</td>
<td>12</td>
<td>10</td>
<td>83.33</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>4</td>
<td>Mustan Contents of the Practicum Guide</td>
<td>8</td>
<td>3</td>
<td>37.5</td>
<td>Not Feasible</td>
</tr>
<tr>
<td>5</td>
<td>Pratical Guide Innovation</td>
<td>8</td>
<td>3</td>
<td>37.5</td>
<td>Not Feasible</td>
</tr>
<tr>
<td></td>
<td><strong>Average Percentage</strong></td>
<td></td>
<td></td>
<td>59.17</td>
<td>Decent Enough</td>
</tr>
</tbody>
</table>

### Table 3. Language Eligibility Result

<table>
<thead>
<tr>
<th>No</th>
<th>Language Eligibility</th>
<th>Score Max</th>
<th>Score Get</th>
<th>Percentage (%)</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In Line with the Development of Learners</td>
<td>8</td>
<td>6</td>
<td>75</td>
<td>Worthy</td>
</tr>
<tr>
<td>2</td>
<td>Aspects of Sentence Clarity and Readability</td>
<td>8</td>
<td>7</td>
<td>87.5</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>3</td>
<td>Writing Aspect</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>Very Worthy</td>
</tr>
<tr>
<td>4</td>
<td>Aspects of Using Language, Terms and Symbols</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>Very Worthy</td>
</tr>
<tr>
<td></td>
<td><strong>Average Percentage</strong></td>
<td></td>
<td></td>
<td>90.63</td>
<td>Very Worthy</td>
</tr>
</tbody>
</table>

### Table 4. Presentation Result

<table>
<thead>
<tr>
<th>No</th>
<th>Serving Eligibility</th>
<th>Score Max</th>
<th>Score Get</th>
<th>Percentage (%)</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Guidebook Component Practiced</td>
<td>12</td>
<td>9</td>
<td>75</td>
<td>Worthy</td>
</tr>
<tr>
<td>2</td>
<td>Aspects of Guiding Presentation Practice</td>
<td>4</td>
<td>2</td>
<td>50</td>
<td>Decent Enough</td>
</tr>
<tr>
<td>3</td>
<td>Level of Existence Practicum</td>
<td>8</td>
<td>6</td>
<td>75</td>
<td>Worthy</td>
</tr>
<tr>
<td>4</td>
<td>Evaluation</td>
<td>12</td>
<td>10</td>
<td>83.33</td>
<td>Very Worthy</td>
</tr>
<tr>
<td></td>
<td><strong>Average Percentage</strong></td>
<td></td>
<td></td>
<td>70.83</td>
<td>Worthy</td>
</tr>
</tbody>
</table>

### Table 5. Graphic Result

<table>
<thead>
<tr>
<th>No</th>
<th>Graphic Eligibility</th>
<th>Score Max</th>
<th>Score Get</th>
<th>Percentage (%)</th>
<th>Information</th>
</tr>
</thead>
</table>
Based on the analysis of the value of the content feasibility aspect, the result is 59.17% (Decent Enough) can be seen in the table 2, meaning that the books circulating in schools are in accordance with the BSNP but can be redeveloped. From the aspect of language feasibility, the results of the analysis obtained are 90.63% (very worthy) can be seen in the table 3, meaning that the language aspect used in the circulating practicum guidebooks does not need to be revised. Furthermore, the results of the feasibility aspect of the presentation obtained results of 70.83% (worthy) can be seen in the table 4, meaning that the practical guide books circulating in schools can be added to Core Competencies (KI) and Basic Competencies (KD) as well as work safety in the laboratory and some instructions on how to work laboratory equipment. Some practical implementations are also difficult for students to carry out directly because they are quite dangerous, practicum designers can be made safer for students and environmentally friendly. Based on the results of the feasibility aspect of the graphic, the result is 88.54% (very worthy) can be seen in the table 5, based on the BSNP so that it does not need to be revised again.

From the overall results of the analysis of practicum books circulating in schools, it was found that the average value of the BNSP results was 77.3% (Worthy), the class XI practicum guidelines circulating in schools were suitable for use by students according to the BSNP, but there were some improvements such as making experiments safe for students and environmentally friendly should also be done. After this analysis is carried out, a practical guide book that is safer for students and also environmentally friendly in the form of a green chemistry-based practicum guide book will be developed.

Guide natural material-based high school chemistry practicum that has been designed to be valid and suitable for use class XI high school students. The percentage of the validity score obtained is 72.3% and the percentage score location obtained 72.7% (12). Then based on research that has been done by Jumasari (13), the class XII chemistry practical manual used in schools is in accordance with the BSNP and is suitable for use but needs to be developed according to the 2013 curriculum, considering that the practical guide book still uses the KTSP curriculum.

Ekin (14) explained the results of the analysis of the 3 practical guide books are still found a number of weaknesses and shortage, development is carried out project-based practicum guide and standard character according to BSNP criteria, it is expected that learning can grow student character is innovative, creative, affective, productive, collaborative, disciplined, and contribute to improving learning outcomes student chemistry. The research that has been carried out by Manalu (15) describes the chemical practicum guide book which was developed based on contextual research so that students can easily carry out practical activities because one of the components of contextual learning is constructivism which means building their own knowledge through everyday experience.
4 Conclusion

The feasibility level of the chemical practicum guide circulating in class XI schools has a suitable category for use based on the BSNP but it is not safe for students and the environment because many practicums use hazardous chemicals, where the average value of the BNSP practical guide book is 77.3% (Worthy) where the category is feasible and valid for use by students. Where each percentage of content eligibility category is 59.17%, language eligibility is 90.63%, presentation eligibility category is 70.83%, and graphic eligibility category is 88.54%.

Practical guide books circulating in schools can be updated with the addition of KI and KD as well as work safety in the laboratory and some instructions on how to work laboratory equipment. Some practical implementations are also difficult for students to do directly because they are quite dangerous, practicum designers can be made safer for students and environmentally friendly by applying the concept of green chemistry.

References


Abstract. This study aims to determine: 1) Analysis of innovative teaching materials used by universities; 2) Analysis of innovative textbooks in universities for analytical chemistry based on BSNP; 3) The feasibility of project-based innovative learning resources has complied with the eligibility standards of teaching materials based on BSNP criteria; 4) the effect of project-based innovative learning resources in improving higher order thinking skills in acid-base titration teaching, 5) the effect of project-based innovative learning resources in improving student learning outcomes in acid-base titration teaching. The sampling technique is purposeful sampling. The sample of this research is two classes of chemistry education students. The research instruments are valid and reliable objective tests of learning outcomes, sources of innovative teaching materials, thinking ability assessment questionnaires and BSNP validation questionnaires. The analytical technique used is the Likert scale technique and the independent sample t-test test in the SPSS 23 program. Based on the results of the study, conclusions can be drawn, among others: 1) Practicum guiding teaching materials used by universities based on the feasibility standards of teaching materials have values, among others; content feasibility (3.12), language feasibility (3.27), presentation feasibility (3.34) and graphic feasibility (3.37); 2) Project-based innovative learning resource teaching materials used by universities based on the feasibility standards of teaching materials have values, among others; content feasibility (3.7), language feasibility (3.67), presentation feasibility (3.77) and graphic feasibility (3.66) the criteria are eligible to be used; 3) The results of the assessment show the effect of project-based innovative learning resources in the implementation of learning to improve higher-order thinking skills to produce Sig. < (0.00 < 0.05); and 4) The results of the assessment show that the use of project -based innovative learning resources has an effect on improving student learning outcomes on the subject of acid-base titration to produce Sig. < (0.00 < 0.05).

Keywords : innovative learning resources, higher order thinking skills, Study Results, Acid base titration.

1 Introduction

The world of education is currently facing an issue, especially the corona virus pandemic. Learning exercises that are usually done face-to-face suddenly need to be changed to online techniques. Along with the Covid-19 pandemic, world changes are undergoing a very rapid
4.0 industrial revolution, both in the fields of technology, science, psychology, and the transformation of cultural values. This development in the end also demands a transformation of the educational paradigm. Education in the modern era is not enough to only emphasize the achievements of science as a product, but must also emphasize various dimensions of life skills through the use or application of digital technology and the internet. (Jayawardana, HB A, 2020)

Source study is all source like messages, people, materials, tools, techniques, and background used student as source for activity study and could increase quality learn it. Source long time learning this used by student University Medan State on eye studying chemical analytic is a book entitled Analytical Chemistry I (Analytical Chemistry base), based on results analysis use BNPS instruments. Source study this efficient used on moment learning stare face, but no for moment this does it online learning.

also known as project-based learning, is a contextual learning model because it is expected to change the way students learn independently by increasing higher-order thinking skills, increasing student creativity in work, generating creative ideas, and training critical thinking, in responding to a problem faced in the real world. Project-based learning allows students to design a problem and find a solution on their own. Project-based learning has the advantage of its characteristics, namely helping students make decisions and frameworks, helping students design processes to determine an outcome, train students to be responsible for managing information carried out on a project that is carried out and finally students produce a real product that students produce. which is then presented in class (Marzuki et al., 2017).

Positive results from past analysts regarding the use of venture-based and mixed media creative learning assets by Juliandini G., Manihar, S., and Zainuddin, M (2020) where the consequences of exploration are project-based and visionary and good imaginative learning assets in Anion exam learning can cultivate students’ undisputed level reasoning ability while further developing student learning outcomes. From the description introduced, the experts are interested in directing the exploration with the title: "Asset-Based Learning Asset Enhancement to Further Develop Higher Demand Thinking Skills in Performing Acid Base Titrations”

2. Method

This research is a development research with ADDIE development model (Analysis, Design, Development, Implement, Evaluation). This research is a quantitative research with the aim of developing learning resources to see the improvement of learning outcomes using test instruments and to see students' learning motivation using non-test instruments. The research will be conducted at the Department of Chemistry Education, Faculty of Mathematics and Natural Sciences (FMIPA) of Medan State University in the 2020/2021 academic year. The population in this study were all lecturers of chemistry at the State University of Medan and all students of chemistry education at the State University of Medan. The sample in this study were three UNIMED chemistry lecturers as validators, material experts and media experts who were selected by purposive sampling and the samples in this study were two classes of chemistry education students who were taken by purposive sampling, to measure learning achievement before being given treatment. In the experimental class, students are taught to use innovative project-based learning resources while in the control class to use a practicum guide. The research design can be seen in table 3.1 below:
### Table 3.1 Table design Study Use Source Study Innovative Based on Project 3

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Treatment</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment Class</td>
<td>T1_</td>
<td>X_A</td>
<td>T2_</td>
</tr>
<tr>
<td>Control Class</td>
<td>T1_</td>
<td>-</td>
<td>T2_</td>
</tr>
</tbody>
</table>

Source: Sugiono, 2014

Information:

- \( X_A \) = Learning using project-based innovative learning resources
- \( T_1 \) = Initial test (Pre-test)
- \( T_2 \) = Final test (Post-test)

The type of research used in this research is the research and development method (Research and Development). Research and development methods or in English Research and Development are research methods used to produce certain products, and test the effectiveness of products (Sugiono, 2014).

The research to be conducted is experimental. The research involved two classes of chemistry education students. Before learning begins, students are given an objective test in the form of a multiple choice test to determine the students' initial abilities (pre-test). Then after the end of the learning process students are given an objective test to determine changes in student learning outcomes (post-test). The control class uses a practicum guide used by students, while the experimental class uses developed learning resources.

### 3. Results and discussion

The exploration used is Innovative Work research (Research and Development) where the results of this test are project-based showing materials for teaching Titration Acid Base. This study aims to decide: (1) testing the requirements for creative performance materials used in universities (2) investigating imaginative course readings that have been available in logic colleges according to BSNP, (3) the use of learning assets in the light of consistency with the principles of principle. displaying material in accordance with BSNP regulations, (4) the impact of developing imaginative learning assets to increase higher reasoning abilities in the acquisition of corrosive base titrations, (5) the impact of developing business-based learning assets in further development of student learning outcomes in corrosive base titration education, (6) students' reactions to project-based creative learning assets.

### 4. Conclusion

Source learning that has used by student University The land of Medan in eye studying chemical analytic is book entitled Analytical Chemistry I (Analytical Chemistry base), based on results analysis use BNSP instruments. one _ Theory in eye studying this is titration sour language. On Theory this there is a number of a must practice done, while learning conducted online. So required something innovation source study based project for increase
results study student on Theory that. One of the learning models that can increase Skills experimentation student is a learning model based project. Tests used is study Creation Innovative (Research and Development) where results from study this is based project showing ingredient for teaching Acid Base. Study conducted with To do innovation titration teaching materials sour language, standardized teaching materials by expert validator use questionnaire eligibility taken by purposive sampling.

Results study show that (1). Analysis source study student on Theory titration sour language obtained the average rating appropriateness contents of 3.14; appropriateness language 2.89; appropriateness presentation 2.76; and appropriateness graph 2.72. (2). Part coordinated learning to in asset learning creative is showing Theory as module electronics, group small project titration language corrosive, recording learning, and recording completed functional direct by para scientist. (3). Test normalization asset learning imaginative based on effort by material master validator get score typical 3.68; qualification language 3.40; depth material 3.44; and 3.76 positions and design media situation arrived at the point middle 3.54. Remember evaluation this, an evolved item be in a class really possible and no need overhauled. (4). Ability more reasoning tall on class test try get score typical 85.45 whereas class control get score typical 79.49. (5). results study class exploratory obtained normal value is 0.71 on classification high, while class control get normal value is 0.50 in class medium. (6). Reaction student after use asset learning based Duty creative generally very good.

References

To Keep Committee Fund Management SMA Education Quality

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Abstract. Face-to-face learning (PTM) is limited. Education funding for health sanitation and incentives for teachers and education personnel. This research uses descriptive research methods with a qualitative approach through observation, interviews, and documentation in the form of videos and recordings. The results of the data were analyzed by reducing, displaying, and verifying them. Educational funding sources come from school operational assistance funds, educational operational assistance, and school committees. Based on Permendikbud 75 of 2016 committee funds are used to cover the lack of funds, improve school quality that is not budgeted for in the BOS and BOP, develop facilities and infrastructure as well as school committee operational activities that are reasonable and accountable in a transparent manner. Committee funds are voluntary, meaning they have been agreed upon through a meeting and are mandatory. The results of the research on additional assignments funded by the school committee in high schools such as allowances for operators, laboratory managers, library coordinators, homeroom teachers, website managers, administration, excess hours, teacher fees, daily pickets, excess teaching hours, and meeting consumption. and guide students in maintaining the quality of education

Keywords: Incentive, Committee Fund, Permendikbud nomor 75, 2016

1. Introduction

Based on Permendikbud number 44 of 2012, article 5, the government and/or local governments are prohibited from charging basic education units organized by 9-year basic education from elementary to junior high school, and it is prohibited from collecting any fees from parents for any purpose. As stated in Article 11, it is prohibited to charge students who are economically incapable for costs associated with new student admissions, assessment of learning outcomes, student graduation, and the welfare of stakeholders in the education unit, while at the SMA/SMK level, Permendikbud number 26 of 2016, Article 10 Paragraph 5b, financing activities related to improving school quality that is not budgeted for in other sources of

¹Permendikbud No. 44, 2012.
²Permendikbud No. 75 for 2016.
education financing, namely school operational assistance (BOS) and educational operational assistance (BOP). Circular of the Governor of North Sumatra number 440/1413/2022 regarding controlling the spread of the Covid-19 virus, the Omicron variant. Face-to-face learning (PTM) is limited to 100 percent, while PTM is limited to 50 percent. Until further notice, hybrid learning (online and face-to-face learning at the same time) will be available. Learning in schools has not been effective and efficient to Lubis, SHH, et al. (2022). The problem of education financing is used as efficiently and effectively as possible. According to Wardiyah, S. et al. (2015), the school activity and budget plan (RKAS) and the school income and expenditure budget plan (RAPBS) are prepared by the principal, teacher council, and parents. Funds that are prepared with parental participation are committee funds or education coaching donations (SPP). According to Komariah, N (2018), the amount of committee funds is determined through committee meetings. There are three types of committee funds, including (1). Monthly fixed funds (students are required to pay every month), (2). Incidental funds (paid once while being a student); (3) Voluntary funds are funds given voluntarily. The SPP fixed fund is one of the funding sources. This fund will be used to maintain education at SMAN 1 Silaen. Although there is a gap between education (SD and SMP), which eliminates the school committee or SPP funds, secondary education (SMA, SMK, and MA) is allowed to obtain one of the sources of SPP funds or committee funds.

2. Research Method

This research was conducted at SMAN 1 Silaen in Hutanamora village, Silaen sub-district, Toba district, North Sumatra province. The research method used is the descriptive method, describing the state of the phenomenon as it is. Descriptive research can be done now or in the future. Descriptive research was conducted with a qualitative approach. Several research subjects (committee chairman, acting (plt) principal, treasurer, honorary teacher, teacher, and student's parents) provided data. The data collection techniques were data reduction, data display, and data verification (triangulation) carried out continuously until the data is saturated (valid according to theory). The research subjects consist of (1) committee management, (2) acting principal, and (3). Treasurer, (4). PNS teacher (5). Honorary teacher, (6) Parents of students. The sources of data used in this study are primary data from interviews and documentation (school archives, photos, and videos). Secondary data sources include journals, books, articles, and the internet (Google).

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7Sugyono: Research and Development Methods, Alfa beta Bandung, third printing, 366 pages (2020)
3 Results and Discussion

3.1 Research Results

Commitment to Committee Funding. Funding for committee funds According to 6 research subjects, schools cite routine school committee funds through SPP for operational financing and infrastructure facilities sourced from parents, which are paid every month. Financing is one component that cannot be separated from the implementation of education. Based on the description above, the funding needed for operational activities and infrastructure facilities in the education unit comes from parents. Based on the description above, the funding needed for operational activities and infrastructure facilities in the education unit comes from parents. Additional operational tasks funded by school committees in SMA are in Table 1

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Operator Allowance</td>
<td>Rp.350,000, -</td>
<td>Rp.350,000, -</td>
</tr>
<tr>
<td>2.</td>
<td>Lab Manager Allowance (Computer, chemistry, biology, and physics) @Rp.50,000, -</td>
<td>Rp.400,000, -</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Library manager</td>
<td>Rp. 50,000, -</td>
<td>Rp. 50,000, -</td>
</tr>
<tr>
<td>4.</td>
<td>Homeroom Alliance of 15 study groups</td>
<td>Rp. 50,000, -</td>
<td>Rp. 50,000, -</td>
</tr>
<tr>
<td>5.</td>
<td>Web Manager Allowance</td>
<td>Rp. 150,000, -</td>
<td>Rp.150,000, -</td>
</tr>
<tr>
<td>6.</td>
<td>Four Employees administrative allowance</td>
<td>Rp.300,000, -</td>
<td>Rp.300,000, -</td>
</tr>
<tr>
<td>7.</td>
<td>30 hours honorarium for extra teaching hours</td>
<td>@Rp.100,000,-</td>
<td>Rp.300,000, -</td>
</tr>
<tr>
<td>8.</td>
<td>24-hour counseling guidance teacher honor</td>
<td>Rp. 90,000, -</td>
<td>Rp.2.160,000,</td>
</tr>
<tr>
<td>9.</td>
<td>The advantages of teaching hours for Civil Cervantes ari 107 hours</td>
<td>@Rp. 5,000, -</td>
<td>Rp.535,000, -</td>
</tr>
<tr>
<td>10.</td>
<td>Daily package 6 days x 3 teachers = 18 teachers</td>
<td>@Rp.40,000, -</td>
<td>Rp.720,000, -</td>
</tr>
</tbody>
</table>

| Total | Rp.7,615,000, - |

Source: RAB Committee 2021-2022

The number of students amounted to 662 according to the data in the dapodik, minus 17 student (1 student committee child, 7 sons and daughters of the teacher, and 9 student who dropped out) = 654 x Rp. 15,000,- = 9,675,000,- - Rp.2,060,000,- (reserve cost), which is used for internet network maintenance and payment of teacher fees in the middle of the school year.

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*Nur Gamar: Implementing Education Financing Management (Case Study of MTS Darul Khair Respective, Batu District, Banggai District, Central Sulawesi, Gorontalo, Islamic Education Management Journal, vol 7 no 1, 12 (2019)*
The Legal Foundation. The legal basis for funds is from the Permendikbud committee number 75 of 2016 and Government Regulation number 66 of 2010 concerning the management and implementation of education. The school committee has a role and function in Permendikbud number 75 of 2016.

Funding Sources for the Committee. The committee's source of funding comes from parents, the amount of which is determined through committee meetings. At the parents' meeting, a committee fund was formed to pay attention to schools by improving the quality of education. But in the atmosphere of the COVID-19 pandemic, it is to maintain the quality of education.

The Function of Voluntary Committee Funds. Permendikbud number 75 of 2016 committee funds are voluntary, especially Article 1 paragraph 5. The contribution of educational development is the provision of money in the form of goods or services from parents, and the community voluntarily and does not bind the education unit based on the consensus of the parents.

Committee Funds to Cover Shortages. The purpose of the committee funds to cover the lack of funds is to improve quality and motivate student services. Its management is to improve the quality of facilitating learning, repair small buildings, and assist in financing honorary teachers who are not funded by BOS and BOP. Covering this lack of funds is under the committee's duties, one of which is to raise public funds in the context of financing the implementation of education in schools to improve the quality of education, although financing is needed in the education unit, meaning that BOS and BOP funds cannot be allocated for activities in the education unit. cover the lack of costs so that all activities can take place.

Fund of the Committee to Maintain Quality. The purpose of the committee funds is to maintain quality and provide motivation with respect so that teachers and education staff remain enthusiastic in carrying out their duties, especially guiding and carrying out the responsibilities of students in the pandemic. COVID-19 According to Hizbullah (2009), the characteristics of

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9Permendikbud no. 75 for 2016.
11Permendikbud 75/2016, article 1 paragraph 5, 3
12Silabus.web.id
quality education, one of which is in the process, namely having a quality culture (cooperation, feeling of belonging, willingness to change, self-improvement, and openness). Maintaining quality, paying attention, and developing students' self

Table 2. Activities carried out in SMA.

<table>
<thead>
<tr>
<th>No</th>
<th>Activity</th>
<th>Builder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Literacy Thursday</td>
<td>Djuni Posma Rouli, S.Pd</td>
</tr>
<tr>
<td>2.</td>
<td>Scout</td>
<td>Benny Hotman Siagian, S.Pd, M.Si</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sabar Nursia Siahana, S.Pd</td>
</tr>
<tr>
<td>3.</td>
<td>Marching Band</td>
<td>Remi E.S.Y Simangunsong, S.Pd</td>
</tr>
<tr>
<td>4.</td>
<td>Raising saka School</td>
<td>Say Pulma Tamba, S.Pd</td>
</tr>
<tr>
<td>5.</td>
<td>Music and Dance</td>
<td>Derita Nababn, S.Pd</td>
</tr>
<tr>
<td>6.</td>
<td>Choir</td>
<td>Mareta marbun, S.Pd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dra. Kartina Siagian</td>
</tr>
<tr>
<td>7.</td>
<td>Spiritual</td>
<td>Erika Elfrida, S.PAK</td>
</tr>
<tr>
<td>8.</td>
<td>The National Science Olympiad</td>
<td>Subject Teacher</td>
</tr>
</tbody>
</table>

Source: Djuni Posma Rouli, April 23, 2021

Fig. 2. Literacy Thursday.

Source: Djuni Posma Rouli, April 23, 2021

Funds for the Infrastructure Development Committee. Committee funds can be used for infrastructure. However, for the 2021–2022 school year, committee funds are used to maintain the quality of education while infrastructure has not been allocated. Permendikbud number 75 of 2016, committee funds are used for the development of existing infrastructure in the education unit. Education financing consists of two technical concepts, one of which is the effective use of funds and appropriate expenditures, including infrastructure, operational, and management costs. Committee funds are handed over to schools to manage committee funds on
infrastructure as needed in the education unit, for example, making waterways, computers, and so on. 13

Committee funds are used for transparent and accountable operational activities. Committee funds can be used for operational activities in educational saunas fairly and transparently. Permendikbud number 69 of 2009 concerning standard costs for indirect education operational costs such as power, water, telecommunications, maintenance of facilities and infrastructure, overtime pay, transportation, consumption, taxes, and insurance. Every year the school prepares a RAPBS which shows how to plan income and use costs for school operational purposes, including homeroom teachers, daily pickets, paying honorary teachers, honorary staff, buying consumable educational materials and equipment, consumption (drinking and eating at meetings), telecommunications, allowance for educator operators, laboratory management, wet management, excess teaching hours for 24 hours for both honorary teachers and civil servants). Committee funds for operational activities are fair and transparent14

3.2. Discussion

Funding of Committee Funds. Funding for committee funds is used for operational activities and infrastructure facilities, which are sourced from parents (Rosmawaty, 2020). According to Ardiyan, L., et al (2022), financing is the provision of money from parents (committee funds) according to deliberation in the education unit.

Legal Basis of Committee Fund. According to Permendikbud number 75 of 2016, committee funds function to increase the role of school committees

Source of Committee Fund. The committee's source of funds comes from parent meetings to improve the quality of education. The task of the committee is to determine the articles of association, and by-laws, provide a strategic development plan, and sign the RAPBS/RKAS without participating in compiling it15

Voluntary Committee Funds and Its Purpose. Voluntary funds mean the result of an agreement and not mandatory fundraising (Wahyudi, Kdik, 2021). In Permendikbud number 75 of 2016 voluntary does not mean donating as they please and can not donate even though they have the financial capacity to reduce public participation funds (Syahrir, 2019). Voluntary means agreed upon by the meeting and are mandatory

14Permendikbud 75/2016, article 10 paragraph 5b, 8,
Committee Funds to cover Shortage Fees. Committee funds cover the lack of funds so that activities in schools take place, even though funds are limited and many activities are not carried out.\textsuperscript{16} The need for committee funds in education units varies.

Committee Fund for Sustaining Learning. The role of the school committee in improving the quality of education is not just providing funds, but providing innovative ideas and ideas (Astutidik, 2020: 1)

Funds for the Infrastructure Development Committee. Committee funds before the 2021-2022 school year were used for infrastructure, but during the Covid-19 pandemic, committee funds were used to maintain quality according to Permendikbud number 75 of 2016, the committee funds were used to develop infrastructure, operational costs, and their management according to the needs of the education unit\textsuperscript{17}

Committee funds are used for operational activities. Fairly and responsibly. Committee funds can be used for operational activities in the education unit fairly and transparently. Permendikbud Number 69 of 2009 concerning standard costs for indirect education operational costs such as power, water, telecommunications, maintenance of facilities and infrastructure, overtime pay, transportation, consumption, taxes, and insurance. Every year the school prepares a RAPBS which shows how to plan revenue and use costs for school operational purposes among additional\textsuperscript{18} tasks to motivate include homeroom teachers, daily pickets, paying teacher fees, honorary staff, buying consumable educational materials and equipment, consumption (drinking and eating at meetings), telecommunications, educator operator allowance, laboratory manager, web manager, overtime teaching 24 hours for both honorary teachers and PNS teachers. Committee funds for educational operational activities can be budgeted fairly and transparently.

4 Conclusion

Financing for education in SMA is sourced from BOS, BOP, and school committee funds. Committee funds come from parents who agreed on the results of the meeting based on Permendikbud number 75 of 2016. Funds can finance components other than those funded by BOS and BOP, Honorary teacher committees, and operational duties for additional teachers in schools.

Committee funds are voluntary. It does not mean they can contribute or not, but funds that have been agreed upon by parents through meetings and the results of the meeting are obligatory to cover the lack of costs that are not budgeted in the BOS and BOP.

Committee funds are handed over to schools to manage committee funds to maintain the quality of education; infrastructure; educational operations; improve quality (teachers and education

\textsuperscript{16}Widiya Astuti, et al: Policy Implementation Regarding Donation-Based School Committee Services at State Vocational High School 3 Banjarmasin, eprint.uniska-bjm.ac.id (2021)


\textsuperscript{18}Hamdan, Education Financing Management (Elementary IT Case Study Trunk Quiz Human Development), Journal of Educational Management, vol. 12 no. 1,1 (2019).
staff honorary); maintain the quality of education (teachers and education personnel honorarium); the welfare of school personnel (consumption); telecommunications (Wi-Fi and website); dapodik operators; laboratory managers and library coordinators; homeroom incentives; web managers; and picket teacher incentives.

Foundations law Permendikbud 75 Number 2016 must be socialized on a broad scale to understand the fund committee volunteer and no levy. Each subject (chairman's committee, head school, treasurer committee, civil servant teachers, honorary teachers, and parents) must, you're welcome to be responsible for answers to activities and decisions agreed by parents and public.

Results meeting and allocation fund published to parents so that parents who are not present know the results of the meeting already decided and agreed upon.

A larger fund committee and more motivated teachers to improve participant education quality.

Acknowledgment. Dr. Eka Daryanto, MT, supervising lecturer for Economics and Education Financing for the Postgraduate Education Administration Study Program at the State University of Medan, Medan, North Sumatra. Dr.Restu, MS is a supervising lecturer for the Economics and Education Financing Study Program Post Graduate Education Administration at Medan State University in Medan, North Sumatra.

References

[11] Permendikbud 75/2016, article 1 paragraph 5, 3
[12] Silabus.web.id
[14] Permendikbud 75/2016, article 10 paragraph 5b, 8,
The Effect of Implementing Good School Governance and Organizational Religiosity on Teacher Performance through Leader Commitment

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Abstract. This study aims to determine the effect of implementing good school governance, organizational religiosity, and leadership commitment to teacher performance. This research method is quantitative research. The sample used was 84 people. Data collection techniques were carried out using interviews, observations, and questionnaires, then calculations were carried out through the SPSS application. The results of this study are: 1) Good school governance has an effect but is not significant on teacher performance. 2) Good school governance has a significant effect on leader commitment. 3) Leader commitment has a significant effect on teacher performance. 4) Organizational religiosity has a significant effect on teacher performance. 5) Organizational religiosity has a significant effect on leader commitment. 6) Good school governance has a significant effect on teacher performance through leader commitment. 7) Organizational religiosity affects teacher performance through leader commitment.

Keywords: Implementation of Good School Governance, Organizational Religiosity, Leader Commitment, and Teacher Performance.

1 Introduction

In the course of activities in a school institution, the Human Resources (HR) component is one of the most important factors in supporting the success of a school institution, so that the potential of human resources needs to be managed properly in order to be able to compete with other school institutions. One of the existing human resources in school institutions is the teacher, where teacher performance can affect the success of school institutions. Teachers must provide good quality performance so that the quality of education and the knowledge it produces is of high quality. Improving the quality of education can determine the level of prosperity and welfare of a nation in the future, so that the vision of development has a clear direction of education (Ahmad, 2018).

There are several facts that occur in the field that there are teacher performances that do not meet the standards and achievement of teacher performance competencies as they should. Based on research conducted by Ismara and Khurniawan (2020) found that improving the
performance of Vocational High Schools is influenced by indicators of good school governance, including transparency, accountability, responsibility, autonomy, fairness, participation, effectiveness and efficiency, and consensus oriented. Then the research conducted by Anak Agung Rai Susilawathi, Umi Muawanah, and Ahmad (2021) found that good school governance had a significant effect on school reputation, good school governance had a significant effect on school performance, school reputation has a significant influence on school performance, and good school governance has a significant influence on school performance mediated by school reputation.

From the description above, it can be taken as an example of an educational institution in the city of Medan to see the performance of teachers from educational institutions, namely SMA Methodist Medan (SMA Methodist 1 Medan, SMA Methodist 7 Medan, SMA Methodist 8 Medan, and SMA Methodist 12 Medan). Methodist School is one of the schools in Medan City. The four Methodist High Schools both have very good accreditations, namely the "A" accreditation. The educational background of the teachers and other educators is in accordance with the fields of knowledge being taught and their respective fields of work. However, from temporary observations, it is also known that there are still some teachers in the school who do not yet have an educator certificate (certification). Then it was also found that there are still teachers who have not followed the competence. This is due to the fact that some of these teachers are teachers who have just finished their education from lectures. There are also teachers who have other positions where the teacher serves as vice principal in the curriculum field. One of the tasks of the curriculum is to determine the number of hours of lessons that will be given to teachers in schools to match the income that will be obtained by these teachers.

Identification of problems

Based on the above background, the researcher can identify problems so that this research can be seen as something new. As for some things that can be identified by the author, namely:

1) Good School Governance (GSG) is the most important thing in an organization, because GSG can make the results of the performance of an educational institution increase. However, in reality there are some educational institutions that do not realize the importance of GSG in these institutions.

2) Commitment and religiosity are needed in a person in carrying out their daily activities. Commitment and religiosity can improve performance in organizational institutions. However, the level of commitment and religiosity in organizational institutions may decline. This can be caused by several factors, one of which is the work culture in the organizational environment.

Research purposes

Based on the description of the background, identification of the problem, and the formulation of the research problem above, the writer can make the research objectives to be achieved, namely:

1. To analyze the effect of implementing Good School Governance on teacher performance in schools.
2. To analyze the effect of implementing good school governance on leader commitment.
3. To analyze the effect of leader commitment on teacher performance in schools.
4. To analyze the effect of organizational religiosity on teacher performance in schools.
5. To analyze the effect of organizational religiosity on leader commitment.
6. To analyze the effect of implementing good school governance on teacher performance in schools through Leader Commitment.
7. To analyze the influence of organizational religiosity on teacher performance in schools through leader commitment.

2 Theoretical foundation

2.1 Theoretical Framework

Resource Based Theory. Resources-Based View (RBV) is a theoretical concept that can provide answers in creating a competitive advantage for a company (Kuncoro, 2005). Resource-based approach (Resource Based Theory) is a theory developed to analyze the competitive advantage of a company that emphasizes the advantages of knowledge (Knowledge) or the economy (learning economy) that relies on intangible assets. The Resource Based View holds that the resource base will create a sustainable competitive advantage. According to Barner (2011), the success of an organization is determined by internal resources which are grouped into 3 categories, namely:
1) Physical resources, including all plant, equipment, location, technology, and raw materials;
2) Human resources, including all employees, including their training, experience, intelligence, knowledge, skills, and abilities;
3) Organizational resources, including company structure, planning processes, information systems, patents, trademarks, copyrights, databases, and so on.

Agency Theory. Agency theory is derived from agency relations, where the main delegate works as an agent. However, agency theory assumes the occurrence of agency problems after the separation of ownership (Huse, 2005). Uncertainty in agency relationships is due to information asymmetry (Deegan, 2004), where agents have higher knowledge and expertise than managers because the former are directly involved in daily operational activities. Agency theory explains that agency relationships arise when one or more people (Principal) hire another person (Agent) to provide a service and then delegate decision-making authority to the agent (Jensen and Meckling, 1976).

Good School Governance. Governance is basically about effective leadership that can be used as a mechanism to create processes, systems, and controls that apply and appropriate behavior to ensure long-term sustainability and continuity in an organization such as a school (FEDSAS, 2015: 3). The main key to understanding good school governance is an understanding of the principles in it. There are several principles of Good School Governance, namely:
1) Community Participation (participation)
2) Transparency
3) Consensus Oriented (Consensus)
4) Independence
5) Effectiveness and Efficiency
6) Accountability
7) Strategic Vision (Strategic Vision)
Organizational Religiosity. According to the Great Indonesian Language Dictionary (2020) it states that religiosity has the meaning of devotion to religion. Religiosity is very important for employees to have, because if employees have a higher level of religiosity, then employee motivation to produce good performance or performance will also be higher (Sulistyo, 2011).

Religiosity is the level of trust and confidence inherent in a person to be able to carry out activities in his daily life. In general, there are five aspects of religiosity, namely:

1) Religious belief (ideological dimension);
2) Religious practice (ritual dimension);
3) Religious experience (experience dimension);
4) Religious knowledge (intellectual dimension);
5) Experience (consequential dimension).

Teacher Performance. Performance is a measure of the success of the organizational goals that have been set (Kristiyana and Widyaningrum, 2018). Teacher performance is the ability and success of teachers in carrying out learning tasks (Supardi, 2014). According to Law No. 19 of 2005 concerning National Education Standards, teacher performance can be seen from the ability of teachers to master the required competencies, namely pedagogic competence, personality competence, social competence, and professional competence.

Leader Commitment. According to Gumiandari (2013: 50) states that among the forms of leadership commitment can be realized, among others, in the following ways:

a) Commitment in achieving the vision, mission, and goals of the organization.
b) Commitment in carrying out work in accordance with work procedures.
c) Commitment in developing the quality of the relevant Human Resources (HR) and product quality.
d) Commitment in developing teamwork.
e) Commitment to be dedicated to the organization critically and rationally.

3 Research Methods

This research uses quantitative research, namely the process of finding knowledge that uses data in the form of numbers as a tool to analyze information about what you want to know (Kasiram, 2008). The population used in this research is the office holders in the school (each school apparatus), starting from the Principal, PKS Curriculum, PKS Administration, PKS Student Affairs, PKS Public Relations, and teachers who are in the school environment. The total population in this study were 84 people. Sources of data needed in this study consisted of two, namely primary data and secondary data.

3.1 Data Analysis Methods and Data Techniques

Data analysis. In this study, the scale that will be used is the Likerl scale. On the Likerl scale, the variables to be measured are translated into variable indicators. Then the indicator is used as a starting point for compiling instrument items in the form of statements or questions. Answers on the Likerl scale can be in the form of words, including:
Data Engineering. Data analysis techniques used in this study are:
1) Descriptive Statistical Analysis.
2) Classic assumption test
   a) Multicollinearity Test
   b) Heteroscedasticity Test
   c) Normality test
   d) Linearity Test
3) Hypothesis testing
   a) Simple Regression Analysis
   b) Path Analysis and Sobel Test

4 Research Results and Discussion

4.1 Description of Research Results

Descriptive Analysis. Descriptive analysis in this study includes analysis of respondents' characteristics, descriptive statistical analysis, and categorization of respondents' answers. The discussion about each descriptive analysis is as follows:

a. Characteristics of Respondents

In this study, the characteristics of the respondents observed were as follows:

1) Age

Descriptive characteristics of respondents based on age are presented in the table as follows:

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Frequency (Person)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 – 37</td>
<td>41</td>
<td>48.81</td>
</tr>
<tr>
<td>38 – 53</td>
<td>32</td>
<td>38.10</td>
</tr>
<tr>
<td>&gt; 53</td>
<td>11</td>
<td>13.09</td>
</tr>
<tr>
<td>AMOUNT</td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the data above, it can be concluded that the majority of the respondents in this study were teachers aged 22-37 years or around 48.81 %. While the least respondents were teachers aged > 53 years, there were 11 people or around 13.09 %.
2) **Length of work**

Descriptive characteristics of respondents based on the length of work as follows:

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Frequency (Person)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>7</td>
<td>8.33</td>
</tr>
<tr>
<td>1 – 5</td>
<td>18</td>
<td>21.43</td>
</tr>
<tr>
<td>6 – 10</td>
<td>29</td>
<td>34.52</td>
</tr>
<tr>
<td>11 – 15</td>
<td>14</td>
<td>16.67</td>
</tr>
<tr>
<td>&gt; 15</td>
<td>16</td>
<td>19.05</td>
</tr>
<tr>
<td><strong>AMOUNT</strong></td>
<td><strong>84</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Based on the data above, it can be concluded that most of the respondents in this study were teachers who had worked for 6 years - 10 years, namely as many as 29 people or about 34.52%.

4.2 **Classic assumption test**

a. **Multicollinearity Test**

The following are the results of the multicollinearity test conducted on the research variables:

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>6.906</td>
<td>2.806</td>
</tr>
<tr>
<td></td>
<td>Good School Governance</td>
<td>.044</td>
<td>.033</td>
</tr>
<tr>
<td></td>
<td>Organizational Religiosity</td>
<td>.860</td>
<td>.105</td>
</tr>
</tbody>
</table>

* Dependent Variable: Leader Commitment
Table 4. Second Multicollinearity Test (X1, X2, and Z Against Y)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>(Constant)</td>
<td>26,837</td>
<td>5,238</td>
<td></td>
</tr>
<tr>
<td>Good School Governance</td>
<td>.002</td>
<td>.060</td>
<td>.003</td>
</tr>
<tr>
<td>Organizational Religiosity</td>
<td>-121</td>
<td>.255</td>
<td>-.068</td>
</tr>
<tr>
<td>Leader Commitment</td>
<td>.603</td>
<td>.200</td>
<td>.436</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Teacher Performance

Based on the multicollinearity test conducted on the variables of Good School Governance, Organizational Religiosity, Leader Commitment, and Teacher Performance as the two data above, it can be concluded that there is no multicollinearity between the independent variables in the regression model used in this study. This can be seen from the tolerance value of each variable whose value is greater than 0.10 and the VIF value is less than 10.

b. Heteroscedasticity Test

It is said that heteroscedasticity occurs if the resulting significance value for each variable is < 0.05. If it is said that there is no heteroscedasticity if the resulting significance value for each variable is > 0.05.

Table 5. Heteroscedasticity Test Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-1.095</td>
<td>3.341</td>
<td>-.328</td>
<td>.744</td>
</tr>
<tr>
<td>Good School Governance</td>
<td>.045</td>
<td>.038</td>
<td>.133</td>
<td>.246</td>
</tr>
<tr>
<td>Organizational Religiosity</td>
<td>-.054</td>
<td>.163</td>
<td>-.051</td>
<td>-.332</td>
</tr>
<tr>
<td>Leader Commitment</td>
<td>.113</td>
<td>.128</td>
<td>.137</td>
<td>.888</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Abs_Res2

Source: SPSS Data Test Results
Based on the data above, it can be said that in each independent variable there is no
heteroscedasticity. This can be seen from the significance value of each independent variable
whose significance value is > 0.05.

c. Normality test

A good regression model is a normal or close to normal data distribution, detecting normality
by looking at the spread of data (points) on the diagonal axis of the graph. In addition, it can
also be seen from the table test of normality using Kolmogorov-Smirnov with a value of Sig>
0.05, then the data can be said to be normally distributed.

Table 6. Normality Test Results

<table>
<thead>
<tr>
<th>N</th>
<th>84</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Parameters a,b</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.000000</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>3.14225782</td>
</tr>
<tr>
<td>Most Extreme Differences</td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>.090</td>
</tr>
<tr>
<td>Positive</td>
<td>.090</td>
</tr>
<tr>
<td>Negative</td>
<td>-.085</td>
</tr>
<tr>
<td>Test Statistics</td>
<td></td>
</tr>
<tr>
<td>asymp. Sig. (2-tailed)</td>
<td>.086</td>
</tr>
</tbody>
</table>

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Based on the data above, it can be seen that the significance probability value obtained is >
0.05. Asymp. Sig. value. (2-tailed) of 0.086 is greater than 0.05 so that the data can be said to
be normally distributed.

d. Linearity Test

To determine whether there is linearity or not, that is by looking at the Sig column. on the
Linearity row in the Anova Table. If the value is < 0.05, it is linear so it can be said to meet
the linearity requirements.

Table 7. Summary of Linearity Test Calculation Results

<table>
<thead>
<tr>
<th>Model</th>
<th>F count</th>
<th>F table (5%)</th>
<th>Sig.</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP*GSG</td>
<td>F(23,59) = 0.708</td>
<td>F(23,59) = 1.713</td>
<td>0.819</td>
<td>Linear</td>
</tr>
<tr>
<td>TP*RO</td>
<td>F(10,72) = 0.782</td>
<td>F(10,72) = 1.964</td>
<td>0.646</td>
<td>Linear</td>
</tr>
<tr>
<td>TP*LC</td>
<td>F(15,67) = 1.685</td>
<td>F(15,67) = 1.818</td>
<td>0.075</td>
<td>Linear</td>
</tr>
<tr>
<td>LC*GSG</td>
<td>F(23,59) = 0.663</td>
<td>F(23,59) = 1.713</td>
<td>0.861</td>
<td>Linear</td>
</tr>
<tr>
<td>LC*RO</td>
<td>F(10,72) = 0.400</td>
<td>F(10,72) = 1.964</td>
<td>0.942</td>
<td>Linear</td>
</tr>
</tbody>
</table>

Based on the results of the linearity test above, it can be seen that the variables of good school
governance, organizational religiosity, and leader commitment produce F arithmetic < F table. The
significance value is $> \alpha$ (0.05) and it can be concluded that the data is in the form of a linear function.

4.3 Hypothesis test

The criterion used is if the value of Sig. smaller than 0.05 then the effect that occurs is significant. If the value of Sig. greater than 0.05 then the effect is not significant.

1) Hypothesis Test 1

The significant test of the Good School Governance variable was carried out by looking at the significance value (Sig.) obtained from data processing with the SPSS program. Based on the output of data processing, it can be seen that the value of Sig. of 0.347 $> 0.05$. Thus the effect of the implementation of good school governance on teacher performance is not significant. So it can be concluded that the application of Good School Governance does not have a significant effect on teacher performance. can be seen the results of the value of $R^2$ or the value of the coefficient of determination of the R Square value of 0.011. This shows that changes in the Teacher Performance variable can be explained by the Good School Governance variable of 1.1%.

2) Hypothesis Test 2

The significance test of the Good School Governance variable on Leader Commitment was carried out by looking at the significance value (Sig.) obtained from data processing with the SPSS program. Based on the output of the data processing performed, it can be seen that the value of Sig. of 0.014 $< 0.05$. Thus the effect of the implementation of Good School Governance on Leader Commitment is significant. So it can be concluded that the implementation of Good School Governance has a significant influence on Leader Commitment. Based on the table above, it can be seen the results of the $R^2$ value or the value of the coefficient of determination from the R Square value of 0.071. This shows that changes in the leader's commitment variable can be explained by the Good School Governance variable of 7.71%.

3) Hypothesis Test 3

The significance test of the leader's commitment to teacher performance was carried out by looking at the significance value (Sig.) obtained from data processing with the SPSS program. Based on the output of the data processing performed, it can be seen that the value of Sig. of 0.000 $< 0.05$. Thus the effect of Leader Commitment on Teacher Performance is significant. So it can be concluded that the leader's commitment has a significant influence on teacher performance. Based on the table above, it can be seen the results of the $R^2$ value or the coefficient of determination of the R Square value of 0.152. This shows that changes in the Teacher Performance variable can be explained by the Leader's Commitment variable of 15.2%.

4) Hypothesis Test 4

The significance test of the organizational religiosity variable on teacher performance was carried out by looking at the significance value (Sig.) obtained from data processing with the SPSS program. Based on the output of the data processing performed, it can be seen that the value of Sig. of 0.031 $< 0.05$. Thus, the effect of organizational religiosity on teacher performance is significant. So it can be concluded that organizational religiosity has a significant influence on teacher performance. Based on the table above, it can be seen the
results of the $R^2$ value or the coefficient of determination of the R Square value of 0.055. This shows that changes in the Teacher Performance variable can be explained by the variable Organizational Religiosity of 5.5%.

5) Hypothesis Test 5

The significant test of the organizational religiosity variable was carried out by looking at the significance value (Sig.) obtained from data processing with the SPSS program. Based on the output of data processing, it can be seen that the value of Sig. of 0.000 < 0.05. Thus the effect of Organizational Religiosity on Leader Commitment is significant. So it can be concluded that Organizational Religiosity has a significant influence on Leader Commitment. Based on the table above, it can be seen the results of the $R^2$ value or the value of the coefficient of determination of the R Square value of 0.482. This shows that changes in the leader's commitment variable can be explained by the variable of organizational religiosity of 48.2%.

6) Hypothesis Test 6

Based on the results of the coefficient of determination, the values of $e_1$ and $e_2$ can be calculated as follows:

\[
e_1 = \sqrt{1 - R} \\
e_2 = \sqrt{1 - 0.71} \\
e_1 = 0.538 \\
e_2 = 0.921
\]

Based on the results of the coefficient of determination of the direct effect given by the implementation of good school governance on teacher performance, an $R^2$ value of 0.104 was obtained. The $R^2$ value of the direct effect given by the implementation of good school governance on the leader’s commitment is 0.267. And the value of the direct influence given by the leader’s commitment to teacher performance is 0.389. So that the value of the indirect effect given by the implementation of good school governance on teacher performance through leader commitment is $0.267 \times 0.389 = 0.104$. Based on the results of these calculations, it can be seen that the value of direct influence (0.104 ≤ 0.104). These results indicate that the variable of good school governance implementation through the leader’s commitment variable has an influence on the teacher performance variable.

According to Resource Based Theory, the success of an organization is determined by internal resources which are grouped into 3 categories, including human resources covering all employees, including training, experience, intelligence, knowledge, skills, and abilities, and organizational resources including planning, information systems, databases, and so on (Barner, 2011). The role of a leader is needed in the management of existing resources within the organization. Good school governance with high leadership commitment will be able to improve the quality of teacher performance.

In preparing quality financial reports, it is necessary to have a commitment from a leader to provide policy direction for teachers. Preparation of budgets such as teacher salaries, teacher allowances, teacher training, and so on can be key indicators of organizational success. Leader commitment is needed in budgeting in the organization.

7) Hypothesis Test 7

Based on the results of the coefficient of determination, the values of $e_1$ and $e_2$ can be calculated as follows:
\[ e_1 = \sqrt{1 - R} \]
\[ e_2 = \sqrt{1 - R} \]
\[ e_1 = \sqrt{1 - 0.055} \]
\[ e_2 = \sqrt{1 - 0.152} \]
\[ e_1 = 0.972 \]
\[ e_2 = 0.921 \]

Based on the results of the coefficient of determination, the \( R^2 \) value of the direct influence given by the variable of organizational religiosity to teacher performance is 0.235. The \( R^2 \) value of the influence of organizational religiosity on leader commitment is 0.694. And the \( R^2 \) value of the direct influence given by the leader’s commitment to teacher performance is 0.389. So that the value of the indirect influence given by organizational religiosity on teacher performance through leader commitment is 0.694 x 0.389 = 0.270. Based on the results of these calculations, it can be seen that the value of direct influence is indirect effect (0.235 < 0.270). These results indicate that the variable of organizational religiosity through the leader’s commitment variable has an influence on the teacher performance variable.

4 Conclusions and recommendations

This research theoretically contributes significantly to the understanding of good school governance, organizational religiosity, teacher performance, and leader commitment. The purpose of this study was to determine the effect of implementing good school governance and organizational religiosity on teacher performance through leader commitment.

Based on the results of the discussion and analysis as described in the previous chapter, the conclusions of this study are Good school governance has an effect but not significant on teacher performance, good school governance has a significant effect on leader commitment, leader commitment has a significant effect on teacher performance, organizational religiosity has a significant effect on teacher performance, organizational religiosity has a significant effect on leader commitment, good school governance has a significant effect on teacher performance through leader commitment, and organizational religiosity affects teacher performance through leader commitment.

Suggestion

Suggestion that can be given by the author can be divided into two parts, namely:

1) For school
   a) Schools need to increase the role of a leader or management to improve the governance and performance of teachers in the school environment. Leaders need to increase teacher participation in regular meetings, seeking advice and input from teachers.
   b) Schools need to create good and conducive working relationships, both among teachers, employees, and with top management or leaders.
   c) Supporting facilities such as places of worship and work facilities need to be provided to teachers so that teachers are able to work optimally.
   d) Schools need to improve the procedures for worship that are carried out so that worship can run well.

2) For Further Researchers
   a) Further research can be carried out by developing the variables used in this study into more specific dimensions.
   b) Further researchers can add other variables that can affect teacher performance.
   c) Further researchers can develop and expand the object of research so that research results are maximized.
Reference

Analysis of The Effect of Clearance of Budget Targets, Competency of Government Apparatus on Performance Accountability with Internal Control System as Moderate Variables

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{deliy6975@gmail.com}

Universitas Negeri Medan

Abstract. This study aims to analyze the effect of budget target clarity, government apparatus competence on performance accountability with the internal control system as a moderating variable at the Dairi District Education Office, Samosir District Education Office and Pakpak Bharat District Education Office. This type of research is descriptive quantitative. This study uses a survey method by distributing questionnaires to the budget allocation makers in the Dairi District Education Office, Samosir District Education Office and Pakpak Bharat District Education Office. The population of this study were all employees within the Dairi District Education Office, Samosir District Education Office, Pakpak Bharat District Education Office, consisting of 30 samples of respondents including the head of the department, secretariat, treasurer, general and staffing sub-section, finance sub-section, planning sub-section and evaluation, the field of early childhood development, the field of elementary school development, the field of junior high school development, the field of coaching education staff. The data analysis method used is descriptive statistical analysis and multiple linear regression analysis. The analysis is assisted by the Statistical Package for Social Science (SPSS) program. The results of this study indicate that the clarity of budget targets and the competence of government officials simultaneously has a positive and significant effect on Performance Accountability at the Education Office of Dairi, Pakpak Bharat and Samosir Districts while the internal control system is not able to moderate the clarity of budget targets, the competence of government officials on performance accountability in Dairi District Education Office, Samosir District Education Office and Pakpak Bharat District Education Office.

Keywords: Clarity of Budget Targets, Competence of Government Apparatus, Internal Control System and Performance Accountability.

1 Introduction

The rapid development of accounting gives more attention to all types of organizations, including public sector organizations. The government is expected to focus on improving accountability as well as improving performance outcomes. Therefore, the government
establishes rules for implementing an effective accountability system which is commonly known as the Government Agency Performance Accountability System (SAKIP). The aspect of accountability is recognized as a fundamental value for good governance in public organizations (Al Shbail & Aman, 2018).

The concept of accountability in Indonesia is not a new thing. Almost all government agencies and institutions emphasize the concept of accountability, especially in carrying out government administrative functions. This phenomenon is the impact of community demands which began to be heralded again at the beginning of the reform era in 1998. These public demands arose because during the New Order era the concept of accountability was not able to be applied consistently in every line of government which in the end became one of the causes of the weakness of the bureaucracy and became a trigger for the emergence of various irregularities in financial management and state administration in Indonesia.

Presidential Regulation No. 29 of 2014 concerning the Performance Accountability System for Government Agencies and Presidential Instruction No. 2 of 2014 concerning Actions for Prevention and Eradication of Corruption is carried out in the context of realizing a government that ensures a more balanced and tangible form of accountability to the community. In addition, efforts to support the realization of such accountability or accountability have long been regulated in Government Regulation no. 8 of 2006 concerning Financial Reporting and Performance of Government Agencies. Thus the Performance Accountability System for Government Agencies needs to be implemented as a measuring tool to determine the organization's ability to achieve the vision and mission as well as organizational goals. The measurement results achieved then become an effective evaluation medium in improving the performance of Government Agencies. This is also in line with the agenda of strengthening supervision which refers to Government Regulation Number 60 of 2008 concerning the Government Internal Control System (SPIP) requiring a review of the main performance achievements of government agencies which focuses on assessing the effectiveness and efficiency of performance achievements.

Based on this, government agencies are required to submit accountability for their performance through government agency performance accountability reports (LAKIP) periodically and then control their accountability based on evaluations of their performance reports which aim to encourage increased performance of government agencies administratively while reducing the possibility of administrative errors.

An entity is said to be accountable when the entity is able to present information openly about the decisions that have been taken, allows parties outside the organization to review the information, and take corrective action if necessary. The government bureaucratic system that can be assessed objectively by the public will be judged from an accountable system. In addition, Public Accountability is the government's effort to organize government in a better direction (Astuty, 2013).

**Performance Accountability**

Performance accountability is a manifestation of the obligation of a government agency to account for the success/failure of implementing programs and activities that have been mandated by stakeholders in order to achieve the organization's mission in a measurable manner with performance targets/targets that have been set through government agency performance reports compiled periodically. The Government Agency Performance Accountability System directs that the implementation of government must be efficient,
effective, clean and responsible. Further implementation is based on the Regulation of the Minister for Empowerment of State Apparatus and Bureaucratic Reform of the Republic of Indonesia Number 53 of 2014 concerning Technical Guidelines for Performance Agreements, Performance Reporting and Procedures for Reviewing Performance Reports of Government Agencies.

Based on the Minister of State Apparatus Empowerment Regulation NO.PER/20M.PAN/11/2008 concerning the preparation of the main performance indicators, it is stated that the criteria for good performance indicators in relation to the accountability of the performance of government agencies must have SMART elements or Specific means clear and there is no possibility of misinterpretation, Measurable can be measured objectively, both quantitatively and qualitatively, Achievable means that it can be achieved rationally without reducing the level of challenge that should be, Relevance means that performance must be related to relevant aspects, Timebound means that it is possible to be measured in a certain predetermined time perspective.

Based on the good performance criteria above, it is expected that all agencies will be able to realize a result-oriented government and be able to apply the principles of good governance, namely transparency, participation and accountability. Through the application of these principles, the government will be able to improve services to the community.

Clarity of Budget Goals

Clarity of budget targets is an illustration of the extent to which budget objectives are clearly and specifically defined with the aim that the budget can be understood by employees who are responsible for achieving the budget targets. Clarity of budget targets is a planning guide in setting budgets based on clear and specific targets so that they can be understood by those who are responsible for achieving the goals to be achieved. The clarity of budget targets has implications for implementing officials to prepare budgets in accordance with the targets to be achieved by government agencies.

Suhartono and Solichin, 2006 said that the clarity of budget targets is the extent to which budget objectives are clearly and specifically defined with the aim that the budget can be understood by the person responsible for achieving the budget targets. Clarity of budget targets will help employees to achieve the expected performance, where by knowing the budget targets the level of performance can be achieved. Individual involvement will understand the targets to be achieved by the budget. As well as how to achieve it using existing sources, then the budget targets that are prepared will be in accordance with what will be achieved. Clarity of budget targets is also the extent to which budget objectives are clearly and specifically defined with the aim that the budget can be understood by the person responsible for achieving these targets.

Government Apparatus Competence

Competence according to Boutler et al. (1999) is a characteristic that underlies a person to be able to show a good work performance in a particular field of work, role or situation. According to the Decree of the Head of the State Personnel Agency No. 46A of 2003 dated November 21, 2003, these are the abilities and characteristics possessed by a Civil Servant in the form of knowledge, skills, and behavioral attitudes needed in carrying out their duties, so that the Civil Servant can carry out their duties professionally, effective, and efficient. Hood and Lodge (2004) argue that competence describes selective ideas in management and public
services so as to achieve good governance. Based on the government, the competence of the state apparatus is defined as the work ability of ASN which includes aspects of knowledge, skills, and work attitudes that are absolutely necessary in carrying out their duties (Regulation of the Head of the State Civil Service Agency Number 8 of 2013). The competence of the apparatus can be optimal if it is a reliable competence in their field. Thus, village financial management accountability is not only related to the availability of regulations and supporting facilities, but the most important thing is the existence of competent and reliable apparatus. Competence is a criterion for the apparatus to produce high performance. They are required to prepare and implement an adequate design of operational standards for village financial governance and supervision, and prepare the Village Medium-Term Development Plan (RPJMDes) and determine the Village Revenue and Expenditure Budget (APBDes) in accordance with priority programs, manage village finances in accordance with applicable regulations, laws and regulations and avoiding deviations from village financial management. These regulations can result in state financial losses.

**Internal Control System**

Mulyadi (2001:163) states that the internal control system includes the organizational structure, methods and measures that are coordinated to maintain organizational wealth, check the accuracy and reliability of accounting data, encourage efficiency and encourage compliance with management policies. The implementation of a good internal control system in every organization, both private and public sectors is to ensure financial accountability and transparency in the management of funds at all levels in order to achieve objectives effectively and efficiently. The implementation of the internal control system in the public sector, especially in local governments, is guided by Government Regulation (PP) No. 60 of 2008. Internal control system (SPI) based on PP no. 60 of 2008 is an integral process for actions and activities carried out continuously by the leadership and all employees to provide adequate confidence in the achievement of organizational goals through effective and efficient activities, reliability of financial reporting, safeguarding state assets, and compliance with laws and regulations.

Thus it can be concluded that the internal control system is an integral process by the leadership and all employees including organizational structure, methods and measurements in achieving organizational goals on an ongoing basis to obtain adequate assurance through effective and efficient activities, reliable financial reports, and adherence to legislation. The implementation of internal control in regional financial management includes demands and expectations that government officials are able to create a strong bureaucracy in achieving the goals that are aspirational. Internal control consists of 5 (five) related components (Ramandei (2009 quoted from COSO), namely: Control Environment, Risk Assessment, Control Activities, Information and Communication and Monitoring.

## 2 Research Methods

**Types of research** The research used is descriptive quantitative research method, that is, this study aims to explain existing phenomena by using numbers to base the characteristics of individuals or groups. The research will be conducted in several education offices in North Sumatra, namely the District Education Offices of Samosir, Dairi and Pakpak Bharat.
Data Analysis Techniques

The data analysis technique used in this study refers to the concept, namely the interactive model using three steps, namely:

1. Data reduction is done by grouping the data. The entire data was collected in accordance with the aspects of the problem in the study. The verified conclusions are made into findings.
2. Presentation of data (data display), which is presented in the form of a description in accordance with the research aspect, which aims to facilitate researchers in interpreting the data and drawing conclusions.
3. Drawing conclusions (verification), the results of data reduction collected and analyzed will be drawn conclusions.

3 Research Results And Discussion

Respondent Description

Description of Respondents In this study, the profiles of respondents were grouped into 4 (four) descriptive groups. The following is a descriptive-based description of respondents with a total of 30 respondents.

<table>
<thead>
<tr>
<th>Table 1 Description Respondent-Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>Woman</td>
</tr>
<tr>
<td>Man</td>
</tr>
<tr>
<td>Amount</td>
</tr>
</tbody>
</table>

Source: Processed Data (2022)

Based on table 1 above, it can be seen that the description of the respondent's gender in this study was dominated by 18 male respondents (60%), and the remaining 12 female respondents (40%).

Description of respondents by age, as follows:

<table>
<thead>
<tr>
<th>Table 2 Description Respondent-Age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>30 – 39 Years</td>
</tr>
<tr>
<td>40 – 49 Years</td>
</tr>
<tr>
<td>50 – 59 Years</td>
</tr>
<tr>
<td>Amount</td>
</tr>
</tbody>
</table>

Source: Processed Data (2022)

Based on table 2 above, it is known that the age of the respondents in this study was dominated by respondents aged between 40 to 49 years, namely as many as 12 people (40%), followed by respondents aged between 50 to 59 years, namely 10 people (33, 13%), and the last respondents aged 30 to 39 years were 8 people (26.67%).
Table 3 Description Respondent-Last Education

<table>
<thead>
<tr>
<th>Last education</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>17</td>
<td>56.67%</td>
</tr>
<tr>
<td>S2</td>
<td>10</td>
<td>33.3%</td>
</tr>
<tr>
<td>Etc</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>Amount</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Processed Data (2022)

Based on table 3 above, the description of respondents in this study is dominated by respondents with a bachelor's degree (S1) education level, as many as 17 people (56.67%), then followed by respondents with a secondary education level (S2) 10 people (33.3%) and others as many as 3 people (10%).

Table 4 Description Respondent-Origin PT

<table>
<thead>
<tr>
<th>From</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTN</td>
<td>19</td>
<td>63.3%</td>
</tr>
<tr>
<td>PTS</td>
<td>11</td>
<td>36.67%</td>
</tr>
<tr>
<td>Amount</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Processed Data (2022)

Based on table 4 above, it is known that the description of respondents based on the origin of PT (University) this respondent is dominated by 19 people (State Universities) (63.3%), followed by respondents from PTS (Private Universities) as many as 11 people (36.67%).

Respondents' Responses to the clarity of budget targets

Respondents' responses to the performance accountability variable include 4 (four) indicators, namely Specific, Measurable, Oriented, Implementation and Evaluation. Respondents' responses to these variables are as follows:

Table 5. Respondents' Responses Clarity of budget targets

<table>
<thead>
<tr>
<th>Question points</th>
<th>SS</th>
<th>S</th>
<th>N</th>
<th>TS</th>
<th>STS</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
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Source: Processed Data (2022)

1. Distribution of respondents' answers to questions regarding the clarity of budget targets in this work unit. Of the 30 respondents, 2 people (6.67%) stated strongly agree, 12 people (40%) agreed, 13 people (43.33%) stated neutral and the remaining 3 people (10%) disagree;
2. Distribution of respondents' answers to questions regarding budget specifications in this work unit. Of the 30 respondents, 3 people (10%) stated strongly agree, 18 people (60%) agreed, 8 people (26.67%) stated Neutral and the remaining 14 people (16.9%) were neutral;

3. Distribution of respondents' answers to my question can determine the level of importance of budget targets for each program/activity. Of the 30 respondents, 8 people (26.67%) stated strongly agree, 14 people (46.67%) agreed and the remaining 8 people (26.67%) were neutral;

4. The distribution of respondents' answers to my questions can clearly identify the outputs and outcomes that must be achieved in each program and activity. Of the 30 respondents, 5 people (16.67%) stated strongly agree, 17 people (56.67%) agreed and the remaining 8 people (26.67%) were neutral.

5. The distribution of respondents' answers to the budget questions made has taken into account the priority scale. Of the 30 respondents, 6 (20%) strongly agreed, 10 (33.33%) agreed and the remaining 13 (43.33%) were neutral; and 1 person (3.33%).

6. The distribution of respondents' answers to questions on performance indicators for each activity listed in the budget has been clearly defined and measurable. Of the 30 respondents, 6 people (20%) strongly agree, 10 people (33.33%) agree and the remaining 13 people (43.33%) are neutral, and 1 person (3.33%) disagrees;

7. Distribution of respondents' answers to the question of the need for clarity on budget targets in this work unit. Of the 30 respondents, 3 (10%) strongly agreed, 18 (60%) agreed and the remaining 8 (26.67%) were neutral, and 1 person (3.33%) disagree;

8. The distribution of respondents' answers to my questions can determine the implementation and evaluation of the success of a clear budget target. Of the 30 respondents, 1 person (3.33%) stated strongly agree, 11 people (36.67%) agreed and the remaining 13 people (43.33%) were neutral and 5 people (16.67%) disagreed.

Table 6. Respondents' Responses to the Competence of Government Apparatus

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Source: Processed Data (2022)

1. Distribution of answers to questions about the need for competence of government officials in this work unit. Of the 30 respondents, 7 people (23.33%) stated strongly agree, 16 people (53.33%) agreed, 7 people (23.33%) stated neutral.

2. The distribution of answers to my question can determine the effect of the competence of government officials on performance. From 30 respondents, 3 people (10%) stated
strongly agree, 18 people (60%) agreed, 8 people (26.67%) stated Neutral and the remaining 1 person (3.33%) disagreed.

3. The distribution of answers to my questions can determine the level of importance of the competence of government officials in each program/activity. Of the 30 respondents, 5 people (16.67%) stated strongly agree, 15 people (50%) agreed and the remaining 10 people (33.33%) were neutral;

4. The distribution of respondents' answers to the competency questions made has taken into account expertise. From 30 respondents, 5 people (16.67%) agreed, 13 people (43.33%) agreed and 12 people (40%) were neutral.

5. The distribution of respondents' answers to the competency questions made has taken into account the staffing code of ethics. Of the 30 respondents, 3 (10%) strongly agreed, 18 (60%) agreed and the remaining 8 (26.67%) were neutral; and 1 person (3.33%).

6. Distribution of answers to questions of competence and skills possessed by employees to complete the work. Of the 30 respondents, 8 people (26.67%) stated strongly agree, 14 people (46.67%) agreed and 8 people (26.67%) were neutral;

7. Distribution of respondents' answers to the question of whether there is competence in the government apparatus in this work unit. Of the 30 respondents, 9 (30%) strongly agreed, 15 (50%) agreed and the remaining 6 (20%) were neutral;

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Source: Processed Data (2022)

1. The distribution of respondents' answers to the question has a close relationship between performance achievement and performance planning. Of the 30 respondents, 4 people (13.33%) strongly agree, 12 people (40%) agree and the remaining 12 people (40%) are neutral, and 2 people (6.67%) disagree;

2. The distribution of respondents' answers to Renstra questions has become a reference for SKPD in preparing/controlling programs/activities and has fully synergized with RKPD, Renja, Performance Agreements and Performance Reports. Of the 30 respondents, 2 people (6.67%) strongly agree, 16 people (53.33%) agree and the remaining 10 people (33.33%) are neutral and 2 people (6.67%) disagree;

3. The distribution of respondents' answers to questions on the work unit's budgeting procedures has been fully aligned with the Strategic Plan in planning activities that actually produce measurable outcomes. Of the 30 respondents, 2 people (6.67%) strongly
agree, 13 people (43.33%) agree and the remaining 13 people (43.33%) are neutral and 2 people (6.67%) disagree;

4. The distribution of respondents' answers to performance reporting questions has been fully determined by referring to the goals and objectives and is equipped with relevant and measurable performance indicators. Of the 30 respondents, 4 people (13.33%) strongly agree, 13 people (43.33%) agree and the remaining 11 people (36.67%) are neutral, and 2 people (6.67%) disagree;

5. The distribution of respondents' answers to performance measurement questions has been carried out using the performance indicators specified in the performance agreement document. Of the 30 respondents, 6 people (20%) strongly agreed, 13 (43.33%) agreed and the remaining 9 (30%) were neutral and 2 (6.67%) disagreed;

6. The distribution of respondents' answers to internal monitoring and evaluation questions has been carried out consistently to ensure the achievement of performance according to the targets to be achieved by the SKPD. Of the 30 respondents, 4 people (13.33%) stated strongly agree, 11 people (36.67%) agreed, 13 people (43.33%) stated neutral and the remaining 2 people (6.67%) disagreed;

7. The distribution of respondents' answers to AKIP questions is used as consideration in planning the next program/activity. Of the 30 respondents, 2 people (6.67%) strongly agree, 16 people (53.33%) agree and the remaining 10 people (33.33%) are neutral, and 2 people (6.67%) disagree;

8. Distribution of respondents' answers to questions The performance report provides benefits for increasing the accountability of SKPD performance. Of the 30 respondents, 2 people (6.67%) strongly agree, 17 people (56.67%) agree and the remaining 9 people (30%) are neutral, and 2 people (6.67%) disagree

Table 7. Respondent's response to internal control system

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Source: Processed Data (2022)

1. Distribution of respondents' answers to internal control questions on a regular basis is very necessary in order to control the accountability of the performance of government
agencies. From 30 respondents, 5 people (16.67%) stated strongly agree, 9 people (30%) agreed and the remaining 16 people (53.33%) were neutral;

2. The distribution of respondents' answers to questions from the leadership of government agencies has established discipline for policies and procedures and provides appropriate sanctions for deviations or violations of existing rules of behavior. Of the 30 respondents, 4 people (13.33%) stated strongly agree, 16 people (53.33%) agreed and the remaining 10 people (33.33%) were neutral;

3. The distribution of respondents' answers to questions from the leadership of government agencies is able to explain and account for any intervention or neglect of internal control. Of the 30 respondents, 5 (16.67%) strongly agreed, 9 (30%) agreed and the remaining 16 (53.33%) were neutral;

4. The distribution of respondents' answers to questions from the leadership of government agencies has developed competency standards for each task and function in each position in Government Agencies and regularly reviews the performance of the relevant Government Agencies. Of the 30 respondents, 4 people (13.33%) stated strongly agree, 16 people (53.33%) agreed and 10 people (33.33%) stated neutral;

5. Distribution of respondents' answers to questions from leaders of government agencies conducting training and mentoring to help employees maintain and improve their job competencies. Of the 30 respondents, 4 (13.33%) strongly agreed, 17 (56.67%) agreed and the remaining 9 (30%) were neutral;

6. The distribution of respondents' answers to questions intensive interaction with officials at lower levels responded positively to reporting related to finance, budgeting, programs, and activities. Of the 30 respondents, 4 (13.33%) strongly agreed, 16 (53.33%) agreed and the remaining 10 (33.33%) were neutral;

7. The distribution of respondents' answers to questions on the formation of an organizational structure is carried out in accordance with the needs and is guided by the laws and regulations. Of the 30 respondents, 4 (13.33%) strongly agreed, 13 (43.33%) agreed and the remaining 11 (36.67%) were neutral and 2 (6.67%) disagreed;

8. Distribution of respondents' answers to questions from the leadership of Government Agencies using adequate mechanisms to identify risks from external and internal factors and applying the precautionary principle in determining acceptable risk levels. Of the 30 respondents, 7 people (23.33%) strongly agreed, 13 people (43.33%) agreed and the remaining 9 people (30%) were neutral, and 1 person (3.33%) disagreed;

9. The distribution of respondents' answers to questions from the leadership of Government Agencies uses separate evaluations to be able to interact intensively with officials at lower levels so that they can make improvements in the future. Of the 30 respondents, 4 (13.33%) strongly agreed, 17 (56.67%) agreed and the remaining 9 (30%) were neutral;

10. The distribution of respondents' answers to questions from the leadership of Government Agencies uses adequate monitoring for the completion of audits so that the leaders of government agencies are able to account for the errors found by the auditors. Of the 30 respondents, 6 people (20%) strongly agree, 15 people (50%) agree and the remaining 6 people (20%) are neutral, and 3 people (10%) disagree;

11. The distribution of respondents' answers to questions from the leadership of Government Agencies always updates the information so that the information received is more accurate. From 30 respondents, 4 people (13.33%) strongly agree, 10 people (33.33%) agree and the remaining 14 people (46.67%) are neutral, and 2 people (6.67%) disagree;
4 Discussion

Respondents agreed that the clarity of budget targets is important in improving performance accountability, where by applying the clarity of optimal budget targets will create performance accountability in government agencies can be achieved. Planning guidelines are very necessary the clarity of budget targets because they can determine budgets based on clear and specific targets so that they can be understood by the people who are responsible for achieving the goals to be achieved. unclear goals create doubts for managers to act because they do not know the direction in achieving goals. If the budget targets are stated clearly, the budget implementers will give a positive and relatively strong reaction such as increased job satisfaction, decreased work tension, increased employee attitudes towards the budget, budget performance and cost efficiency in budget implementers significantly.

Respondents agreed that the competence of the government apparatus is also important in improving performance accountability, where competence is a criterion for the apparatus to produce high performance. They are required to prepare and implement an adequate design of operational standards for village financial governance and supervision, and prepare the Village Medium-Term Development Plan (RPJMDes) and determine the Village Revenue and Expenditure Budget (APBDes) in accordance with priority programs, manage village finances in accordance with applicable regulations, laws and regulations and avoiding deviations from village financial management these regulations can result in state financial losses. The competence of the apparatus is needed to ensure the implementation and achievement of programs from the government village, so that great apparatus competence and strict supervision are needed to increase the accountability of the performance of government agencies.

Respondents agreed that the internal control system is also one of the important things in improving performance accountability. Where with the supervision carried out by internal parties in an agency, the accountability of its performance will be good. Clarity of budget targets and competence of government officials will increasingly be able to run properly to achieve performance accountability which is the goal of a government agency with supervision provided by internal parties. The better the supervision carried out, the better the accountability of the resulting performance.

5 Conclusion

Performance accountability is based on the realization of the obligation of a government agency to account for the success/failure of implementing programs and activities that have been mandated by stakeholders in order to achieve the organization's mission in a measurable manner with performance targets/targets that have been set through periodic government agency performance reports. To achieve performance accountability, planning guidelines are needed in setting budgets based on clear and specific targets so that they can be understood by the people who are responsible for achieving the goals to be achieved, the need for competencies possessed by employees and internal supervision carried out by government agencies.
References

[31] Law No. 60 of 2008 concerning the Government's Internal Control System.
Implementation of Independent Campus at Private Universities in North Sumatra

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3)Mechanical Engineering Education Study Program, Universitas Negeri Medan, Medan, Indonesia,
4)Master of Higher Education Management Study Program, Universitas Muhammadiyah Sumatra Utara,
Medan, Indonesia, 5)Management Study Program, Universitas Prima Indonesia, Universitas Negeri
Medan, Indonesia1,2,3,4,5

Abstract. The Independent Learning Independent Campus gives students the right to study
for three semesters outside the study program. The expected goal of the program is for university graduates to have superior competencies and personalities relevant to the demands of the industrial revolution 4.0 and society 5.0. This study aims to describe the implementation profile of the Independent Learning Independent Campus through a survey method at 211 private universities in North Sumatra. Data collection techniques used online questionnaires, and data analysis used descriptive statistics. The percentage of activities that were most participated by students in the Independent Campus activities were Internships/Practice (30.55), Teaching Assistance in Education Units (12.65%), and Village Building (27.07%). An alternative solution to increase the quantity and quality of student participation in the Independent Campus activities is to strengthen the internal management of sustainable institutions.

Keywords: Independent Learning Independent Campus, Internal management strengthening

1. Introduction

The Independent Learning Independent Campus Policy has four main agendas, namely (1) Opening of New Study Programs, (2) Higher Education Accreditation System, (3) Higher education policy to become Public Universities Legal Entities, and (4) Right to study for three semesters outside the study program. Independent Campus policy provides flexibility in fulfilling the study period and load for undergraduate or applied undergraduate students through 1) following the entire learning process in a study program at a university according to the period and study load; and 2) following the learning process in the study program to fulfill some of the time and learning load and the rest following the learning process outside the study program [10]. Through Independent Learning Independent Campus, students have the opportunity for one semester or the equivalent of 20 (twenty) credits to study outside the study program at the same university; and a maximum of 2 (two) semesters or equivalent to 40 credits of studying in the same study program at different universities, learning in various
study programs at other universities; and/or learning outside of Higher Education [10]. Learning at Independent Learning Independent Campus program is also expected to provide challenges and opportunities for developing creativity, capacity, personality, and student needs, as well as developing independence in seeking and finding knowledge through realities and field dynamics such as ability requirements, real problems, social interaction, collaboration, self-management, performance demands, targets, and achievements. The Independent Learning Policy of the Independent Campus is also expected to encourage students to master various practical sciences for entering the world of work. Independent Learning Independent Campus allows students to choose the courses they will take.

The form of Independent Learning Independent Campus activities can be carried out inside the Study Program and outside the Study Program, including (1) Student Exchange, (2) Internships/Work Practices, (3) Assistance Teaching in Education Units, (4) Research/Research, (5) Humanitarian Projects, (6) Entrepreneurial Activities, (7) Independent Studies/Projects, and (8) Building Thematic Real Work Villages/Lectures [10]. The technique for implementing the eight Independent Learning activities on the Independent Campus is regulated in the Free Learning Guidebook-Independent Campus [4]. Experiential learning programs with flexible pathways are expected to facilitate students to develop their potential according to their passions and talents. The essence of the Independent Learning Independent Campus activity is a collaboration between universities and external parties, both with the Industry and the World of Work or other parties, such as State-Owned Enterprises and Regional-Owned Enterprises.

The impact of the Independent Learning Independent Campus activity was very positive in improving the cognitive and psychomotor domains of the students involved as well as increasing the competence and capacity of lecturers [9]. Mitigating obstacles to the implementation of Independent Learning Independent Campus is necessary so that the program's objectives can be consistently achieved. Implementing the Independent Learning Independent Campus program also impacts increasing experiential learning to build students’ hard and soft skills, fulfilling graduate learning achievements, and increasing lecturer capacity [2].

In addition to the positive impact, the Independent Learning Independent Campus implementation, which began in 2020 at private universities, is still experiencing various problems. The dominant problems are related to the adaptation of the Indonesian National Qualifications Framework's curriculum in the Independent Learning Independent Campus application, the limitations of partner campuses, the budget allocation, and the quality and productivity of lecturers and students that still need to be improved [16][17].

Conceptually, curriculum change is a routine activity that must be carried out in response to the development of Science, Technology, and the Arts, community needs, and the needs of graduate users. So university adaptability is needed in dealing with new policies in higher education management, such as Independent Learning Independent Campus. Considering the complexity of implementing the Independent Learning-Independent Campus in Private Universities, as identified above, it is necessary to analyses the implementation profile. The analysis is also expected to be able to formulate facilitation for private universities in accelerating the implementation of the Independent Campus policy.
2. Method

The survey method [14] was used to reveal the profile of the implementation of Independent Learning Independent Campus, which was carried out at 211 private universities in North Sumatra. The data was collected using an online questionnaire, and 187 private universities uploaded the answers to the questionnaire. The data analysis technique used descriptive statistics followed by in-depth interpretation to formulate alternative solutions to the problems in implementing the Independent Learning Campus at Private Universities in North Sumatra.

3. Result and Discussion

In North Sumatra, according to 2021 Performance Report for Higher Education Service Institutions Region I North Sumatra, there are 211 private universities consisting of universities, institutes, colleges, academies, and polytechnics with a total of 1,139 study programs as describe in Table 1.

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<td>3</td>
<td>Colleges</td>
<td>72</td>
<td>213</td>
</tr>
<tr>
<td>4</td>
<td>Academies</td>
<td>69</td>
<td>89</td>
</tr>
<tr>
<td>5</td>
<td>Polytechnics</td>
<td>13</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>211</td>
<td>1,139</td>
</tr>
</tbody>
</table>

The Independent Campus Independent Learning policy has been implemented by 59.68% of 187 private universities in North Sumatra. However, campuses not carried out based on field surveys are still in the preparation phase and refinement of institutional normative documents, especially those related to the curriculum. Regarding the management unit of Independent Learning Independent Campus, as many as 39.78% of campuses already have it. Meanwhile, campuses that do not yet have an Independent Campus management unit technically integrate the task of coordinating the implementation of Independent Campus Independent Learning into the details of the study program tasks with intensive coordination with the university.

In terms of institutional quality related to obtaining accreditation from 1,139 study programs, 2.37% were accredited A, 45.56% were accredited B, 40.38% were accredited C, 3.42% expired, and 8 study programs applied for reaccreditation, 25%. As for the institutional accreditation rating, data shows that from 211 private universities, 1 accredited A (0.47%), 20.85% accredited B/Very Good, 32.22% accredited C, 8 Unaccredited and not yet accredited 90 or 42.65%.

Survey data shows that from 187 private universities, the number of active students registered is 248,931. The Independent Learning Independent Campus implementation at Private Universities until the end of 2021 was attended by 23,804 or 10% of the number of active students. The low number of students who carry out Independent Learning activities at the
Independent Campus requires an improvement strategy through realistic programs considering the educational resources available at each university. Furthermore, considering that the implementation of 8 types of Independent Learning activities at the Independent Campus is also closely related to study program performance data, universities must encourage and facilitate student participation in these activities. The data on independent learning activities for separate campuses can then be used to fulfill accreditation forms expected to contribute to efforts to increase the accreditation ratings of universities and study programs. The profiles of the types of activities and students who carry out Independent Learning Independent Campus activities are presented in Table 2.

Table 2. Students Participating of Independent Learning Independent Campus in North Sumatra Private Universities

<table>
<thead>
<tr>
<th>Types of Learning Activities</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Student Exchange</td>
<td>1,297</td>
<td>5.45</td>
</tr>
<tr>
<td>2. Internships/Work Practices</td>
<td>7,272</td>
<td>30.55</td>
</tr>
<tr>
<td>3. Teaching Assistance in Education Units</td>
<td>3,011</td>
<td>12.65</td>
</tr>
<tr>
<td>4. Research</td>
<td>1,866</td>
<td>7.84</td>
</tr>
<tr>
<td>5. Humanitarian Projects</td>
<td>1,074</td>
<td>4.51</td>
</tr>
<tr>
<td>6. Entrepreneurial Activities</td>
<td>2,047</td>
<td>8.60</td>
</tr>
<tr>
<td>7. Independent Studies/Projects</td>
<td>793</td>
<td>3.33</td>
</tr>
<tr>
<td>8. Building a Thematic Real Work Village</td>
<td>6,444</td>
<td>27.07</td>
</tr>
<tr>
<td>Total</td>
<td>23,804</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Private universities in North Sumatra mainly carry out the types of Internships/Work Practices (30.55%) activities. The Building a Thematic Real Work Village activity was ranked second. The dominance of these two activities is natural because Internships/Work Practices and Building a Thematic Real Work Village were carried out by many universities before the independent campus program was implemented in 2020. Teaching Assistance in Education Units activities are also the types of activities that are widely carried out (12.65 %) by the private university. Teaching practice in schools is a learning practice in educational study programs carried out by students in schools and has also been implemented before the Independent Campus program was implemented.

The other five types of Independent Campus activities require alternative strategies to increase the number of students who carry out these five activities. The university's internal policies must immediately be established regarding implementing the Independent Learning Independent Campus. Review of statutes and strategic plans owned by private universities need to be reviewed and, if necessary, revised to accommodate policies, programs, and activities contained in the Decree of the Minister of Education and Culture Number 3/2020. The next effort is to stipulate the Chancellor's regulations and decisions regarding the Independent Campus's implementation. Complete policy support regarding the Independent Learning of the Independent Campus will be able to facilitate and support the implementation of Independent Campus programs and activities, which of course, must be designed by implementing an accountable performance-based education financing plan. The implementation process of the Independent Campus also requires monitoring and evaluation as the embodiment of the Internal Quality Assurance System so that the performance targets of the Independent Campus can be evaluated. The monitoring and evaluation results can be utilized in the context of sustainable
quality development through the determination of strategies, programs, and activities to improve the quality of the implementation of the Independent Campus.

Implementing the 8 Independent Learning Independent Campus activities requires strategic partnerships and collaborations between universities and external parties. This collaboration will also be utilized and contribute significantly to strengthening the quality of study program accreditation. In principle, improving the quality of study program accreditation is one of the scopes of policies for improving vocational higher education in the National Medium-Term Development Plan IV (2020-2024) related to education, namely: increasing quality and competitive human resources. Therefore, cooperation between study programs with industry and the world of work is very strategic is needs to be established and carried out intensively to strengthen graduate employability competencies through improving the learning process, which aims to provide students with experience in real work situations.

The Independent Learning Campus Policy is also supported by a funding transformation policy from the Ministry of Education and Culture, Research and Technology through 3 schemes, namely Incentives based on the achievement of Key Performance Indicators (for state universities), Matching Fund (for state universities and private universities). And the Competitive Fund (for state universities and private universities). However, the survey results show that the percentage of private universities that receive various grant schemes related to the funding transformation is still deficient at 17.75%. Therefore, a strategy is needed to strengthen the competence of private university managers in formulating the proposed Independent Campus competitive fund scheme [8]. The policy of funding transformation has been carried out under the Directorate General of Higher Education since 2003. The strategy for funding universities systematically and gradually leads to a block grant system that gives universities greater autonomy to manage and utilize funds with greater accountability demands. The aim is to increase efficiency, effectiveness, and accountability for using development funds. The block grants are allocated, among others, through a competition scheme based on study programs and institutions that started in 1995. The objectives of these various grants are to improve the quality of leadership, the quality, and relevance of graduates, the academic atmosphere, internal management, sustainability, and efficiency and effectiveness.

The Independent Learning-Independent Campus policy has implications for changes in higher education organizations. Change can be defined as the movement of employees and organizational leaders from the organization's current mode of operation (status quo) to the innovation of future operational methods [3]. Any structure, strategy, process, culture, and system causes an organization to operate differently from the conditions above, including an organizational change.

Cooperation is one of the priorities of the strategic role of collaboration in the Strategic Plan of the Ministry of Education and Culture 2020-2024 with the development plan: Improving quality and competitive human resources. The strategy carried out by the Ministry of Education and Culture to increase the number of world-class universities is to encourage support from the business/industry world through internship opportunities, research and commercial collaboration, resource sharing, and funding and implement the Independent Campus initiative that encourages interdisciplinary studies and experience in industry/ community for vocational and academic higher education students. The survey results related to cooperation between private universities and external strategic partners are presented in Table 3.
Table 3. Private Universities Cooperation with External Parties

<table>
<thead>
<tr>
<th>Types of Cooperation</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education, Research, and Community Service</td>
<td>146</td>
<td>25.09</td>
</tr>
<tr>
<td>Twin Program *</td>
<td>38</td>
<td>6.53</td>
</tr>
<tr>
<td>Joint Degree*</td>
<td>3</td>
<td>0.52</td>
</tr>
<tr>
<td>Double Degree*</td>
<td>4</td>
<td>0.69</td>
</tr>
<tr>
<td>Transfer and/or Acquisition of Credit Scores and/or Other Similar Units*</td>
<td>9</td>
<td>1.55</td>
</tr>
<tr>
<td>Assignment of Senior Lecturers as Coaches at Universities That Need Coaching</td>
<td>12</td>
<td>2.06</td>
</tr>
<tr>
<td>Lecturer and/or Student Exchange*</td>
<td>42</td>
<td>7.22</td>
</tr>
<tr>
<td>Sharing Various Resources *</td>
<td>39</td>
<td>6.70</td>
</tr>
<tr>
<td>Development of Centre for Indonesian and Cultural Studies</td>
<td>12</td>
<td>2.06</td>
</tr>
<tr>
<td>Scientific Periodic Publishing</td>
<td>43</td>
<td>7.39</td>
</tr>
<tr>
<td>Apprenticeship *</td>
<td>81</td>
<td>13.92</td>
</tr>
<tr>
<td>Organizing Joint Seminar*</td>
<td>64</td>
<td>11.00</td>
</tr>
<tr>
<td>Joint Research*</td>
<td>63</td>
<td>10.82</td>
</tr>
<tr>
<td>Visiting Professor</td>
<td>14</td>
<td>2.41</td>
</tr>
<tr>
<td>Graduate Distribution</td>
<td>12</td>
<td>2.06</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>582</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Note: The * sign is an activity that private universities have carried out in North Sumatra that is relevant and has the potential to increase student participation in the Independent Learning Independent Campus activities.

The implementation of the Independent Learning Independent Campus, in addition to having an impact on universities, also has an effect on external partners with an indication that all partners express their agreement regarding the implementation of the 8 Independent Learning Independent Campus activities [15]. However, potential problems in the performance of Independent Campus need to be analyzed, especially regarding the implementation of collaboration between universities with industry and other external parties. Other potential problems include how the mechanism and design of student exchanges and internships consider the quality of study programs and universities, geographical situation, conditions, support for human resources, and students' socioeconomic status. Next is the mechanism and design of quality assurance for study programs and institutions [15], especially if it is linked to the new accreditation policy as an integrative policy package for Independent Learning-Independent Campuses as regulated in Regulation of the Minister of Education and Culture No 5/2020 concerning Accreditation of Study Programs and Institutions. Other potential problems related to the adaptation of the Indonesian National Qualifications Framework (KKNI) Curriculum and budget allocations that are still far from adequate are other problems encountered in implementing the Independent Campus [16]. Meanwhile, the obstacles experienced by the
industry in implementing the Independent Learning Independent Campus are related to the readiness of internal management to accommodate activities with learning achievements that must be achieved by students [7].

The number of collaborations in Table 3 is 582, which is relatively small compared to private university study programs in North Sumatra, which amounted to 1,139. Higher education partnerships with external partners in implementing independent campuses and in developing human resources, based on the data in Table 3, still require an increase in quantity and quality. Efforts that need to be made to increase student participation in implementing Independent Learning Independent Campus (table 2) need to consider campus readiness. This readiness is related to human resources, especially lecturers who will be assigned as supervisors in the implementation of 8 types of independent learning activities on a separate campus. Other aspects are governance and internal management, curriculum, funding and infrastructure, and other elements.

One of the potential problems related to university governance and management is regulation. They are mainly associated with converting off-campus activities, equivalent to 20 credits. Although the Ministry of Education and Culture has made regulations, internal obstacles on campus related to the conversion of credits are still encountered because, in one semester, several courses were converted into off-campus activities. In addition to regulatory problems in universities, the obstacle faced in implementing the Independent Campus is the unpreparedness of the lecturers for new habits, especially in the current new average era. Some educators, in this case, the lecturers, still have difficulty adapting to changing conditions even though the world has moved dynamically with disruptive changes. Lecturers should be dared to leave their comfort zone to collaborate with students as agents of change [4].

4 Conclusion

Implementing Independent Learning in Independent Campuses at Private Universities in North Sumatra still requires a strategy to increase the quantity and quality because the percentage of students who carry out activities is 10%. Strengthening internal management can be done by revising institutional normative documents such as the five-year Strategic Plan, which ideally integrates 8 Independent Learning activities at Independent Campus as a priority for annual programs and activities.

The Performance Indicators in the Strategic Plan of Private Higher Education should ideally be reviewed and revised by integrating the Main Performance Indicators of Higher Education Service Institutions [13], especially those related to the Independent Campus. A relationship between activities, outputs, and performance indicators with the annual target will strengthen the internal management of private universities in implementing the Independent Learning of the Independent Campus because internal policies support it. The funding strategy with the money follows function principle will be implemented because the education financing base has met the performance-based regulation. It should be used as an alternative is the formation of a unit in charge of the Independent Learning Independent Campus Program to accelerate the implementation of the 8 Independent Learning activities of the Independent Campus.

Private universities in North Sumatra also need to develop policies and quality manuals for the Independent Learning Independent Campus that are integrated with the university's internal quality assurance system that has been implemented. In formulating policies and quality
manuals for the Independent Learning Independent Campus Program, it is better to refer to the policies and quality manuals from the quality assurance system that has been applied in universities and then socialized and referred to in the implementation of the Independent Campus. The strategic quality assurance efforts also need to be evaluated for performance and followed up for continuous improvement.

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Thanks are also conveyed to the honourable Head of the Region I Higher Education Service Institute for the support and permission to use survey data to implement the Independent Learning Independent Campus at the Private University of North Sumatra.

References


[10] Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 3 of 2020 concerning National Higher Education Standards

[11] Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 5 of 2020 concerning Study Program Accreditation and Institutional Accreditation

[12] Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 22 of 2020 concerning the Strategic Plan of the Ministry of Education and Culture for the Year 2020-2024

[13] Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 3/M/2021 concerning Key Performance Indicators of State Universities and Higher Education Service Institutions in 2021


Analisis Kepuasan Stakeholder pada Implementasi Kurikulum MBKM Fakultas Sains dan Teknologi.

Practical Analysis of Web-Based Assessment to Improve Student's Understanding in Economic Mathematics Course

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Abstract. Web-based e-learning is one proof of technological developments in learning. The development of technology has many benefits for the learning process, making it easier for lecturers and students to carry out the teaching and learning process. The use of the web in learning is a major requirement that requires all learning devices to be designed digitally. One of these components is a learning evaluation/assessment that can improve student understanding, especially the economics mathematics course. This study aims to analyze the practicality of web-based assessments to improve student understanding in the mathematical economics course. This literature study is supported by curriculum analysis, student needs analysis and learning analysis. The results of the practical analysis of Web-based assessment research can be seen through a literature review to improve student understanding through questionnaires with an average percentage gain of 88.23% in the very practical category, with data from 120 students 30% of students choose to do assignments through sending answers in file form, 3% of students choose to do assignments manually and 67% of students choose to do assignments using the web. This also increases the result of understanding with 37.5% of completeness in pre-cycle 1, 65% in cycle I and 85% in cycle II.

Keywords: Analysis, Practicality, assessment, understanding, web.

1 Introduction

The development of science and technology plays an important role in human life, one of which can be seen in the field of education. The faster the pace of technological development will thus encourage the creation of new innovations in the world of education that renew the quality of education and will produce quality individuals.

From the development of technology, many benefits are obtained to make it easier for lecturers and students in the teaching and learning process. However, in addition to having many benefits, technological advances also have a fairly serious impact on student life as stated (Yuliana et al.) The development of information technology has had a tremendous influence on human life and perspective. Computers, cell phones, and other technological innovations have become the main work support tools, while in learning Good use of technology will facilitate the learning process,
dig up information, and find the latest ideas, so that they (students) will become good learners. active, creative and innovative.

Web-based e-learning is very useful in improving education in Indonesia as seen in research (tiur malasari siregar et al, 2020) obtained from the results of the media and material test each obtained a score of 80.3% and 86.7% which means it is included in the "Very Good" category. "We can conclude that the use of the web in learning has become a necessity. According to Arsyad (2011: 4) In order to support and maximize learning, including e-learning, of course, learning media are needed that are able to provide solutions for students so that they can understand the material being studied easily.

The use of the web in learning is be a primary need in a teaching and learning process that requires all learning devices to be designed to be digitized starting from learning designs, teaching materials, media, worksheets and assessments. With the rapid development of technology, the obstacle that often occurs in the world of education is the assessment design where it is very necessary to adapt to current technological advances. Thus the adaptation that needs to be done is to develop an assessment in web form.

The practicality of web-based learning media to support e-learning obtained a very good response rating by obtaining an average response result of 87.88% and obtaining the "Very Practical" category. There are three main aspects that affect the practicality of web-based learning media, namely the attractiveness of the media, the suitability of the content and the quality of the media. So that a conclusion can be reached that web-based learning media are categorized as very practical to use to support e-learning according to (Kiki, 2020) as well as stated (Elsa Pertiwi, 2021) that the web-based learning media developed have a valid category after data processing is carried out and states effective web-based learning media as evidenced by an increase in student learning outcomes. From the results of previous research, it can be seen that this web-based assessment is a very practical assessment carried out online.

Many things can affect the level of student understanding in learning, especially in economics mathematics courses, such as the limitations of learning tools, as currently we are doing online learning but the assessment system that we use is still manual in the sense that we are still giving questions in the form of files that we send via E-learning, problem solving in textbooks, quality of teachers who do not understand technology and lack of references related to economics mathematics subject matter according to the economic cases currently being faced as stated (kiki, 2020) Web-based assessment is one of assessment method that is carried out online, basically a web-based assessment is an assessment that is designed to be practical and easy to use and has advantages for teachers and students, school institutions and parents of students, as well as for the academic community and government. If the assessment is carried out accurately (objectively) the web-based assessment provides objective results in accordance with the criteria desired by teachers and students.

Based on the explanation described above, considering the importance of practical assessment, especially web-based assessment, which is increasingly needed today, especially in economics mathematics courses. According to Nieveen (in Plomp & Nieveen, 2013: 28) there are three general criteria for high-quality media, namely validity, practicality and effectiveness. These three quality criteria will experience a shift in emphasis during the study. According to Plomp (in Plomp & Nieveen, 2013: 30, Table 3), in the preliminary research phase, the main priority is emphasized on content validity and the second is consistency and practicality. The next phase is the development or manufacture of prototypes which initially emphasizes consistency
(construct validity) and practicality, then prioritizes practicality and gradually pays attention to
effectiveness. At the assessment stage, the emphasis is on practicality and effectiveness.
Practicality is a media quality criterion that is always present in each phase. So when choosing
media for learning, the first thing to consider is whether the media is practical or not.

2 Method

This study aims to analyze the practicality of web-based assessment in order to improve
students' understanding, especially in the mathematical economics course by using curriculum
analysis, analysis of student needs, analysis of learning needs and literature study through
collecting several sources or references and literature study related to the faced title of the
problem, literature such as journals, articles and books that support this discussion with a time
span from 2013 to 2021. The formulation of the research problem is an analysis of the
practicality of web-based assessments to improve students' understanding in economics
mathematics courses. The data from the practicality results are then calculated on average
according to the following formula (1):

\[ \bar{x} = \frac{\text{amount of data}}{\text{number of data}} \]  

(1)

The practicality criteria will be determined based on the average percentage according to table
1. The Value Interpretation Criteria.

<table>
<thead>
<tr>
<th>Number</th>
<th>Value Rating</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>81%-100%</td>
<td>Very Practical</td>
</tr>
<tr>
<td>2.</td>
<td>61%-80%</td>
<td>Practical</td>
</tr>
<tr>
<td>3.</td>
<td>41%-60%</td>
<td>Currently</td>
</tr>
<tr>
<td>4.</td>
<td>21%-40%</td>
<td>Less Practical</td>
</tr>
<tr>
<td>5.</td>
<td>0%-20%</td>
<td>Not Practical</td>
</tr>
</tbody>
</table>

3 Result and discussion

The results of the curriculum analysis carried out in terms of economic mathematics courses
with the aim that students are able to use mathematical analysis in solving macro and micro
economic problems that have an impact on making decisions. With this goal, students are
expected to be able to develop their abilities in solving learning problems and integrating them
in the economic field, such as currently learning activities are carried out in hybrid learning with
the learning process and all learning tools are implemented and prepared according to needs,
from the results of the economics mathematics curriculum analysis through the semester
learning plan, it can be seen that the assessment given in the form of routine assignments at each
meeting increases student understanding. It is very practical to use in learning and this statement
is also supported by Arief Wisaksono (2020) which states that the learning evaluation
application is a solution for everyone involved in the world of education so that they can learn
effectively while at the same time being able to quickly find out who is not meeting the target,
both students and teachers in accordance with the k13 curriculum and Yunita Dwi Ermawati (2019) also stated in the results of his research that internet-based learning evaluation tools have feasibility with very feasible and effective categories.

The results of the analysis of student needs with a total of 120 students were asked to fill out a questionnaire, with answers as shown in Figure 1. [1] below:

![Figure 1: Student Needs](image)

Based on the figure, it can be seen that 30% of students choose to do assignments by sending answers in the form of files, 3% of students choose to do assignments manually and 67% of students choose to do assignments using the web. From these results, it can be seen that assessment using the web is needed by students in learning, besides being practical in use, saving time, and can be done anytime and anywhere. Analysis of learning seen from the learning process through evaluation of 120 students taking economics mathematics courses in the Mathematics Department of State University of Medan, giving pretest questions three times, namely before cycle 1, cycle 1 and cycle 2 with the aim of knowing how the level of students' understanding of use of web-based assessment. The results of the evaluation analysis can be seen in the following table 2:

<table>
<thead>
<tr>
<th>Table 2: Result of learning evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Earning Aspect</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Number of student</td>
</tr>
<tr>
<td>Understand</td>
</tr>
<tr>
<td>Less understand</td>
</tr>
<tr>
<td>Score</td>
</tr>
<tr>
<td>Average</td>
</tr>
<tr>
<td>Understand percentage</td>
</tr>
</tbody>
</table>
From the table above, it can be seen that the level of student understanding has increased. The web-based assessment system can improve students' understanding in the learning process, this can be seen from the pre-cycle scores of 7652 out of 120 students with an average acquisition of 63.77 and a percentage of 37.5%. This can prove the completion of the evaluation by sending files through hybrid learning before using a web-based assessment. In the Cycle I, after using the web-based assessment system, it proved that there was an increase in student understanding with an average value of 74.84 with a completeness percentage of 65% and in the Cycle II, students' mathematical understanding increased even more with an average value of 88.76 with a percentage completeness of 85%.

The results of the literature study analysis, there are 4 journals or articles related to the analysis of the practicality of web-based assessments to improve students' understanding of the mathematical economics course. Journals or articles used as references are journals or articles with a time span of 2013-2021.

In Muliansani's research (2017) related to Web-Based E-Tests to Improve the Efficiency of the Learning Outcome Evaluation Process, he said that the results of implementation and analysis during the application of the system design that were built, can be presented with several conclusions that the process of implementing the evaluation of student learning outcomes is much faster and more efficient with the efficiency rate reaches 75% of the previous method; The exam implementation process becomes easier and user friendly; The examination process is safer and more reliable. This is because the time limit given to take the exam is not enough for students to cheat or other things that can waste exam time.

In Ayu Irsalina's research (2018) stating the results of online and offline responses and activities, it can be concluded that the development of this student worksheets is very practical to use in acid-base learning in terms of online activities of 97.03% and offline activities of students of 98.33%, the results The student response questionnaire was 93.33% with an average of 92.37%.

Research by Kiki Ayu Faradayanti (2020) stated that the practicality of web-based learning media to support e-learning obtained a very good response assessment by obtaining an average response result of 87.88% and obtaining the "Very Practical" category. There are three main aspects that affect the practicality of web-based learning media, namely the attractiveness of the media, the suitability of the content and the quality of the media. So that it can be reached a conclusion that web-based learning media is categorized as very practical to use to support e-learning on the subject of Electrical Motor Installation (EMI) in vocational high school.

In the research, Riana Maylinda (2021) stated that teaching materials for scoology-assisted buffer solution enrichment developed were feasible and practical as learning resources in enrichment programs. It can be seen from the results of the validator's assessment of teaching materials that the average score of the material components is 45.5 out of a maximum score of 60 in the appropriate category, while the media component average score is 43.5 out of a maximum score of 56 in the appropriate category. The enrichment teaching materials that have been prepared have received positive responses from students in large-scale trials, namely 76.75% of students gave a positive response to the developed teaching materials, and 97.67% of students assessed the practicality of the developed teaching materials. This buffer solution enrichment teaching material development product can be used as a learning resource in the enrichment program.
According to the percentage data from the four journals that have been described, the average percentage can be obtained in the following Table 3:

**Table 3. Results of literature studies from the four journals**

<table>
<thead>
<tr>
<th>Number</th>
<th>Journal/Article</th>
<th>Year</th>
<th>Percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Muliansani</td>
<td>2017</td>
<td>75</td>
</tr>
<tr>
<td>2.</td>
<td>Ayu Irsalina</td>
<td>2018</td>
<td>92.37</td>
</tr>
<tr>
<td>3.</td>
<td>Kiki Ayu Faradayanti</td>
<td>2020</td>
<td>87.88</td>
</tr>
<tr>
<td>4.</td>
<td>Riana Maylinda</td>
<td>2021</td>
<td>97.67</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td></td>
<td><strong>88.23</strong></td>
</tr>
</tbody>
</table>

The four journals or articles are then mapped out their practicality data on a graph as shown in *Figure 2. [2]* below:

![Data Kepraktisan](image)

*Fig. 2. Results of literature studies from the four journals*

Based on Table 3, the practicality of Web-based assessment to improve students' understanding gets an average percentage gain of 88.23% with a very practical category according to table 1 of the value interpretation criteria.

Based on the articles presented with the average acquisition of reference data calculations, of course there are several factors that make it possible for web-based assessments to improve student understanding and become very practical to use as alternatives in improving learning understanding, especially economic mathematics. If seen from the results of the questionnaires used as research instruments, all of them focus on three aspects of the practicality of web-based assessments, including 1. The attractiveness of web-based assessments, 2. The suitability of learning materials and problem development, and 3. The quality of web-based assessments presented. Attractiveness is related to the appearance of web-based assessments, the
presentation of questions is also very influential in increasing student understanding, especially since it is designed in the form of the current economic case.

With the current hybrid learning system assisted by web-based assessments to improve student understanding, it will be easier for students to access and use the internet either through computers, laptops, smartphones or other devices, so it will be easier to carry out the learning process anywhere and anytime.

4 Conclusion

Based on curriculum analysis, student needs analysis, learning analysis and literature study, it can be concluded that this web-based assessment is very much needed by students in Hyubit learning besides being practical in its use, it can save learning time and can be done anytime and anywhere, seen from 120 people. students 30% of students choose to do assignments through sending answers in the form of files, 3% of students choose to do assignments manually and 67% of students choose to do assignments using the web and this web-based assessment can also improve student understanding in learning seen when prabcycle 1 completes learning 37.5%, cycle 1 learning completeness is 65% and cycle II learning completeness is 85%. This proves that web-based assessment is very much needed and effectively used in learning and can improve student understanding. While the analysis of the practicality of Web-based assessment can be seen from the results of the literature review, it can be concluded that to improve students' understanding, the average percentage gain is 88.23% in the very practical category.

References

Environmental Performance: In Efforts to Improve Financial Performance and Firm Value

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Abstract. This study examines the effect of environmental Performance on firm value through the company's financial Performance. The sample in this study is companies that follow Proper from the Ministry of Environment and Forestry of the Republic of Indonesia and have been listed on the Indonesia Stock Exchange. The analytical method used in this research is path analysis. The study's results found that environmental Performance significantly influences financial Performance and firm value. Financial Performance can mediate the effect of environmental Performance on firm value.

Keywords: Environmental Performance, Financial Performance, Firm Value

1. Introduction

The company's value does not increase if the level of company performance, especially the company's financial performance, does not increase. Financial Performance in a company can be assessed by how optimally the company generates profit or profit from all operating activities. If a company can obtain or achieve optimal company profits, it will directly impact the level of business continuity. Today, many companies only focus on achieving optimal performance levels but do not pay attention to the environmental impact of their activities or operating processes, whereas in some reports, it is found that many companies ignore environmental impacts. [1].

Excessive use of chemicals in the operations and production activities of the company also contributes to the negative impact on the environment and tends to damage the environment. In addition, the company's lack of awareness to manage waste correctly and adequately will further aggravate environmental conditions. Based on data from the Ministry of Environment of the Republic of Indonesia data obtained that from 2,593 companies from 299 types of industrial businesses, there are still 645 companies that are still in the red category, where these results mean the company is only able to achieve the requirements set to control environmental impacts. Based on these results, the environmental condition must be a severe concern for companies, communities, and governments. In the last two decades, many researchers have researched the impact of company operations on the environment, often referred to as Corporate Environmental Responsibility (CER) [2].
The impact of pollution of the company's activities on the environment is divided into air, soil, and water pollution. Based on a report from the Ministry of Environment (KLHK) in 2020, it was found that there are still 59% of rivers in Indonesia are in the heavily polluted category, 26.6% are in the moderately polluted category, and 8.9% are in the lightly polluted category, where industrial activities cause the majority. The waste from the company causes the biota in the river to be unable to live due to a lack of oxygen. Based on these data, it can be concluded that most rivers or water areas in Indonesia have been polluted by industrial waste, which impacts the lower quality of clean water in Indonesia [3].

Pollution of watersheds (DAS) is very common in Indonesia, where in 2020 there are two companies in the Citarum watershed, namely PT Kamarga Kunia Textile Induri (KKTI) and PT How Are You Indonesia (HAYI) found guilty because they have been proven guilty. Polluting the environment of the Citarum watershed, the Citarum watershed was polluted by 721,945.66 hectares, and for this impact, they were punished with material compensation of IDR 16.263 billion. [4]. In addition to water pollution, there are several cases of air pollution, such as air pollution by PT Acid Industry and PT Mahkota Indonesia. The investigation results from the Ministry of Environment and Forestry and the Provincial Government of DKI Jakarta found that the two companies polluted the air around the factory [5].

Based on various findings of violations and cases that occurred in Indonesia, the Government of Indonesia decided on the provisions contained in the decision of the Chairman of BAPEPAM-LK Regulation Number X.K.6 regarding the requirements for presenting reports of Indonesian public companies in the annual report. The regulation stipulates the obligation of public companies to give social responsibility reports, one of which is related to the company's responsibility to the environment. Furthermore, the 2014 Ministry of Environment and Forestry regulation Number 3 formulates a company's performance assessment in environmental management or Proper, where based on this proper assessment, the company's environmental Performance can be classified (Gold, Green, Blue, Red, and Black). So this regulation can prevent companies from committing violations that have an impact on environmental pollution.

A company's high or low environmental performance assessment can directly impact the level of company value, where the better the company's environmental Performance, the company's value will also increase. The factors that can cause this to happen are the view of the company's ability to realize the social contract and legitimacy so that the company gets a positive response from the market. Investors are more interested in investing in companies with an excellent corporate image because, in general, companies with a good corporate image have loyal customers and have an impact on the stability of the level of financial performance obtained by the company [6]. However, in research from Chang [7], different results were found that environmental performance variables negatively influence firm value. Furthermore, in the study by Chang [8], it was found that the environmental performance of companies in China from 2008-2012 significantly influenced the company's financial performance, which was proxied to Return on Assets. However, there are different research results found by Munjal & Malarvizhi [9], where it was found that in banking companies in India, the environmental performance achieved by the company did not significantly affect the company's financial Performance.

1.1 Stakeholder Theory
Stakeholders are a group of people or parties who are interested in the conditions of a company or organization; these people or parties usually contribute to the company or organization and feel the impact of a decision chosen by the company or organization [10]. Meanwhile, according to Azheri [11], the stakeholder approach is the relationship between a company and an organization with parties inside or outside the company or organization. So based on this explanation, it can be concluded that stakeholders are parties who have an attachment to a company or organization and feel the impact of every decision taken by the company or organization.

In its development, stakeholder theory is considered a theory that describes the relationship between the company and parties who have an interest in the company, where in the decision-making process, these parties have a vital and dynamic role. So based on this, it can be concluded that the company or organization is not an entity that can operate independently and put aside the interests of the parties related to it, wherein the relationship between the company and the interested parties is the principles of accountability and responsibility will be created [12]. The tagline of the stakeholder theory is that the better the relationship between the company and its interested parties, the better the business activities of a company; where in creating this relationship, there must be a sense of trust, respect, and collaboration between the two [10]. Stakeholder theory is part of strategic management, which contains the main goal which is to help the company to create good relations with interested parties, especially external parties, which in turn can create a competitive advantage for the company [13].

1.2 Environmental Performance on Financial Performance

Singh et al. [14] revealed that when a company incurs costs related to environmental aspects, it will automatically build a good image for stakeholders and potential investors. From this, there will be a positive response from the market because it has carried out its obligations and responsibilities for environmental care. The government created proper to encourage companies to take better care of the environment. So companies that follow Proper will undoubtedly get positive scores from stakeholders even though they only get a rating of 3 or 4, already showing their concern for the environment. Previous studies that discussed EP's effect on FP found a positive influence [15,16]. Meanwhile, different studies have found that EP does not affect FP due to companies that are too focused on increasing profit orientation without paying attention to EP, which might be able to increase profits or improve the company's FP [9]. Based on the explanation above, EP and FP, the alternative hypotheses in this study are:

H1: EP Affects FP

1.3 Environmental Performance on Firm Value

Many environmental issues at home and abroad will cause the community to demand that all companies pay attention to the social and environmental impacts arising from the company's operating activities and take responsibility for overcoming them. The community wants the company to be able to control the impact caused by its business activities. The company can do this situation with efforts to manage and preserve the environment [2]. The explanation above follows the theory of legitimacy as a form of company recognition from the community. From this recognition, the company certainly has a good image for the community. Investors will be more interested in companies with a good image or image in the community, because it
impacts high consumer loyalty to the company's products. In a study conducted by Khanifah et al. [17] found that EP has a negative effect on FV. However, a study conducted by Fadrul et al. [21] shows that EP positively affects FV.

H4: EP Affects FV

1.4 Environmental Performance on Firm Value Towards Financial Performance

Various environmental problems in Indonesia can give rise to community claims because the company's production activities interfere with and even harm the environment and society [18]. This phenomenon supports the theory of legitimacy, a form of recognition of the company's existence from the community. Companies must be able to align economic goals with environmental and social goals. That way, the public's view of the company will be good [7].

If the company already has a door in the people's hearts, the community will likely accept the products produced by the company [19]. Furthermore, automatic FP has a direct effect on the value of the company [20]. When the company's EP is good, it will increase FP, which indirectly also increases the value of the company. Investors will prefer company shares by looking at the market economy and emerging news. At the same time, EP assessed by Proper is a company's long-term strategy to maintain the company's sustainability (going concern) which cannot be felt in the short term. In this case, it is also supported by signal theory, in Rinsman & Prasetyo's research [15] which provides an understanding of the importance of information about the company needed by shareholders or external parties owned by the company. Chang's research [8] found that companies with good environmental and social Performance will respond positively to investors by increasing stock prices, which will increase FP and company value. Furthermore, in Fauziyyah's research, [20] it was found that EP indirectly affects FV through FP.

H8: EP Affects FV through FP

2. Research Method

This study uses the associative method with a quantitative data approach, aiming to examine the independent variable's effect on the dependent variable through the mediating variable [21]. In this study, two tests will be carried out: testing the direct and indirect effects. In this study, the research population is all companies that followed Proper from 2010-2020 and are listed on the Indonesia Stock Exchange (IDX) from 2010-2020. Furthermore, to determine the number of samples in this study, the researcher used a sampling method with purposive sampling. In this study, path analysis was used to determine the causal relationship and to explain the direct and indirect effects of a set of variables as causal variables.

3. Results

3.1 Normality Test

Based on the results of normality testing with Kolmogorov Smirnov, the Asymp. value was found. Sig (2-tailed) is 0.100, where the value is greater than 0.05, so it can be concluded that the data in this study meet the assumption of normality in the sub-structure 1 test.
Furthermore, the normality test results for sub-structure 2 of the Asymp. value were also found. Sig (2-tailed) is 0.200, where the value is greater than 0.05, so it can be concluded that the data in this study meet the assumption of normality in sub-structure two tests.

3.2 Autocorrelation Test

Based on the results of the autocorrelation test in sub-structure 1, it was found that the DW value was 2.007, where the value was in the criteria \( du (1.71) > dw (2.007) > 4 – du (4 – 1.71) \). So it can be concluded that there is no autocorrelation in the sub-structure equation 1. Furthermore, the results of the autocorrelation test in sub-structure 2 found that the DW value is 1.819, where the value is in the criteria \( du (1.71) > dw (1.819) > 4 – du (4 – 1.71) \). So it can be concluded that there is no autocorrelation in sub-structure equation 2.

3.3 Hypotheses Test

Table 3. Multiple Linear Regression Test Results and Partial Significance of Substructure 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>9.080</td>
<td>4.147</td>
<td>2.190</td>
<td>.032</td>
</tr>
<tr>
<td>EP</td>
<td>2.360</td>
<td>.050</td>
<td>.208</td>
<td>2.053</td>
</tr>
</tbody>
</table>

a. Dependent Variable: FP

The effect of EP on FP variables is 0.208. Furthermore, based on the results of the partial significance test, it was found that \( (2.053) > (1.99) \) and \( (0.044) < 0.05 \) so that it can be concluded that EP has a positive and significant effect on FP.

Table 4. Multiple Linear Regression Test Results and Partial Significance of Substructure 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>.823</td>
<td>.414</td>
<td>1.990</td>
<td>.050</td>
</tr>
<tr>
<td>EP</td>
<td>.539</td>
<td>.114</td>
<td>.357</td>
<td>4.710</td>
</tr>
<tr>
<td>FP</td>
<td>.084</td>
<td>.011</td>
<td>.633</td>
<td>7.585</td>
</tr>
</tbody>
</table>

a. Dependent Variable: FV

The effect of EP on the FV variable is 0.357. Furthermore, based on the results of the partial significance test, it was found that \( (4.710) > (1.99) \) and \( (0.000) < 0.05 \) so it can be concluded that EP has a positive and significant effect on FV. The effect of FP on the FV variable is 0.633. Furthermore, based on the results of the partial significance test, it was found that the t-count value \( (7.585) > t-table (1.99) \) and the sig value \( (0.000) < 0.05 \), so it can be concluded that FP has a positive and significant effect on FV. Based on the results of the mediation test, it is
known that the Sobel Test Statistic (4.14) > 1.975 and the Two-Tailed Probability (0.00) < 0.05. so it can be concluded that FP can significantly mediate the effect of EP on FV.

4. Conclusion

The partial significance test results indicate that EP has a positive and significant effect on FP. These findings are consistent with previous research that found a positive and significant impact of EP on FP. Furthermore, the partial significance test results revealed that EP has a positive and significant effect on FV. These results align with Fadrul et al. [22], who found that EP positively affected FV. Research by Harahap et al. [23] also found that EP can affect FV. The results of the mediation test found that FP could significantly mediate the effect of EP. The results align with Chang [8], who found that firms could use EP as a competitive advantage. Investors will respond positively to companies with good environmental and social Performance by increasing stock prices and the company's value.

References


The Effects of Using a Problem Based Learning Model Supported by E-book on Students Physics Problem Solving Ability

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Abstract. This journal is time to determine the effects of using a problem-based learning model supported by e-book on students’ physics problem solving abilities. The designed of this research is a quasi experiment designed with two groups of pretest-posttest design. The population in this study is all students of grade X of Senior High academic year 2021/2022. SH X-IA 1 class is as the experiment class by using the problem based learning model and X-IA 2 class by using conventional learning. The research instrument used is a test in the form of problem solving ability essay that has been declared valid. The analysis of data is using a test of Manova. The results of data analysis can be concluded that problem solving ability who are taught by using the problem based learning model supported by e-book is better than students who use the conventional learning.

Keywords: Problem Based Learning- problem solving ability- e-book.

1. Introduction

We need skilled human resources to build a nation that is able to compete with other nations and thrive in the 21st century globalization era. According to Trianto (2011), education is the only vessel that has the right method for preparing quality human resources. (HR) and visually functions as a tool to build quality human resources. The creation of quality human resources for the development of a nation is very dependent on education. The ability to manage human resources is very important for technological progress. Science and technology will not advance and become the driving force of national development without superior human resources. Life has been influenced by advances in science and technology (science and technology). In order to master science and technology, it is necessary to improve the standards of human resources by increasing the standards of education in schools. Students should be encouraged to discover and build knowledge, develop life skills, and be ready to solve problems in life through education.

Science is covered in some of the current curriculum content. The aim of the 2013 Physics curriculum is to assist students in gaining understanding and knowledge of useful physics concepts that can be used in everyday life. Physics is primarily a methodical approach to the study of nature; consequently, physics is a process of discovery and accumulation of
facts, concepts, and principles. According to Rustaman (2007), the vision of science education is to produce students who excel in science and technology. This refers to the goals of national education. Through mastering scientific concepts, technical activities, and making meaningful use of their environment, students who understand science aim to understand themselves and their environment.

When students are able to understand what they have learned and apply it in everyday life, it shows that science education has succeeded in realizing this vision. The physics learning process must be modified by emphasizing thinking skills, problem-solving skills, and practical experience. In fact, what happens in the field of learning is optimal problem-solving abilities. A study by Sirait (2019) found that the low level of learning science is due to the fact that measuring academic achievement in schools is still conceptual. Moreover, Indonesian students are not used to solving contextual problems and need reasoning, reasoning and creativity to solve them. This is the nature of TIMSS queries. Based on the results of the interpretation of the TIMSS survey on the abilities of the cognitive aspects (knowledge, application and reasoning) of Indonesian students it shows that they are still able to know on average.

Based on the empirical data above, we need to make major and fundamental changes in the implementation of scientific learning. Improving learning requires various efforts that ultimately lead to higher quality learning processes and outcomes, preparing students for the future. Based on the analysis of observational data using a problem-solving-based evaluation rubric to create questions that describe students' problem-solving abilities. About 23% of the data was collected during the problem solving strategy implementation phase, and another 77% reached the strategy phase. At school, the facts from the first two observational activities become the foundation for problem-solving skills. The problem-based learning model is an alternative learning model that provides opportunities for students to learn about scientific processes and problem-solving techniques. Arends (2008:41) a learning method in which students learn by acquiring knowledge, asking questions, and solving real-world problems to improve their thinking skills, independence, and self-esteem.

The problem-based learning model has been shown to have a positive effect in a number of studies. Students learn how to solve problems and understand the scientific method. Technology advances at a rapid pace over time, giving educators a variety of options for classrooms and other learning environments. Teachers must look for new and innovative breakthroughs to innovate in line with developments in science and technology to deal with these possibilities. The transformation of textbook learning into electronic books is one of the innovations in educational technology. Electronic books, or e-books, are digital versions of books. Mataya (2010) electronic book is a single file that contains digital text, images, and audio. In order for students to understand the concept of material, this combination helps them visualize abstract learning materials. E-books are especially attractive because of the demand for a mix of multimedia and e-books. In addition, many students find it difficult to explain what they are testing during the exercise, which requires additional instruction. Students may not always have access to this guide due to limited time and space for face-to-face meetings. During development, the e-book may be viewed on a computer or other electronic device, depending on the author. E-books are considered a good learning tool for physics classes. E-books also assist educators in streamlining and maximizing study time. E-books make it easy to carry lots of files around, ensuring that teachers never run out of content for their students.
Researchers found that every student has a smartphone. Since students themselves use smartphones to access social networks such as Facebook, Twitter, Instagram, WhatsApp, web browsing, games and music, smartphones play a minor role in education. E-books are used to equip students with teaching materials to utilize technology in the learning process. Based on these problems, the problem posed is to see the problem-solving abilities of students who are taught using a problem-based learning model assisted by E-Books are better than students who are taught using conventional learning and increase (gain) problem-solving abilities using a problem-based learning model assisted by E-Books.

2. Theoretical Study
   a. Problem Based Learning Model

   Problem Based Learning Model is more comprehensive than learning strategies, methods or procedures. Glossary There are four unique characteristics of the learning model that are not unique to learning strategies or methods: 1) The teacher constructs theoretical and logical justifications. 2) Learning objectives that must be met. 3) necessary educational procedures that allow the use of learning methods, the best learning model; 4) learning arrangements needed to achieve learning objectives; It can be seen from the characteristics of the learning model that each model helps students achieve various learning objectives and competencies and guides learning design. Thus, the way of learning is essentially a mapped form of learning that is presented by an educator from beginning to end. To maximize learning outcomes, the learning model is a type of learning activity stage which is part of the interaction. In addition, there are four groups of learning models, namely as follows: 1) social interaction models; 2) A model for processing information; 3) individual examples; and 4) models to change behavior. In practice, educators must remember that there is no one learning model that is most suitable for all circumstances. Therefore, the conditions of the students, the nature of the teaching materials, the available media facilities, and the conditions of the educators themselves must be considered in choosing the appropriate learning model.

   Student-centered education is problem-based instruction. Teaching is not about what students do, but how they think while learning. In problem-based learning, the teacher basically functions as a guide and facilitator, enabling students to think critically and learn how to solve problems. In this type of learning, the teacher's role is to present and explain something to students. Riswari (2018) claims that problem-based learning helps in acquiring basic knowledge that is relevant to the real world, scientific thinking skills, and awareness of the importance of teamwork goals.

   Problem-based learning emphasizes problem-driven learning. So, problem-based learning starts with problem solving, and the problems given to students need to give them new information (knowledge) so they can learn new things before they can solve problems. It is therefore, finding the right answer is not the only aspect of continuous learning. In addition, students interpret problems, collect important data, determine potential solutions, weigh their options, and reach conclusions.

   b. Electronic Book

   Ebooks are travel guides in digital form that can be accessed on any electronic device. Electronic goods include: gadgets, cellphones, computers and others (Fausih, 2015) similar to traditional books, e-books primarily function as a means of education asking for knowledge from e-books or conveying knowledge to e-books. E-books written by many people can teach
you a lot. In addition, there are free e-books available in various formats. E-books are more accessible than traditional books. You can quickly get the ebook you want by sitting in front of your computer or other online device. The e-book can also be downloaded for free online.

c. Problem solving skills

Physics students need to understand that problem solving is a complicated process. Most of the time, physical problems stem from everyday life. According to Santrock (2011), finding the best way to achieve a goal is the basis of problem solving. Teachers can pose narrative problems, decision-making problems, closure and diagnosis problems, strategy implementation problems, problem analysis problems, concepts for solving problems, and other types of problems (Jonassen, 2004). Students with problem solving skills use relevant theories and concepts to solve problems. Students deepen their understanding of research fields, build knowledge, gain new perspectives, and make decisions when they solve problems (Rohanum, 2013).

Students often forget the teacher's formula without fully understanding its basic meaning. According to Purnamasari (2017), students are often given material and equations to understand static fluid material without having to find the physical concept itself. Students are not able to understand the concepts involved in solving everyday problems because these problems are presented repeatedly in physics lessons. In addition, Dewey and Polya argue in Petrina (2007) that the definition of problem solving is "finding a way out of a difficulty, avoiding obstacles, achieving certain goals, or solve the problem using another solution. The inability of students to solve physics problems is mainly caused by a lack of practice and the habit of asking questions.

Heller, et al (1991) made a problem-solving step in science learning through five stages. First, visualize the problem. In this step, visualization of land issues from words into visual representations, making a list of known and unknown variables, identification of basic concepts. Second, describe the problem in physics description. In this step, the visual representation is converted into a physical description by creating a free-body diagram and selecting a coordinate system. Third, plan the solution, which is planning a solution by changing the physical description into a mathematical representation. Fourth, execute the plan, carry out the plan by performing mathematical operations. Fifth, check and evaluate, evaluate the solutions obtained by checking the completeness of answers, marks, units and values.

3. Research Methods

This research was conducted at School Medan. The time of the study was carried out from November 10 to December 13, 2022 class X semester I of the 2021/2022 academic year with the subject matter of Static Fluids. The population in this study were all students of class X semester I of SMA Swasta Mentari Bangsa Medan which consisted of 2 classes.

The variables in this study in terms of their roles, consist of independent variables and dependent variables. In this study, the independent variable is the problem based learning model, while the dependent variable in this study is problem solving ability.
In the experimental class with the model *problem based learning* while the control class uses a conventional learning model. The design used in this study was *pretest-posttest control group design*.

**Table 1.** Pretest-posttest control group design

<table>
<thead>
<tr>
<th>Class</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Postest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>Y₁</td>
<td>X₁</td>
<td>Y₂</td>
</tr>
<tr>
<td>Control</td>
<td>Y₁</td>
<td>X₂</td>
<td>Y₂</td>
</tr>
</tbody>
</table>

**Information:**
- $X_1 =$ Learning with a problem based learning model
- $X_2 =$ Conventional learning
- $Y_1 =$ Pretest of problem solving ability given before treatment in the experimental class and control class
- $Y_2 =$ Posttest of problem solving ability given after treatment in the experimental class and control class

In order to make it easier to carry out research, the steps or flowchart of the research procedure are presented in Figure 1

**Table 2. Problem Solving Ability Scoring Guidelines**

<table>
<thead>
<tr>
<th>No</th>
<th>Stage</th>
<th>Indicator</th>
<th>Maximum Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding the problem</td>
<td>Make a quick sketch&lt;br&gt;Gathering information in problems&lt;br&gt;Make a problem affirmation&lt;br&gt;Determine the approach to solving problems in the form of physics concepts</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Interpreting the problem</td>
<td>Create a free body diagram/sketch that describes the problem (eg in Cartesian coordinates)&lt;br&gt;Identifying variables in the form of symbols&lt;br&gt;Making quantitative relationships between variables</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Planning strategy</td>
<td>Build specific equations&lt;br&gt;Applying physics concepts to problems&lt;br&gt;Designing problem solving through equations from physics concepts</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>I carry out the strategy</td>
<td>Modify equations and make substitutions&lt;br&gt;Perform calculations using the selected equation</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Evaluating solutions</td>
<td>Evaluating unit&lt;br&gt;Determine the logic of the answer</td>
<td>10</td>
</tr>
</tbody>
</table>
4. **Research Result**

The results of the pre-test and post-test it is known that there is a difference in the average score of students' problem solving abilities in the experimental class and the control class. The difference in the average results of the pre-test and post-test of students' problem solving skills. Therefore, we need to determine the rate of increase. The N-gain improvement rate of students' problem solving skills can be calculated by the normalized gains of the two sample classes. The calculation of the percentage increase in N-gain normalized problem solving ability is shown in Table 3.

<table>
<thead>
<tr>
<th>Ability</th>
<th>Prefest</th>
<th>Posttest</th>
<th>N-gain %</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Problem Solving</td>
<td>30.03</td>
<td>71.8</td>
<td>60</td>
<td>Medium</td>
</tr>
<tr>
<td>Control Problem Solving</td>
<td>33.6</td>
<td>61.8</td>
<td>42</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Based on Table 3, calculate the percent increase in the N-gain problem-solving ability of the experimental class students by 60% compared to the control class by 42%. The percentage calculation shows that the increase in N-Gain problem solving abilities is higher in the experimental class than in the control class. It can be concluded that students in the experimental class who were taught with a problem-based learning model using e-books performed better than the control class who were taught with conventional learning. Calculating the percentage increase in N gain for the next problem solving skill is an analysis of the gain per item. This analysis helped confirm the increase in the size of students' problem solving skills in the way that was given to the experimental and control classes. The average percentage increase in N-gain per indicator of problem solving ability is shown in Table 4.

<table>
<thead>
<tr>
<th>KPM Indicator</th>
<th>Average N-gain per Indicator Problem Solving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Category</td>
</tr>
<tr>
<td>Understanding the</td>
<td>37</td>
</tr>
<tr>
<td>Interpreting the problem</td>
<td>40</td>
</tr>
<tr>
<td>Planning a strategy</td>
<td>43</td>
</tr>
<tr>
<td>Implementing the strategy</td>
<td>48</td>
</tr>
<tr>
<td>Evaluating solutions</td>
<td>35</td>
</tr>
</tbody>
</table>

Based on Table 4 it can be seen the difference in the percentage of N-gain increasing problem solving abilities for each indicator of students in the experimental class and control
class. The increase in the N-gain level for each index of problem solving ability in the experimental class was higher than that of the control class in all aspects. The N-gain increase rate indicates that the experimental class taught using a problem-based learning model outperforms the control class taught using conventional learning to improve problem-solving skills.

5. Conclusion

Based on the results of the analysis and discussion in this study, it was concluded that the results of hypothesis testing using the Manova test's analysis of between subjects effects on problem solving ability showed an F value of 15.496 and a significance value of $2.06 \times 10^{-4}$ at the 0.05 level. The sig value obtained $< 0.05$ indicates that there is an effect of the problem-based learning model on the students' physics problem solving ability in the classroom.

The average percentage of N-gain and each indicator of problem-solving ability is higher in the class that uses the problem-based learning model compared to using conventional learning. This shows that the increase (gain) of students' problem solving abilities using the model problem based learning is better than using conventional learning.

References


Analysis of Concept Understanding and Mathematic Algorithm Students in Mathematics Learning with The Application of Model The Realistic Mathematic Education (RME) Algebrator Software Assistant

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Faculty of Mathematics and Science, Universitas Negeri Medan¹,²,³

Abstract. Problems with mathematical concepts and algorithms are increasingly being demanded from students to better understand mathematics lessons. This study aims to describe the ability of students to understand mathematical concepts and algorithms as well as to analyze the difficulties experienced by students in understanding concepts and algorithms in mathematics learning after the learning process is carried out with the application of realistic mathematical education (RME) models assisted by algebrator software. The subjects of the study were students of class X Mia 2 SMA Private ASSISI Siantar, totaling 31 students. The research instrument is a test of the ability to understand concepts, mathematical algorithms and interview guidelines. Data analysis was carried out using the Miles and Huberman model. The results showed: (1) The students' ability to understand mathematical concepts on the material of a system of linear equations. Three variables in the Assisi Siantar High School students in class X mia 2 belong to the Medium category, this can be seen from the results of the average score of each indicator, worth in 59.43. (2) Ability of Mathematical Algorithm students of SMA Assisi Siantar class X mia 2 on the material of linear equation system. Three variables are classified at the moderate level of ability, this can be seen from the results of the score on each indicator that is still in the average category of 55.2. (3) The difficulties experienced by students in completing the ability test for understanding mathematical concepts and algorithms in learning mathematics with the Realistic Mathematical Education learning model with the help of Algebrator software have difficulty understanding concepts, difficulties in applying principles, and also difficulties in implementing operations.

Keywords: Analysis, Understanding Mathematical Concepts, Mathematical Algorithms, Realistic Mathematical Education, Algebrators
1 Introduction

The gap in the mathematical ability of our students in the rankings is very concerning in every assessment and ranking of mathematical abilities conducted by various international survey institutions. As in (pisa-score-2018-list-ranking-mathematical ability-what-a-report-Indonesian) Indonesia listed itself as ranked 73rd out of 79 assessment participants.

In mathematics. The teaching pattern and paradigm of mathematics teachers generally teach with the expository lecture method, this shows that students are less active in learning so that students' mathematical understanding abilities will be very difficult and not even many students do not understand the lessons given and explained by the teacher (Rahmadani, 2013). Understanding mathematical concepts is central to school mathematics learning. With understanding students are able to draw and make conclusions. (Sari, 2012) states that understanding is a fundamental aspect of learning so that the learning model must include the main points of understanding. Learning mathematics requires the ability to understand mathematical concepts and algorithms to solve mathematical problems. Based on this description, the ability to understand mathematical concepts and algorithms is one of the mathematical abilities that students need to develop and possess. But in reality, in learning mathematics, students' understanding of mathematical concepts is still low (sari, 2012 and Sumarmo, 2002). The interesting thing that became a topic in the era of technology and information is Learning using computers in the form of software is now starting to be widely used This is because IT-based learning provides opportunities for students to solve problems individually, increases the development of students' understanding of the material presented, stimulates students to learn with full of enthusiasm, and makes it easy for students to determine their own pace of learning (Nuryadin, 2013).

This study tries to focus on Algebrator Software to help students understand concepts and algorithms for solving mathematical problems. There are several approaches that are suitable for carrying out this learning program, in this case the researcher will use the Realistic Mathematics Education (RME) approach. Realistic Mathematics Education (RME) is a learning approach that supports the involvement of students in learning activities. The RME (realistic mathematics education) learning model and algebrator software were chosen as models and learning aids in providing learning materials because these models and software are expected to be able to provide differences in the quality of learning that lead to measuring the ability to understand mathematical concepts and algorithms.

2 Literature Review

2.1. Definition of analysis

Linguistically, analysis or analysis is a study carried out on a language in order to examine the structure of the language in depth. Anne Gregory (2009) analysis is the first step of the planning process. Dwi Prastowo Darminto and Rifka Juliandy (2020) analysis is the decomposition of a subject from its various parts and a study of the parts themselves, as well as the relationship between the parts to obtain the right understanding and understanding of the meaning of the whole. Prastowo (2020) analysis means evaluating the condition of the posts or verses related to accounting and possible reasons for the differences that arise, from the opinions of the experts above it is concluded that analysis is a description of a subject on the various parts and the study
of the parts themselves and the relationship between the parts to obtain a proper understanding and understanding of the meaning of the whole.

2.2. Ability to Understand Mathematical Concepts

The ability to understand mathematical concepts is the ability to absorb abstract mathematical ideas and apply them into estimates and simple statements that can be represented to help solve mathematical problems.

Table 1. Scoring of Mathematical Concept Understanding Indicators

<table>
<thead>
<tr>
<th>Indicator Understanding concept</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restate a concept</td>
<td>Blank answer</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Cannot restate concept</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Can restate concept but still many errors</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Can restate concepts but not yet correct</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Can restate concepts correctly</td>
<td>4</td>
</tr>
<tr>
<td>Presenting concepts in the form of mathematical representations</td>
<td>Blank answer</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Can present a concept in the form of a mathematical representation but it is not precise and there are still many errors</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Can present a concept in the form of a mathematical representation but it is incomplete</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Can present a concept correctly but incomplete</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Can present a concept correctly and completely</td>
<td>4</td>
</tr>
<tr>
<td>Applying the concept of algorithms in problem solving</td>
<td>Blank answer</td>
<td>0</td>
</tr>
<tr>
<td>Blank answer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unable to apply the appropriate formula procedures in solving problem solving problems</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Can apply formulas according to procedures in solving problem solving problems but there are still many errors</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Can apply formulas according to procedures in solving problem solving problems but not yet right</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Can apply formulas according to procedures in solving problem solving problems correctly</td>
<td>4</td>
</tr>
</tbody>
</table>
2.3. Mathematical algorithm skills

The ability of mathematical algorithms is the ability to think logically to solve problems carried out in systematic steps.

<table>
<thead>
<tr>
<th>Scoring Indicators for Understanding Mathematical Concepts</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Simplify a math problem</td>
<td>no answer 0</td>
</tr>
<tr>
<td>2. Solve mathematical problems with logic</td>
<td>there is an answer but it's wrong 1</td>
</tr>
<tr>
<td>3. Select and use certain settlement procedures</td>
<td>there is an answer, but a small part is correct 2</td>
</tr>
<tr>
<td>4. Presenting solutions systematically repeatedly</td>
<td>there is an answer, partially correct 3</td>
</tr>
</tbody>
</table>

2.4. Difficulty understanding mathematical concepts and algorithms

a. Difficulty in understanding concepts is an obstacle in absorbing abstract mathematical ideas to solve mathematical problems which causes the inability to master the defined concept competencies. In this study, the material taught to students is a three-variable linear equation system, while the difficulties in understanding the concept of a three-variable linear equation system material experienced by students include:

(1) Conceptual difficulties: students are not able to correctly define the meaning of a three-variable system of linear equations,

(2) Principle Difficulty: Students are not able to determine the model of mathematical problems

(3) Operational Difficulty: students are not able to apply the completion process according to the procedure.

b. The difficulty of the mathematical algorithm is an obstacle in logical thinking to solve mathematical problems that causes the inability to master the specified algorithm competence. In this study, the material taught to students is a three-variable linear equation system, while the difficulty of mathematical algorithms in the three-variable linear equation system material experienced by students is between other:
(1) Concept difficulty: students are not able to determine the interpretation of the problem into mathematical symbols

(2) Principle Difficulty: Students are not able to simplify the model of mathematical problems

(3) Operational Difficulty: students are not able to use algebraic operations that apply logically and systematically repeatedly.

2.5. Realistic mathematics education (RME)

Realistic mathematical education (RME) is an approach to learning mathematics to find mathematical ideas and concepts through exploration of real problems that are actually experienced in everyday life.

2.6. Algebrator Software

Algebrator software is one of the algebraic software that is able to solve algebraic problems and basic geometry problems in an easy way, just by typing the problem using the help of several existing toolbars.

3 Method

This research is a descriptive research that uses a qualitative approach. What is described in this study is the ability to understand mathematical concepts and algorithms of ASSISI SANTAR SMA students. The aim is to describe the achievement of each indicator to determine students' ability to understand mathematical concepts and algorithms and try to uncover the causes of difficulties in understanding concepts and algorithms in students. The conclusions from this study only apply to students in the class under study and are not generalized. The data of this research are in the form of answers and written data obtained from written tests and student interview data. The subjects of this research were 31 students of ASSISI Private High School class X. The instruments used in the form of questions about the ability to understand concepts and mathematical algorithms that have been validated and interview instruments.

The description of the targeted research process carried out by researchers systematically can be seen from the following chart:
Fig. 1. Research process
4 Result and Discussion

4.1 Result

The results of the study were obtained from the data analysis process based on the ability to understand mathematical concepts and algorithms which were carried out to students of class X SMA. Based on the test results, the overall data obtained regarding the description of the ability to understand mathematical concepts and algorithms of class X students. After the data is collected, the next step is to make conclusions. The descriptive statistic used is the mean. The mean category is carried out with the aim of clarifying the scale category and making it easier to analyze each question based on the average (mean) that has been obtained.

From the results of data analysis on each indicator provides an overview of the level of knowledge of students' conceptual understanding which can be seen from the results of the average comparison of the three indicators of concept understanding ability which can be illustrated in the following diagram:

![Diagram](image)

Fig. 2. The level of understanding ability concept based on the Three Indicators

From the results of the student's mathematical algorithm ability test as many as 31 people, it is obtained that the level of student's mathematical algorithm ability is spread across five criteria, namely very high, high, medium, low, and very low. The diagram can be seen in the following figure:
From the results of tests and interviews conducted on selected subjects, it was found that the difficulty of understanding mathematical concepts and algorithms from triangulation of written test data and interviews was carried out as shown in the following table:

**Table 3. Difficulty in Understanding Concepts and Algorithms for students in the Very Low category**

<table>
<thead>
<tr>
<th>NO</th>
<th>Indicator</th>
<th>Subject</th>
<th>Written test</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concept Difficulty</td>
<td>K10</td>
<td>Students have conceptual difficulties because students cannot make answers in two different ways</td>
<td>Students have conceptual difficulties because students cannot explain how to solve problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K11</td>
<td>Students have conceptual difficulties because students cannot make answers in two different ways</td>
<td>Students do not have concept difficulties because students cannot explain how to solve problems</td>
</tr>
<tr>
<td>2</td>
<td>Principle Difficulty</td>
<td>K10</td>
<td>Students have not been able to understand and apply the formula so that the work is not systematic</td>
<td>Students have no difficulty in remembering the formulas used so that the work is systematic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K11</td>
<td>Students have not been able to understand and apply the formula so that the work is not systematic</td>
<td>Students do not have difficulty in remembering the formula used so that the work is systematic</td>
</tr>
<tr>
<td>3</td>
<td>Operation Difficulty</td>
<td>K10</td>
<td>Difficulty operating operations because students can’t complete the answer correctly</td>
<td>There are operational difficulties because students have not completed the correct answer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K11</td>
<td>Difficulty operating operations because students can’t complete the answer correctly</td>
<td>There are operational difficulties because students have not completed the correct answer</td>
</tr>
</tbody>
</table>
4.2 Discussion

From the results of the analysis and the learning process that was carried out for two meetings in class X Mia SMA PRIVATE ASSISI gave reflective learning results. The difficulty of students from the category of ability to understand mathematical concepts and algorithms is very low, namely students have difficulty solving all the questions given. There are no indicators of the ability to understand mathematical concepts and algorithms that meet the requirements. This can be seen from the students' answers which only contain what is known on the questions and cannot complete the answers properly. Meanwhile, students from the category of ability to understand concepts and mathematical algorithms are in the medium category, students have difficulty in solving problems, namely difficulties in indicators of concepts, principles and operations. However, each student did not experience difficulties in each of these indicators. There are students who have difficulty with concept indicators. There are also students who have difficulty with indicators of concepts and principles. And there are also those who have difficulty in principle and operating indicators. This can be seen in the answers of students who still have many errors. Then the difficulty of students from the category of ability to understand concepts and high mathematical algorithms can be seen from the achievement of the indicators. In addition, the ability to understand mathematical concepts and algorithms in the medium category shows that students still do not meet the indicators of difficulty of concepts, principles, and operations. This shows that students' mathematical difficulties are still relatively low. Students have not been able to develop the ability to understand mathematical concepts and algorithms through the learning provided by the teacher. And the difficulty of students from the category of high creative thinking ability is only on the operating indicators. This can be seen from the results of students' answers which are generally wrong on the operating indicators. In addition, the ability to understand mathematical concepts and algorithms in the high category shows that students have almost no difficulties in the indicators of concept, principle, and operation difficulty.

5 Conclusion

Based on the results of the analysis, research findings and research discussions that have been described after learning with realistic mathematical education models assisted by Algebrator software, conclusions are obtained about the ability to understand mathematical concepts and algorithms and the difficulties experienced by students, especially students of ASSISI Siantar Private High School class X Mia 2, namely: The ability to understand students' mathematical concepts in the material of a system of linear equations. Three variables in students were obtained that the lowest achievement score was on the indicator of applying the concept of an algorithm in problem solving, followed by the indicator restating a concept, then on the indicator presenting the concept in the form of a mathematical representation. Then seen from the average score of achievement indicators carried out through the ability test for understanding the concepts of high school students Assisi Siantar class X mia 2 classified in the Medium category. The ability of students' mathematical algorithms on the material of a system of linear equations. Three variables are classified at the moderate level of ability, this can be seen from the results of the scores on each indicator that are still in the average category of 55.2. Difficulty in understanding mathematical concepts in mathematics learning with the Realistic Mathematical Education learning model with the help of Algebrator Software, as follows: in the high category, students do not experience difficulties; in the medium category, students have difficulty
understanding concepts so that students experience confusion when solving problems; and students also have difficulty in operating the equation; in the very low category, students have difficulty in all indicators on the ability to understand concepts. Students are not able to use the solution method so they are not able to solve the problem.

Difficulty in the ability of mathematical algorithms in learning mathematics with the Realistic Mathematical Education learning model Assisted by Algebrator Software, as follows: in the high category, students do not experience difficulties; in the medium category, students have difficulty understanding the procedure which is a solving algorithm so that the student experiences confusion when solving problems; and students also have difficulty in operating the equation; in the Very low category, students have difficulty in all indicators of Algorithm ability. Students are not able to use solving methods and algorithm procedures so they are not able to solve problems.

Acknowledgment. On this occasion, the author would like to express his sincere gratitude and highest appreciation to all those who have helped the author, to his family who have supported the author in every way. Mr. Prof. Dr. Bornok Sinaga, M.Pd as the supervisor I, Mr. Dr. Elmanani Simamora, M.Si as supervisor II, Principal and teachers and administrative staff of ASSISI Private High School who have given permission and opportunity to the author to conduct research at the school.

References

The Impact of Online Learning in Elementary School

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Abstract. Many factors influence the development of elementary school students and their education. The online learning he experienced was one of them. This is due to the lack of stimulation during online learning, many teachers have difficulty in making learning modules and managing distance learning, the busyness of parents due to work results in a lack of assistance in learning and playing for children. This study was aimed at determining the developmental disorders in elementary school children during online learning. The participants in this study were teachers and parents at four private elementary school institutions in Medan. The research method used is qualitative with descriptive techniques and content analysis. Collecting data through field observations and interviews. ATLAS.ti application used to displays research data. Research findings show that online learning has an effect on psychosocial development disorders of children at elementary school age, namely the limited interaction of children with other people and reduced communication skills. This disorder has implications for the alienation of children in their daily social life.

Keywords: online learning, students growth.

1 Introduction

Due to the COVID-19 pandemic, the level of achievement in children's education has decreased [1]. Child development is substantially influenced by environmental stimulation. The disruption of child development has been caused by the lack of stimulation provided by online learning. Numerous educators struggle to create learning modules and manage distance learning. Children lack assistance in learning and playing due to their parents' work-related preoccupations [2]. The limited interaction between teachers, parents, and children has a significant impact on children's incomplete developmental tasks (achieved).

Studies on online learning as a result of the COVID-19 pandemic reveal a variety of life problems, particularly in the field of early childhood education, which is one of the sectors most severely impacted [3]. During the COVID-19 pandemic, the Indonesian government enacted a policy requiring parents to work from home (WFH) and children to study from home. According to research findings, this policy causes psychological trauma, leading to increased parental stress and child trauma [4]. During the pandemic, online learning should
serve as a substitute for direct instruction. However, online learning does not produce satisfactory outcomes for children, particularly in Indonesia's early childhood education.

Based on swift decisions, the education system in Indonesia is implementing online learning in early childhood education. This naturally gives parents the impression of shock. Whether they like it or not, parents must educate their children at home. According to the findings of several studies, many parents are unwilling to accompany their children as they use this online learning system [2]. The primary cause is the conflict between work and teaching children. Therefore, the competence of some parents in educating their children is inferior to that of a teacher. Consequently, parents are less capable of guiding their children's online learning during this COVID-19 pandemic.

Teachers, like parents, face obstacles when conducting online learning. The direct interaction learning model that has been prevalent for a long time has become one of the reasons why teachers employ a "turn off style" when dealing with interaction- and touch-free online learning [5]. Teachers must also re-learn, find ideas and strategies for online learning, so that children can access learning materials from a distance. In the meantime, it is well known that play-based learning is a defining characteristic of early childhood education for fostering children's development. Therefore, parents who aren't prepared to go with their children and teachers who don't know how to set up and manage online learning are both detrimental to children's development.

This paper aims to supplement previous research on the relationship between online learning and child development by analyzing how online learning during the COVID-19 pandemic can result in optimal developmental disorders in children [6]. In accordance with this, this study answered three questions. (a) how did children, parents, and teachers learn during the pandemic (teaching-learning process, challenges encountered, how to overcome challenges)? (b) how did online learning become a factor that influences child development? (c) what is the impact of online learning on children's development? These three questions provide direction for comprehending that the COVID-19 pandemic has promoted the improvement of digital literacy, but also has an effect on children's developmental disorders.

Early childhood is affected by the obstacles that arise in online education. The consequence is a disruption in the psychosocial development of young children [7]. Online education has an effect on psychosocial development disorders in children. Every parent should be concerned that their children still require parental assistance during online learning. Parents' mental preparedness and children's learning support are required at this time. Teachers cannot impart knowledge directly to students. Therefore, parents are children's only hope during online learning.

During the COVID-19 pandemic, online learning has complicated the teaching-learning process in society [8]. Children have developed developmental disorders due to school closings and the introduction of online learning. The need to maintain a physical distance as part of a health protocol to protect the public from the dangers of COVID-19 has created new issues in the education sector [9]. Distance online learning has replaced face-to-face instruction. The limitations of internet access, the lack of devices owned, the mastery of digital literacy, the absence of interaction and assistance, and the absence of learning innovations have rendered distance online learning ineffective and ineffective in terms of its impact [10],
Learning outcomes are affected by a variety of issues pertaining to internet access, devices, digital literacy, interaction, mentoring, and innovation in distance education.

Access to the internet, the availability of devices, digital literacy, parental support, and teacher innovation in learning have affected the quality of distance online learning, which has an effect on the development of students [12]. During a pandemic, the most effective alternative education strategy is online education. Complaints and difficulties encountered by children, parents, and teachers were among the various responses to online education, so that it has an effect on childhood developmental disorders [8].

Disorders of child development can be viewed from three perspectives: biological, cognitive, and psychosocial development. The process of a child's biological development involves physical changes to the body. Physical characteristics are associated with body and brain development, sensory capacity, motor skills, and health. Consequently, the process of cognitive development in children involves changes in a child's individual intelligence and way of thinking. Cognitive aspects examine attention, memory, problem-solving, thought processes, reasoning (including moral reasoning), creativity, and language. Psychosocial aspects consist of the formation of emotions, personality, and social relationships [15]. This study will examine the relationship between developmental disorders in the psychosocial aspects of early childhood and online learning.

2 Methodology

During the COVID-19 pandemic, online learning has complicated the teaching-learning process in society. Children have developed developmental disorders due to school closings and the introduction of online learning. The need to maintain a physical distance as part of a health protocol to protect the public from the dangers of COVID-19 has created new issues in the education sector [12]. Distance online learning has replaced face-to-face instruction. The limitations of internet access, the lack of devices owned, the mastery of digital literacy, the absence of interaction and assistance, and the absence of learning innovations have rendered distance online learning ineffective and ineffective in terms of its impact [13]. Learning outcomes are affected by a variety of issues pertaining to internet access, devices, digital literacy, interaction, mentoring, and innovation in distance education.

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processes, reasoning (including moral reasoning), creativity, and language. Psychosocial aspects consist of the formation of emotions, personality, and social relationships [15].

**Table 1. Characteristics of Early Childhood Participants**

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>Grade</th>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4-6 years old</td>
<td>Kindergarten</td>
<td></td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td>2.</td>
<td>3-4 years old</td>
<td>Play Group</td>
<td></td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>3.</td>
<td>0-3 years old</td>
<td>Daycare</td>
<td></td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>66</td>
<td>125</td>
</tr>
</tbody>
</table>

**Table 2. Participant Characteristics of Parents and Teachers**

<table>
<thead>
<tr>
<th>No</th>
<th>Participant</th>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Parents</td>
<td></td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2.</td>
<td>Daycare Teachers</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Play Groups teachers</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Kindergartens Teachers</td>
<td></td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>

This study will examine the relationship between developmental disorders in the psychosocial aspects of early childhood and online learning. The results of the data are adjusted based on the direct interview instrument for teachers and parents.

**Table 3. Parent and Teacher Interview Instruments**

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Online Learning</td>
<td>a. What do parents think about online learning?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. How many times in one week?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. What are online learning methods?</td>
</tr>
<tr>
<td>2.</td>
<td>Online learning constraints</td>
<td>Disadvantages and advantages of online learning?</td>
</tr>
<tr>
<td>3.</td>
<td>Developmental aspects psychosocial</td>
<td>a. How is psychosocial development for children in online learning?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. What is the best method for developing children's psychosocial skills?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. How is the learning model in developing child's psychosocial development?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. What are the child's psychosocial barriers during online learning?</td>
</tr>
</tbody>
</table>
3 Result and Discussion

Online Learning

This study produced a number of findings, including a description of online learning during the pandemic, the obstacles that arise during online learning, and the influence of online learning on the psychosocial development of young children. Online education during the COVID-19 pandemic at early childhood education institutions in Indonesia as a solution to educational issues A description of online education during an epidemic. Figure 1 illustrates the findings of this study.

Figures. 1 depicts the application of online learning in Indonesian early childhood education. Video calls with teachers, voice messages, watching YouTube videos, worksheets given to parents for their children to complete at home, video tutorials, photos of activities sent via social media, and teacher visits to homes are all applications of online learning. Occasionally, teachers also conduct monthly home visits to monitor students. This is to directly monitor the development of the child at home.

Parents and children use mobile phones to communicate and interact with teachers during distance learning. The implementation of online learning is carried out in five days, Monday to Friday. This was conveyed in an excerpt from an interview with one of the female teachers from Kindergarten, as follows:

"We made video calls for the week together. first session with three children together. There is another worksheet session and watching YouTube. Mondays are used for video calls together. Meanwhile, Tuesdays, Wednesdays, and Thursdays are used for independent video calls. I adjust the video call activities to the activities of parents and children. Some are done in the afternoon, evening, and morning with the goal of having all children video call together in one week. (Interview with female teachers from kindergarten, Thursday, April 1, 2021) "

![Fig. 1. Implementation of Online Learning](image)
Learning through video calls for children aged 3 to 6 years is carried out in two sessions. Each session is divided into seven children. This is done because conducting developmental assessments and online learning at the same time becomes difficult and ineffective. Furthermore, parents send a daily report on their child's progress to school, as well as the results of the child's assignments for the week. This can be seen from the results of direct observations via online using video conferencing, namely Google Meet with children.

This is different from children aged 2 years and under (daycare), because it is very difficult to apply online learning. Instead, teachers make home visits to students' homes twice a month. This activity is focused on detecting children's growth and development, such as the ability to walk, their weight, crawling, health and others, as stated by one of the daycare teachers, namely:

"During school closures due to the pandemic, daycare teachers must make visits to children's homes." This is done so that we know as well as record the child's development and growth while at home. We visit our children at their homes once every two months. (Interview of female teachers from Daycare, March 31, 2021)."

**Online Learning Constraints**

In order to extend the learning environment of the classroom to the home, the teacher assigns worksheets as homework to the students. Video tutorials, interactive videos, and YouTube can also be utilized for educational purposes. Despite the fact that online learning is an option during the COVID-19 pandemic, the findings indicate that online learning faces a number of obstacles. Obviously, this will have an effect on child development. **Figure 2** depicts some of the issues that arise when individuals attempt to learn online during a pandemic.

As depicted in **Figure 2**, it is known that online learning encounters a number of obstacles, including the following: 1) changing (inconsistent) lockdown policies; 2) busy parents; 3) poor signals; and 4) limited teaching ability. 5) the work is not in accordance with the teacher's instructions; 6) children do many assignments at night when their parents return from work; 7) children's communication with others is reduced; 8) most of the children's tasks are completed by their parents; 9) children are frequently late in collecting assignments; 10) parents feel burdened with teaching assignments; 11) children are lazy; 12) children are easily sleepy.

![Fig. 2. Online Learning Constraints](image)

The delivery of children's assignments, which is frequently delayed by parents; changing lockdown policies; busy parents; the laziness of children; parents who feel burdened by their
children's tasks; and the results of uncompleted tasks are all negative signals. Children are sleepy because they are required to study at night; parents complete their children's homework; parents lack parenting skills; and parents and children have poor communication [16].

Obviously, online learning requires high-quality media and access in order for learning activities to be implemented as expected. Nonetheless, learning is not always successful [17]. It appears there is a signal constraint issue. This disrupts learning and decreases the child's concentration. Then, during the pandemic, government policies frequently change as the coronavirus spreads. So that children and parents become confused, children are sometimes required to attend school, while other times schools are closed and then reopened.

These obstacles have negative effects on children as well. Additionally, children are required to collect assignments via the device. Another effect is that children are addicted to their electronic devices and spend a great deal of time on YouTube. This is evident from the results of interviews with a number of parents who stated that YouTube learning made their children addicted to watching and that they did not open YouTube links as school assignments.

"The difficulty lies with devices. Children are unwilling to let go of their cellphones." I also recommend anti-radiation glasses to reduce the negative effects of excessive cellphone use. When using my cellphone, I wear anti-radiation glasses, but when it's time to eat or pray, I remove the phone and return it after a break. (Interview with Playgroup Parents, Thursday, April 1, 2021)"

**The Impact of Online Learning on Children’s Psychosocial Development**

Aspects of children's psychosocial development were found to be disrupted by distance learning, according to the findings of the study. Psychosocial aspects of developmental disorders include the development of emotions, personality, and social relationships [18]. Cases found in children included those who were more aggressive than usual, easily irritable and angry, lacked discipline, lacked socialisation, exhibited laziness, were shy, preferred independence and solitude, cried frequently, and stopped learning. **Figure 3** depicts the impact that online learning has on the psychosocial development of children.

![Fig. 3. Online Learning Constraints](image-url)
According to the diagram in Figure 3, the impact on children's psychosocial development is classified as follows: 1) children are easily bored and bored at school; 2) children are more aggressive; 3) children are less obedient in following instructions; 4) children tend to be individuals; 5) children cry more frequently; 6) children lack socialisation; 7) children are easily angered; 8) children are lazy in doing assignments; 9) children are less disciplined; 10) children frequently stop learning.

Children struggle to socialise while learning online [19]. Where children are more at ease playing with cellphones as playmates. When a friend comes over, the child prefers to play alone. Of course, because of the decline in children's social development in the surrounding environment, this should be of greater concern to parents [1], [20].

Online learning has a negative impact on children's development [21]. During the implementation of online distance learning, some children experienced developmental disabilities. According to the findings, children have developmental disabilities in psychosocial aspects [22]. This is based on field findings involving several teachers and parents from five Indonesian school institutions. This situation causes significant changes in children. At this age, children should be developing to their full potential. As a result, online learning is regarded as less effective for the development of children.

In accordance with the findings of research indicating that online learning is ineffective for early childhood because the internet network is less stable [21], children do not concentrate when paying attention to the teacher only on the application screen, and they are not particularly interested in online learning because they require direct attention throughout the process. During online learning, teachers cannot provide direct attention to students [6], [23].

Online education influences aspects of psychosocial development. Aspects of children's psychosocial development were found to be disrupted during online learning, according to the study's findings. Psychosocial aspects of developmental disorders include the development of emotions, personality, and social relationships [4] [24]. Cases found in children included those who were more aggressive than usual, easily irritable and angry, lacked discipline, lacked socialisation, exhibited laziness, were shy, preferred independence and solitude, cried frequently, and stopped learning. Online learning has a significant impact on the social and emotional development of young children [7], [25], [26].

Children are less cooperative because they rarely play with one another [27]; lack of tolerance; lack of socialising with friends; limited learning at home; children's emotions occasionally feel bored and sad; children also miss their friends and teachers. Due to the normal learning process, verbal aggression has been documented. The findings of this study can be used as a guide for evaluating the implementation of online learning or learning at home, given that online learning will continue to grow in popularity [28].

4 Conclusion

The results of the study indicate to parents that the quality of development that occurs during online learning has declined. The manifestation of developmental disorders in children is a decline in psychosocial development. Some of the factors that contribute to it are parents' busy schedules; difficulty signalling; nighttime learning; children who are lazy, sleepy, and bored;
lack of ability to teach parents to children; a lack of communication between teachers and parents; parental pressure; and poorly executed assignments. This research has implications for the prevention of childhood developmental disorders. This is done in order to prepare parents to be the most effective educators for optimal child development at home.

References


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Development of Teaching Materials of Pantun Assisted by Pop Up Book Media for V-Grade Students of SDN 173131 Tarutung

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Abstract. This study aims to: (1) describe the process of developing teaching materials for rhymes with the help of Pop Up Book Media; (2) Describing the feasibility of Pop Up Book media in developing teaching materials for rhymes; (3) Describing the effectiveness of teaching materials for rhymes with the help of Pop Up Book media to the fifth grade students of SDN 173131 Tarutung in the 2021/2022 academic year as many as 20 students. The research method used is development research which refers to the ADDIE model which consists of 5 stages including analysis, design, development, implementation, evaluation. Data collection in this study was carried out through interviews, validator questionnaire sheets, educator response questionnaire sheets, questions that students worked on in the form of multiple choice as many as 10 questions. The results showed that teaching materials for rhymes with the help of Pop Up Book media for fifth grade students at SDN 173131 Tarutung were suitable for use with the validation results from material experts 90%, linguists 90%, media experts 80% and educators responding 80%. The developed teaching materials were also declared effective because students experienced an increase in the average score from 61 to 80.5 after using the developed teaching materials.

Keywords: Teaching materials, rhymes, Pop Up Book.

1 Introduction

Teaching materials used in the learning process is one of the important factors in improving the quality of learning. With the existence of teaching materials, it can be said that the teacher is no longer the only source of learning in the classroom. The teacher can be a facilitator who helps and directs students in learning. Thus, when learning in class, students are ready with sufficient information and knowledge so that the available learning time is not used up to explain the material at length. In addition, students will be more active in learning in class. Aisyah (2020: 85) says that teaching materials are summaries of material given and taught to students in the form of printed materials or in other forms stored in electronic files, both verbal and written. According to Puspitaloka (2020: 46) that teaching materials are materials or subject matter that are systematically arranged, which are used by teachers and students in the
learning process. So it can be concluded that teaching materials are summaries of material that are systematically arranged in both printed and electronic form.

In the past, for the community, rhymes were a means of communicating with each other and even reciprocal rhymes became a habit that was often done, for example in traditional events for adults. This proves that the rhyme is a tool that has long been used by the community in the communication process. Meanwhile, at this time, rhymes are rarely used as a means of communication. In fact, elementary school students are rarely heard of using rhymes. In fact, there are many types of rhymes, including rhymes for children with the theme of joy and sorrow that are able to express the feelings they experience.

Pantun1 is part of an old poem which is a cultural heritage of Indonesia, (Kholifah, 2018:31). According to Sri Murti, (2019: 125) pantun is a way of expressing thoughts and feelings through the arrangement of words that are arranged so that it becomes interesting to read and listen to, while according to Sri Nugraheni (2016:195-197) states that pantun is a Malay oral treasure. a traditional four-line standalone rhyming scheme a-b-a-b.

The first two lines are shadows or sampiran, while the next two lines contain content. Usually the shadow part is the natural elements, while the content part refers to the human world which includes human feelings, thoughts, and actions. In addition to the four-line form, the rhyme can also consist of two lines, six lines, eight lines, and a linked form known as a linked pantun. Based on the two opinions above, it can be said that the rhyme is a way of expressing thoughts and feelings through a word order consisting of four lines with the a-b-a-b scheme. In contrast to gurindam and poetry. Pantun in the form of advice or reprimand that is indirect by using comforting words. In the poem contains advice, advice, fairy tales / stories. While the gurindam contains the values of life or moral values.

The results of the researcher's interview with several teachers from SDN 173131 Tarutung all said that the teachers had never used this Pop Up Book media in the learning process. In fact, some of them have never heard of this media at all. Based on the results of these interviews, researchers are interested in designing teaching materials for rhyme material that are in accordance with the characteristics of students who are dominant in the Batak Toba tribe with the help of Pop Up Book media that can be used by teachers and students in the learning process, with the aim of introducing this Pop Up Book media and Motivating teachers and students at SDN 173131 Tarutung to re-learn rhyme material that is often used in Batak culture, especially in Tarutung city called umpasa. In addition, the researcher hopes that learning the rhyme material with Pop Up Book media will attract more students' attention so that it can increase students' interest in rhymes.

2 Literature Review

Teaching Materials

Meidy Devita (2018:127) states that teaching materials are all materials (both information, tools, and texts) that are systematically arranged, which displays a complete figure of

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1 Pantun is part of an old poem
competencies that will be mastered by students and used in the learning process with the aim of planning and studying the implementation of learning. Imansari (2021:71) also argues that teaching materials are all forms of materials (both information, tools and texts) that are arranged systematically, which displays a complete figure of competencies that will be mastered by students and used in the learning process with the aim of planning and implementing learning. For example textbooks, modules, handouts, worksheets, models, audio, and so on. Based on the opinions described above, it can be concluded that teaching materials are components of learning tools consisting of knowledge, skills and attitudes that students want to master and systematically arranged.

According to Magdalena, et al (2020: 322) that the use of teaching materials has several advantages, including the following: a) The cost of learning is efficient because it can be followed by a large number of students. b). Students can progress at their own pace. c). Teaching materials can be reviewed and revised at any time and gradually, part by part to increase their effectiveness. d). Students receive regular feedback in the learning process, because the feedback process can be integrated into teaching materials. In addition to the advantages, Pribowo (2017: 31) also describes the shortcomings of teaching materials, including the following: 1). The development costs are high. 2). Long development time. 3). Requires a design team that is highly skilled and able to work together intensively during the development period. 4) Students are required to have high learning discipline. 5) Facilitators are required to be diligent and patient to continuously monitor the learning process, provide motivation and provide individual student consultation whenever needed.

There are three principles needed in the preparation of teaching materials according to Magdalena, et al (2020: 180), including: a) Relevance means related or closely related. The point is that learning materials should be relevant to the achievement of competency standards and basic competencies. b). Consistency means obedience or constancy. For example, basic competence asks students' ability to master three kinds of concepts, the material presented is also three kinds. c). Adequacy, meaning that the material presented should be sufficient to achieve basic competencies. The material is not too little and not too much. If the material is too little, it is likely that students will not be able to achieve basic competencies by utilizing the material. If the material is too much it will take a lot of time to learn it.

**Feasibility of Teaching Materials**


**2.1.2 Effectiveness of Teaching Materials**

According to Maratun (2019: 28) states that effectiveness is an act of student success to achieve certain goals that can bring maximum learning outcomes. Meanwhile, according to Hidayat (2018: 25) effectiveness is how an organization succeeds in obtaining and utilizing resources in an effort to realize operational goals. So it can be said that the effectiveness of teaching materials is the extent to which a teaching material achieves the planned learning objectives. In addition, effective teaching materials are not only seen from the evaluation
results achieved by students but are also able to provide good understanding, perseverance, and a sense of pleasure when learning. study.

Pantun

Amar (2016: 87) says that pantun is an old poem characterized by a-b-a-b, where each stanza is 4 lines and each line consists of 8-12 syllables, the first 2 lines are sampiran, the next 2 lines are content. Dinni (2019: 101) also defines the meaning of pantun which is almost the same, namely one type of old poetry consisting of 4 lines with a-b-a-b rhymes. Imansari Nur (2021: 45) says that pantun is an old Indonesian poem that can be used to give instructions, guidance, or guidance, as well as convey a rule. Where the structure of the rhyme is divided into two parts, namely the top and the bottom. The top half of the rhyme/half of the stanza at the beginning of the rhyme is called sampiran, while the bottom half of the rhyme/half of the stanza at the end of the rhyme is called the content or purpose of the rhyme. So from the opinion that has been described above, it can be concluded that the pantun is one of the old types of Indonesian poetry which consists of 4 lines with the rhyme a-b-a-b which is used to convey a purpose.

Umaya Maharini, et al (2020:2) also stated that the rhyme has the characteristics that it consists of four lines (lines), with a rhyme pattern a-b-a-b. The first two lines are called sampiran, the next two lines are called fill. Sudaryat (2016: 41) also suggests the characteristics of pantun, namely: (a) rhymes are native Indonesian poetry, (b) consist of four lines of sebait, (c) each line usually consists of 8-12 syllables, d) each line (array) consists of three to five words, (e) the final rhyme formula a-b-a-b, and (f) the first and second lines are sampiran, while the third and fourth lines are rhyme content.

Pop Up Book

According to Dewanti et al (2018:222) Pop Up Book is a book that has moving parts or has three-dimensional elements and provides a more interesting visualization of stories starting from the display of images that can move when the page is opened. While Umam et al (2019:4) describe that Pop up book is a book that has an image display that can be enforced, beautiful and can move. Meanwhile, Eliyanti et al (2021:249) say that the Pop Up Book is a folded sheet of paper where a two-dimensional or three-dimensional structure appears when opened. Puspitalok et al (2020:21) stated that: "Paper pop ups or movable books are three dimensional books that contain paper pieces that pop up out or move when the book is opened and fold completely flat when the book is closed". Pop Up Books are books that have three-dimensional elements when the book is opened and flat again when the book is closed. So it can be said that the Pop Up Book is a piece of paper that has three-dimensional elements and has a beautiful image display that can be enforced.

Based on the opinions of several experts above, it can be said that this Pop Up Book media has advantages in terms of a more attractive appearance that can attract students' attention in participating in learning. In addition to describing the advantages of this Pop Up Book media, Umam (2019: 54) also describes the weaknesses of this Pop Up Book media. The weaknesses of this Pop Up Book media are: 1. The processing time tends to be longer because it demands more extra accuracy. Requires quite a lot of money to make 2. It costs quite a lot to make it.
3 Research Methods

This type of research is research and development (Research and Development). Purnama (2013: 21) provides an understanding of development research as a type of research aimed at producing a hardware or software product through a typical procedure which usually begins with a needs analysis, continues with the development process and ends with an evaluation. This study refers to the ADDIE model. Where this model consists of five stages, namely Analyze, Design, Development, implementation, and evaluation, Cahyadi (2019: 39). The selection of this model was based on the consideration that this model was developed systematically and based on the theoretical basis of textbook design.

The feasibility of teaching materials for rhymes with the help of Pop Up Book media is known by conducting a validity test by material experts, linguists and media experts. The validation carried out at the validity test stage is theoretical validity, namely the validity carried out by people who are considered experts and competent based on theoretical and logical considerations. The data obtained from the assessments of the three experts described above in the form of qualitative data were converted into quantitative data scores. The scoring rules are adjusted to the assessment using a Likert scale.

The development of teaching materials that have been carried out by researchers is effective because it has been tested on 5th grade students of SDN 173131 Tarutung with a total of 20 people and got an increase in grades with an average score at pretest of 61 and an average score of 80.5 posttest. The results of this study are in line with research conducted by Tiurida Intika (2019) which states that the development of Pantun teaching materials shows a fairly high level of classical learning completeness with 90% to 93.3% completeness in the very effective category. The same thing was also described by Absor Asrofah (2020) in his research where from 40 the number of students scored above 75 or if it was a percentage of the total number of students reaching 67.79%. This means that from the number of 59 students on average more than 50% of the total number of students have completed. This shows that the teaching materials developed are effective for use in learning.

4 Conclusion

The teaching materials for rhymes with the help of Pop Up Book media that were developed are suitable for use after being validated by material experts, linguists, and material experts which were then revised by researchers. Where based on linguists obtained a percentage score of 90% with very good criteria. Material experts get a percentage score of 90% with very good criteria and media experts get a percentage of 88% with very good criteria. Teaching materials for rhyme material assisted by Pop Up Book media are effectively used based on the results of the test instrument questions given to students who experience an increase, namely the average pretest score is 61 and has increased to 80.5.
References

Implementation of Discovery Learning Resources in Teaching Cation Analysis to Improve Higher Order Thinking Skills and Student Learning Outcomes

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Abstract. This study aims to improve higher-order thinking skills and student learning outcomes through the implementation of discovery learning resources in the teaching of cation analysis in groups IV and V. This study was conducted at the State University of Medan in the academic year 2022–2023. The research involved 60 students and was divided into two classes: the experimental class, taught with discovery learning resources and the control class, taught with the student handbook. The implementation of discovery learning resources could improve students' higher-order thinking skills, as seen in the preparation of project plans (M = 75.89 ± 2.26) and project reports (M = 81.94 ± 4.16). The learning outcomes in the experimental class (M = 86.20 ± 5.59) are higher than the scores in the control class (M = 78.80 ± 5.24). It is concluded that the discovery of learning media with the acquisition of standardized values (M = 3.57 ± 0.41) is feasible to be implemented in the teaching of Analytical Chemistry.

Keywords: Discovery, Learning outcomes, Cation Analysis

1 Introduction

In learning activities, students' higher-order thinking skills are fundamental in improving student learning outcomes.¹ Therefore, learning activities must emphasize higher-order thinking skills, especially in chemistry learning, which requires an active role in cognitive and psychomotor.² Moreover, the chemistry learning material has never been taught in high school and is only learned when students are in college. One of which is qualitative and quantitative analysis material. Therefore, learning strategies are needed that can explore students' abilities in learning activities.³ When learning activities are taught using blended learning at the State University of Medan, it is undoubtedly a challenge for educators to realize the importance of implementing active learning methods that can help create more optimal learning activities.⁴,⁵
Moreover, there is a restricted time when participating in practical learning due to pandemic conditions, requiring students to know more about experiments that cannot be practiced. Therefore, interactive and communicative media-based electronic resources are needed to include material, learning videos, practicum guides, and videos of practicum experiments from the coverage of material that can be developed by utilizing web technology in e-book format, which can help students to recognize the characteristics of the material before participating in learning both online and offline.6

In developing chemistry learning resources, many experts argue that the discovery method is effective in learning during the COVID-19 period or after the end of the pandemic.7 Some experts have proven that discovery learning can improve students’ cognitive science skills. 8 Also, using discovery learning resources makes learning more qualified. 9 and making it easier for educators to guide students in understanding learning concepts. 10 A study shows that using discovery learning resources increases the initial knowledge of students majoring in chemistry and biochemistry departments in learning that requires theoretical and practical skills. So the selection of this method is the right decision to apply to chemical matter. 11 Other research has also proven that students accustomed to being taught using the discovery method will be more accustomed to finding, determining, and inferring the material taught by themselves so that more insights into the science are understood. 12

Learning syntax through discovery has proven to be better than the PBL method. Discovery learning requires students to think critically and creatively twice when finding and solving problems. At the same time, problem-based learning requires students to think critically and creatively once when faced with problems given by the teacher. 13 So, the discovery method is constructive in chemistry lessons, especially analytical chemistry.14 This study aims to develop discovery learning resources in group IV and V cation analysis courses to improve higher-order thinking skills and student learning outcomes.

2 Methods

This study focuses on the development and implementation of discovery learning resources to improve higher-order thinking skills and student learning outcomes in understanding learning both in theory and practice with learning achievement competencies that must be achieved by the curriculum applied at the State University of Medan, namely the Indonesian National Qualifications Framework (KKNI). Research activities include the development, standardization, and implementation of learning resources.

Population and Sample

The population of this study consisted of chemistry education majors at the State University of Medan in the Faculty of Mathematics and Natural Sciences who took qualitative and quantitative analytical chemistry courses in the academic year 2022–2023. The research sample was selected purposively and grouped into two classes of experimental and control subjects. The experimental class was taught using discovery learning resources, whereas the control class was taught using textbooks.
Research Procedure

The research process was carried out in the following stages: (1) To complete the analysis of learning resources. It was necessary to examine the learning materials the State University of Medan had previously employed as the foundation for product creation. (2) The design step is carried out by deciding on the description of the creation of learning materials and learning references. (3) Creation of discovery learning materials on the topic of cation analysis groups IV and V have access to practicum videos that are combined with mini project videos as assignment references, as well as e-book learning tools. (5) A feasibility study of the created learning medium is subsequently performed and verified by a team of experts from chemistry lecturers at the State University of Medan to obtain suggestions and improvements. (7) The implementation stage is carried out online and offline through the help of the Google meet application, SIPDA learning, and the WhatsApp group to deliver material and collect assignments during research. (8) The final stage is evaluating the student's final assignment in designing and compiling a practicum project report to see students' high-order thinking skills and student learning outcomes with pretest and posttest as evaluations to determine the improvement of student learning outcomes. Assessment of students' higher-order thinking skills is assessed by assigning project reports done by students and uploaded to the SIPDA application with an assessment system using a 0-100 rubric scale. Learning outcomes are measured by giving a value assessment with a scale of 0-100 on the student's ability to answer practice questions at the beginning and end of learning. Feasibility assessment of discovery learning resources is carried out by material and media expert lecturers using a Likert scale questionnaire with categories (4) very good, (3) good, (2) bad, and (1) very bad.

3 Results

Development of Discovery Learning Resources on Cation Analysis

Discovery learning resources developed on group IV and V cation analysis materials are arranged in the form of learning packages consisting of teaching materials, project packages, media and multimedia, practical project implementation guidelines, and supporting instruments by competency achievement targets. Learning resources can be accessed through SIPDA to provide materials and collect project evaluation assignments and reports.

The development of discovery resources is equipped with learning materials starting from the introduction of cation, the introduction of reactions on cations, group IV cation analysis, and group V cation analysis. In discovery learning, resources have also been equipped with a mini practicum experiment guide as a basis for project assignments consisting of group IV cation analysis sub-materials: Identification of Barium cations (Ba\(^{2+}\)), Identification of Strontium cations (Sr\(^{2+}\)), Identification of Calcium cations (Ca\(^{2+}\)). Furthermore, chemical material for the sub-topic of group V cation analysis: Identification of Magnesium Cation (Mg\(^{2+}\)), identification of Sodium cation (Na\(^+\)), identification of Potassium cation (K\(^+\)), Ammonium cation identification (NH\(_4^+\)). Discovery learning resources are integrated with project assignments in each material coverage, and this is done to train students to get used to exploring and finding proof of the theoretical concepts learned. The description of innovative learning resources includes materials and assignments, as summarized in Table 1.
Table 1. Material Description of Discovery Learning Resources on Cation Analysis Learning

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub-topic material</th>
<th>Discovery learning resource media integrated material coverage</th>
<th>Project Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction to Cation Analysis</td>
<td>The introduction of cation elements begins by classifying the characteristics of each element with the explanation of the material delivered with the help of cation analysis schemes and Youtube videos.</td>
<td>Project 1: Introduction to Elements and Classification of Elements Cation Group 1-5</td>
</tr>
<tr>
<td>2.</td>
<td>Cation Reaction Introduction</td>
<td>Explanation of preliminary analysis and cation reactions if a sample indicated to contain Group IV or V cation elements with the help of mini practicum video learning media uploaded to SIPDA learning.</td>
<td>Project 2: Initial analysis of the reaction of group IV and V cations by conducting a flame test</td>
</tr>
<tr>
<td>3.</td>
<td>Analysis of group IV cations Ba$^{2+}$, Sr$^{2+}$, and Ca$^{2+}$.</td>
<td>Analysis of Group IV cations: Barium, strontium, and calcium. The process of cation analysis is explained in the video and project sheet and is accompanied by a flow scheme for identifying samples containing Group IV cations.</td>
<td>Project 3: Identification of Barium (Ba$^{2+}$) in rat poison samples. Project 4: Identification of Strontium (Sr$^{2+}$) in milk samples Project 5: Identification of Calcium (Ca$^{2+}$) in milk samples</td>
</tr>
<tr>
<td>4.</td>
<td>Analysis of group V cations Mg$^{2+}$, Na$^{+}$, K$^{+}$, and NH$^{4+}$.</td>
<td>Analysis of Group V cations: Magnesium, Sodium, Potassium, and ammonium. The cation analysis process is explained in the video and project sheet and is accompanied by a flowchart of the identification process for samples containing Group V cations.</td>
<td>Project 6: Identification of Magnesium (Mg$^{2+}$) in avocado samples Project 7: Identification of Sodium (Na$^{+}$) in table salt samples Project 8: Identification of Potassium (K$^{+}$) in Salt samples Project 9: Identification of Ammonium (NH$^{4+}$) in Fertilizer samples</td>
</tr>
</tbody>
</table>

Standardization of Discovery Learning Resources on Cation Analysis Materials Groups IV and V

Standardization of discovery learning resources by expert respondents is carried out to ensure the feasibility of discovery learning resources in group IV and V cation analysis learning. The
assessment process is carried out by filling out a media and material feasibility questionnaire according to BSNP (National Education Standards Agency). Respondents' results on a feasibility score of 3.57, with an excellent category. It shows that the discovery of learning resources in terms of delivery of material content, language, material depth, and graphic design is suitable to use as a learning resource for content analysis groups IV and V. The standardization of feasibility assessment by expert respondents can be seen in Table.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description of Material Assessment in Discovery Learning Resources</th>
<th>Respondent Results ((M \pm Sdv)) ((n=4))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Contents: The suitability of the scope of teaching materials with the achievement of analytical chemistry competence</td>
<td>3.59±0.37</td>
</tr>
<tr>
<td>2.</td>
<td>Language: The accuracy of sentence structure, terms, and message readability.</td>
<td>3.65±0.41</td>
</tr>
<tr>
<td>3.</td>
<td>Extension: Availability of learning links on the website.</td>
<td>3.44±0.46</td>
</tr>
<tr>
<td>4.</td>
<td>Depth of material: the accuracy of the content of teaching materials and project packages, systematic writing of chemistry and the suitability of learning objectives on the subject of cation analysis</td>
<td>3.56±0.39</td>
</tr>
<tr>
<td>5.</td>
<td>Design and graphics: order of presentation of material, layout, pictures and graphics, tables, arranged systematically</td>
<td>3.61±0.42</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td><strong>3.57±0.41</strong></td>
</tr>
</tbody>
</table>

**Implementation of Discovery Learning Resources for Teaching Cation Analysis Groups IV and V**

The teaching of group IV and V cation analysis was taught with SIPDA Learning, an application media at the State University of Medan. Learning activities are carried out by blended learning by combining online learning through SIPDA and offline practicum activities to complete the assignments of cation analysis projects. Where each student must choose a sample that contains group IV and V cations often found in the material, the selection is checked by lecturers and instructors after approval. Completion of projects can be completed in offline practicum activities at the chemistry laboratory at the state university of Medan, with examples of experimental videos and guidelines for preparing project reports that can be accessed through the SIPDA application.

Using project tasks to discover learning resources efficiently stimulated students' psychomotor abilities and high-order thinking skills in selecting target analytes used in preparing project reports during practicum learning. Students are more active in practicum activities and enthusiastic about completing project proposal reports collected online through the SIPDA application by the instructions and collection deadlines. The proposals and project reports with an assessment system include analysis, evaluation, and creation assessments to measure students' high-order thinking skills. The proposal score is an average of 75.89, and the final
project report obtained an average of 81.94, with an excellent category. The overall score is shown in Table 3.

<table>
<thead>
<tr>
<th>No.</th>
<th>Higher Order Thinking Ability</th>
<th>Description</th>
<th>Proposal Average</th>
<th>Project Report Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analysis</td>
<td>The ability of students to search for project titles and create a supporting theoretical basis</td>
<td>75.83±2.31</td>
<td>82.50±4.31</td>
</tr>
<tr>
<td>2</td>
<td>Evaluate</td>
<td>Student's ability to analyze the chemicals used samples to be tested</td>
<td>76.00±2.42</td>
<td>82.17±4.29</td>
</tr>
<tr>
<td>3</td>
<td>Create</td>
<td>Student's ability to determine the appropriate strategy in completing project reports</td>
<td>75.83±2.96</td>
<td>81.17±3.87</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td></td>
<td><strong>75.89±2.26</strong></td>
<td><strong>81.94±4.16</strong></td>
</tr>
</tbody>
</table>

* Obtained from a subjective assessment using project appraisal rubric criteria

Furthermore, student learning outcomes from the two classes with different treatment characteristics were evaluated using pre-test and post-test to measure the average learning outcomes. Evaluation activities were carried out using the same instrument test. The pre-test value in control and experimental class averaged 30.67 and 30.90. The final test in the experimental class was carried out with an average of 86.20, as shown in Table 4.

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspects of Assessment of Learning Outcomes</th>
<th>Student Learning Score</th>
<th>Experiment (n=30)</th>
<th>Control (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pretest</td>
<td>30.90±6.07</td>
<td>30.67±5.21</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Posttest</td>
<td>86.20±5.59</td>
<td>78.80±5.24</td>
<td></td>
</tr>
</tbody>
</table>

4 Discussion

The implementation of discovery learning resources with project assignments received a positive response from expert respondents, so they obtained an excellent feasibility value to be used as a learning resource in online and offline learning conditions. Project tasks in discovery learning resources are prepared with video, e-module, project video, and project preparation instrument arranged by the competencies to be achieved in groups IV and V cation analysis. Discovery learning is based on the principle that students can more wholly and actively control themselves to understand the concept of learning media that facilitates the learning process.15

Discovery learning resources used in learning cation analysis groups IV and V have proven successful in increasing students' ability, as seen from the results of subjective and objective
acquisitions to measure higher-order thinking skills and student learning outcomes in working on initial and final evaluation instruments, as well as students' abilities in analyzing assigned projects. Students' high-order thinking skills can be seen in how they choose the target analyte in the actual sample, prepare their project reports according to the instructions, make conclusions and report the results of project work on time.

The discovery model has provided a more memorable online learning experience. In addition to providing exciting learning, cation analysis learning not only focuses on academic abilities but also emphasizes the psychomotor abilities of students in carrying out project assignments to improve high-order thinking skills. The research results show that using the discovery model improves learning. The discovery learning method in learning activities can increase students' abilities and enthusiasm for participating in learning. Using HOTS (High Order Thinking Skills) based learning tools, the discovery learning model will provide different conditions for passive learning to be active and creative.

5 Conclusion

The development of discovery learning resources in group IV and V Cation Analysis courses received a good response from expert respondents by obtaining a feasibility value (M = 3.57 ± 0.41). The discovery of learning resources taught in the experimental class improves higher-order thinking skills with an average (M = 81.94 ± 4.16). Moreover, discovery learning impact the acquisition of the final learning outcomes of experimental class students with a suitable category (M = 86.20 ± 5.59) and higher than the control class taught using textbooks with an average score (M = 78.80 ± 5.24). Thus, discovery learning resources are feasible and effective for improving students' higher-order thinking skills and learning outcomes in group IV and V cation analysis courses.

Acknowledgments. The author would like to thank the lecturers and staff at the Faculty of Mathematics and Natural Sciences, State University of Medan, and all students who have contributed to the preparation of this research article.

References

The Development of Guided Inquiry-Based Learning Resources as a Strategy to Achieve Student Competence in Analytical Chemistry

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Abstract. This study aims to develop and implement an innovative guided inquiry-based learning resource as a strategy for achieving student competence in the teaching of Analytical Chemistry. The research was conducted during the Covid 19 pandemic, involving 30 undergraduate students. Research stages include the development of innovative learning resources with guided inquiry to facilitate students to conduct investigations, include asking, researching, reporting investigation result, and share finding information to hone students higher-order thinking skills (HOTS). A standard inquiry-based learning resource package has been compiled for teaching Cation analysis for undergraduate students. Learning resources and supporting facilities are effective in facilitating students to learn actively in planning and carrying out inquiry assignments and presenting their findings. Thinking skills in the HOTS category have been developed for three aspects, namely the skills to analyze, evaluate, and create for analytical chemistry activities, all of which are classified as very good (M=85.07±1.70). The availability of guided inquiry-based learning resources has succeeded in teaching students to master Cation Analysis, as indicated by the achievement of learning outcomes (M=83.16±4.82) which are classified as good. Guided inquiry-based learning is very appropriate to be used for active learning as a strategy for achieving competence in the field of analytical chemistry

Keywords: Guided inquiry; Learning resource; HOTS, Thinking skills; Active learning

1 Introduction

The application of innovative learning is a good strategy in achieving student competencies, including competencies in analytical chemistry [1]. Analytical Chemistry is a compulsory subject for undergraduate science students to equip analytical competencies, including separation, identification, and determination. Competence in the field of analytical chemistry combines knowledge with skills in the field of analysis to be implemented for contextual determination of target analytes [2]. Thus, efforts must be made to make the teaching and
learning process run well by adjusting class conditions to optimize student learning potential to achieve competency targets. Various strategies can be carried out such as implementing teaching and learning strategies, selecting appropriate learning models and methods, and innovating learning [3],[4],[5].

The problem faced is that it is difficult to facilitate active learning for students in achieving Analytical Chemistry competence because they have to combine knowledge and skills. The global situation experienced in the last two years due to the Covid-19 pandemic, namely social restrictions occurred to cut off the transmission of the corona virus, including restrictions on face-to-face learning [6]. Teaching tends to be done online and restricting student access to study in the laboratory makes it difficult to achieve analytical competence. To overcome this problem, a technique is needed to facilitate students to learn independently as a supporter of limited learning in the laboratory following the health protocol set by the university. One strategy that is of concern is the application of guided inquiry to guide students in active learning to conduct investigations [7,8]. Inquiry-based learning requires stages such as asking questions, conducting research, reporting the results of investigations, and sharing information on findings to hone students' thinking skills [9]. This learning model trains students to learn systematically to build their thinking skills, including higher order thinking skills (HOTS) [10]. Learning activities start from identifying problems, carrying out investigations and reporting research results as findings in overcoming problems. Guided inquiry can be integrated with multimedia to make learning interesting, theory and practice are studied in an integrated manner, resulting in the impression of learning being remembered for longer by students [11,12].

The provision of guided inquiry-based innovative learning resources is an option in the teaching of analytical chemistry, as a strategy to optimize the learning potential of students studying Analytical Chemistry. The application of guided inquiry is believed to be a strategy in facilitating active learning in normal and abnormal situations caused by the Covid-19 pandemic. This study aims to develop and implement an innovative guided inquiry-based learning resource to facilitate active learning for students as a strategy for achieving competence in the field of Analytical Chemistry. Innovative learning resources are needed to stimulate critical and analytical thinking, as well as guide students to study systematically to find answers to problems faced in the field of Analytical Chemistry.

2 Methods

The research method consisted of population and sample, research procedures, and evaluation of learning outcomes following the research procedures described previously with modifications [13,14].

Population and Sample

This research was conducted during the Covid-19 pandemic in the even semester of the 2021/2022 academic year. The research population is students of the Department of Chemistry Education, Faculty of Mathematics and Natural Sciences (FMIPA), Medan State University, involving 30 undergraduate students. This research has complied with the code of ethics for social research in the field of education set by the University. The explanation of the participation of students as samples in the conduct of the research has been explained, they are informed that they will be the source of research data, and students are given the freedom at
any time to withdraw from their participation in the study if necessary without affecting their academic assessment

Research Procedure

The implementation of the research was carried out through the stages of needs analysis of analytical chemistry learning resources, designing and developing innovative learning resources based on guided inquiry and equipped with supporting devices, and implementing learning resources for teaching Cation Analysis to build thinking skills. The preparation of a guided inquiry-based innovative learning resource package for the subject of Cation Analysis was carried out based on a competency-based curriculum. Learning resources contain complete teaching materials, examples of guided inquiry packages, multimedia integration examples of guided inquiry implementation, observation templates and investigative reports and are packaged in digital format. Standardization was carried out using experts, and continued with revisions and refinements of learning resources.

The implementation of learning resources is carried out as a support for online lectures via zoom. The teaching of Cation Analysis is carried out through the initial evaluation stage (pretest) followed by online learning using the University's e-learning facility, the University Learning Portal System (SIPDA), followed by the assignment of inquiry, and evaluation (subjective and objective). Pretest was conducted to see the students' initial ability on the subject of Cation Analysis. Explanations in using SIPDA were given to students in downloading learning resources, uploading inquiry assignments, discussing with instructors online, and seeing the achievement of scores at each stage of the inquiry task implementation. Learning resources are uploaded to SIPDA. Inquiry assignments were carried out through the stages of investigations including: (1) asking questions, (2) conducting research, (3) reporting the results of the investigation, and (4) sharing information on findings. Inquiry proposal assignments uploaded by students were checked by the instructor, and continued with the implementation of inquiry activities after obtaining the instructor's approval. The inquiry is carried out in the laboratory for a certain period of time to comply with the health protocol regulations set by the university, and the output of the inquiry activity is uploaded by students to get an assessment. At the end of the lecture, a final evaluation (post-test) is carried out using multiple-choice objective tests.

Evaluation of Learning Outcomes

Achievement of competence is measured based on student scores in inquiry assignments and final evaluations. The score for the inquiry task product (Proposal and Report) was obtained based on the assessment of thinking skills in the HOTS category for analyzing skills, evaluating skills, and creating new findings, using an assessment rubric on a scale of 0-100. Learning outcomes are obtained based on mastery of knowledge based on the final evaluation using multiple choice objective tests, and the score is converted to a value of 0-100. The Lickert scale was used to assess the opinion of the respondents through a questionnaire. Standardization of learning resources is carried out using a questionnaire with 4 choices, with the assessment criteria from the strongest (4) Very Appropriate to the lowest (1) Very Disagree. Learning motivation was captured using a questionnaire with 5 answer choices, ranked from (5) Strongly Agree to the lowest (1) Strongly Disagree.
3 Results

Innovative Learning Resources With Guided Inquiry

Inquiry-based innovative learning resources for the subject of Cation Analysis have been arranged relevant to the sub-topic, equipped with an inquiry implementation guide as summarized in Table 1. The teaching materials consist of the sub-subject of Cation Analysis, examples of inquiry and multimedia guided inquiry implementation, problems and tasks of inquiry, observation sheets, report templates, presentation templates, and assessment rubrics are all packaged into digital learning resources using flipbooks. Teaching materials are arranged systematically and attractively which are linked by trusted web hyperlinks.

<table>
<thead>
<tr>
<th>No</th>
<th>Sub-topics’</th>
<th>Description and innovation of guided inquiry-based learning resources</th>
<th>Inquiry instructions and tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Cation Analysis</td>
<td>The teaching materials explain the basic theory of cation analysis, analytical steps for grouping cations into cation groups based on their reactions, and the use of selective precipitating reagents. The innovation is equipped with an inquiry procedure for cation grouping analysis, animation of the implementation of cation grouping inquiry flowcharts, and web hyperlinks for cation analysis.</td>
<td>An example of an inquiry assignment is to make a flowchart of cation grouping based on similarity in nature through the addition of selective precipitants into cation groups.</td>
</tr>
<tr>
<td>2</td>
<td>Cation Grouping and Separation of Single Cation</td>
<td>The teaching material contains strategies for grouping cations based on their solubility, and separating one group into a single cation using selective reagents. The material is equipped with an inquiry procedure to group cations into cation groups and then separate them into single cations. There is a video of the implementation of the inquiry separating a cation group into a single cation using selective reagents, and a hyperlink analysis of the separation of one cation group into single cations.</td>
<td>An example of an inquiry assignment, with the title: Grouping cations into one cation group using selective reagents, and separating them into single cations</td>
</tr>
<tr>
<td>3</td>
<td>Identification and confirmation reactions to cations</td>
<td>Teaching materials consist of identification of the presence of cations, and confirmation of cations using special reagents. The material is equipped with a strategy inquiry procedure to identify single cations, and the use of special reagents to confirm the presence of cations. There is a video showing the implementation of the inquiry as a strategy to identify and confirm the presence of single cations using selective chemical reagents, and equipped with hyperlinks for cation identification analysis.</td>
<td>Examples of inquiry assignments, with the title: (1) Identification and confirmation of the presence of single cations resulting from separation, (2) Separation, identification, and confirmation reactions of cations contained in mineral samples, (3) Separation, identification, and cation confirmation reactions contained in cosmetic samples.</td>
</tr>
</tbody>
</table>
Complete materials of Cation Analysis are available in the References [16]

**Standardization of Learning Resources With Guided Inquiry**

The feasibility of inquiry-based innovative learning resources for teaching Cation Analysis has been assessed by experts, namely Analytical Chemistry lecturers who have experience teaching Analytical Chemistry for at least three consecutive years. The assessment is carried out based on the suitability of the teaching materials and the completeness of learning resources with the competency targets set in the competency-based curriculum for undergraduate students. The results of the respondents' assessments are summarized in Table 2.

**Table 2. Results of standardization of guided inquiry-based learning resource packages and their supporting facilities for teaching Cation analysis**

<table>
<thead>
<tr>
<th>No</th>
<th>Types and criteria of guided inquiry-based learning resources</th>
<th>Respondents opinion* $(M±Sd/v) (n=2)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Content:</strong> The suitability of Cation Analysis teaching materials, examples of inquiry, multimedia and supporting facilities with the target curriculum based on Analytical Chemistry competence.</td>
<td>3.54±0.04</td>
</tr>
<tr>
<td>2</td>
<td><strong>Extension:</strong> Availability of inquiry assignments, inquiry implementation guidelines, templates for proposals, inquiry reports and presentations, media integration, assessment rubrics, and hyperlinks to learn Cation Analysis.</td>
<td>3.55±0.46</td>
</tr>
<tr>
<td>3</td>
<td><strong>Accuracy:</strong> Systematics and accuracy of writing, accuracy of examples for contextual applications of Cation Analysis, and accuracy of writing symbols, terms and chemical formulas.</td>
<td>3.61±0.48</td>
</tr>
<tr>
<td>4</td>
<td><strong>Design:</strong> Design, layout of images, tables and illustrations, typesetting, and color selection on learning resources, multimedia and learning resource support devices.</td>
<td>3.66±0.44</td>
</tr>
<tr>
<td>5</td>
<td><strong>Language:</strong> Appropriateness of language use, grammar, terminology, legibility, simplicity of content in learning resources, and relevance to students' thinking levels.</td>
<td>3.56±0.49</td>
</tr>
<tr>
<td></td>
<td><strong>Average</strong></td>
<td>3.58±0.45</td>
</tr>
</tbody>
</table>

*Description: (4) Very Appropriate; (3) Appropriate; (2) Not Appropriate; and (1) Very Inappropriate.

**Implementation of Innovative Learning Resources With Guided Inquiry**

The implementation of inquiry-based innovative learning resources is carried out in one class due to the limited use of laboratory resources during the Covid-19 pandemic. Blended teaching is applied, teaching online using a zoom meeting and continuing with the implementation of inquiry tasks in the laboratory. Other activities such as discussions, presentations and questions and answers using SIPDA. The inquiry-based learning model greatly influences the achievement of student competencies. Students have been facilitated to learn independently to increase their knowledge, find the right answers in solving cation analysis problems, make plans and carry out inquiry tasks, report findings and present the
results of investigations. Learning achievement is obtained based on subjective assessment of thinking skills and the results of objective assessment.

**Inquiry Learning and Higher Order Thinking Skills**

Students successfully attend lectures and have completed inquiry assignments (proposals and reports) which are uploaded to SIPDA on time. The results of the subjective assessment of the proposal and inquiry report for the three aspects of thinking skills are summarized in Table 3. Student achievement from the inquiry report was very good, on average (M=85.07±1.70). Sequentially scores for analytical skills (M=84.33±2.45), evaluation skills (M=85.17±2.67), and creativity skills (M=85.70±1.74) were all in the very good category.

**Table 3. Subjective assessment of higher order thinking skills based on product proposals and inquiry reports**

<table>
<thead>
<tr>
<th>No.</th>
<th>HOTS Components</th>
<th>Description of thinking skills</th>
<th>Learning achievement score for inquiry tasks (M±Sdv) (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proposal</td>
</tr>
<tr>
<td>1.</td>
<td>Analyze</td>
<td>The ability to think analytically in solving problems using qualitative analysis, including: type of sample, sample treatment, determining precipitating compounds to separate cations, determining specific reagents to be able to discriminate, identify, and confirm the presence of the target analyte.</td>
<td>79.83±3.34</td>
</tr>
<tr>
<td>2.</td>
<td>Evaluate</td>
<td>The ability to think systematically in evaluating an inquiry task to determine cations qualitatively, starting from identifying the target analyte contained in the sample using a theoretical approach, considering several alternative precipitating compounds that are selective to precipitate and separate the target analyte, and decide on the most appropriate strategy in identifying and confirming the target analyte compound in the sample.</td>
<td>81.53±4.96</td>
</tr>
<tr>
<td>3.</td>
<td>Create</td>
<td>Ability to determine the best method for cation analysis, skills in modifying new analytical procedures to get better, faster and accurate findings in qualitative determination of cations.</td>
<td>80.17±4.63</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td></td>
<td>80.51±4.32</td>
</tr>
</tbody>
</table>

*Obtained from a subjective assessment using the criteria in the assessment rubric of the guided inquiry

**The Effect of Inquiry-Based Learning on Learning Outcomes**

The main objective of developing innovative guided inquiry-based learning resources is to facilitate active learning for students to achieve their competencies, which is indicated by increasing knowledge and skills in analytical chemistry needed for life skills afterward.
Student learning outcomes from the implementation of innovative learning resources are summarized in Table 4. There was an increase in learning outcomes as indicated by the average achievement of learning outcomes at the end of learning (M=83.16±4.82) compared to before learning (M=47±9.61). Mastery of students in Cation Analysis is classified as very good.

<table>
<thead>
<tr>
<th>No</th>
<th>Learning evaluation</th>
<th>Learning achievement score (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pretest</td>
<td>47±9.61</td>
</tr>
<tr>
<td>2</td>
<td>Posttest</td>
<td>83.16±4.82</td>
</tr>
<tr>
<td></td>
<td>Difference between posttest and pretest</td>
<td>36.16</td>
</tr>
</tbody>
</table>

**Guided Inquiry Based Learning Resources and Student Learning Motivation**

The success of students in achieving curriculum competency targets is largely determined by the students, because studying in higher education is dominated by motivation in utilizing available learning resources. The effect of the availability of inquiry-based innovative learning resources in facilitating students' active learning has been captured as summarized in Table 5. The learning components that influence students' learning such as confidence, challenge, engagement, curiosity, relevance, and satisfaction are all in the very good category (M=4.34 ±0.83). This result is the effect of the application of inquiry-based learning that motivates students to learn actively independently. The inquiry-based learning resource package motivates students to optimize their learning in analytical chemistry, and is proven by the achievement of competence in the field of analytical chemistry.

**Table 5.** Student learning motivation as the implementation of guided inquiry-based learning resources in Cation Analysis teaching.

<table>
<thead>
<tr>
<th>No</th>
<th>Indicator</th>
<th>Description of learning motivation</th>
<th>Respondents’ opinions (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Confidence</td>
<td>Student confidence in using innovative learning resources for independent active learning and conducting inquiry tasks.</td>
<td>4.20±1.06</td>
</tr>
<tr>
<td>2</td>
<td>Challenge</td>
<td>The suitability of the challenge on the inquiry task with the Cation Analysis material being studied.</td>
<td>4.33±0.84</td>
</tr>
<tr>
<td>3</td>
<td>Engagement</td>
<td>Availability of teaching materials, examples of inquiry, multimedia, and templates to guide students in active learning in completing inquiry tasks independently.</td>
<td>4.40±0.81</td>
</tr>
<tr>
<td>4</td>
<td>Curiosity</td>
<td>Students’ curiosity in finding the best qualitative analysis method for contextual determination of cations in real samples.</td>
<td>4.23±0.7</td>
</tr>
<tr>
<td>5</td>
<td>Relevance</td>
<td>Availability and suitability of teaching materials and inquiry assignments in learning resources with the needs of students studying cation analysis.</td>
<td>4.30±0.79</td>
</tr>
<tr>
<td>6</td>
<td>Satisfaction</td>
<td>The level of student satisfaction in using learning resources on the achievement of competence in the</td>
<td>4.60±0.72</td>
</tr>
</tbody>
</table>
4 Discussion

Analytical chemistry as a compulsory subject for undergraduate students in the Department of Chemistry plays a very important role in building student competence in the analytical field, including separation, identification and determination of qualitative or quantitative [15,16]. Analytical skills must be practiced contextually carried out in the laboratory [17]. Global problems due to the Covid-19 pandemic have forced the implementation of learning to be carried out online to break the transmission of the coronavirus, resulting in the teaching of Analytical Chemistry not being carried out holistically, and minus practices that build analytical skills in the laboratory [18,19]. The application of inquiry-based learning in this study is a blended learning model, a combination of online and face-to-face which is designed to facilitate independent active learning to achieve competence in the field of qualitative analytics. Inquiry-based learning resources developed for the subject of Cation Analysis have been systematically, complete, and digitally based to meet the needs of learning resources for undergraduate students [20]. The learning resources resulting from these innovations are standard based on expert opinion, and have the advantage of guiding students to achieve target competencies. The eligibility criteria for learning resources have been met in terms of content breadth, completeness, accuracy, design, and language [21,22]. The availability of innovative learning resources is an advantage in directing students to actively carry out their inquiry tasks during abnormal times due to the Covid-19 pandemic.

The implementation of inquiry-based innovative learning resources in the teaching of Analytical Chemistry has been proven to be effective in building thinking skills, especially the HOTS category, as a strategy to teach students knowledge and skills in the field of qualitative analysis [23,24]. Innovative learning resources integrated with inquiry tasks have succeeded in helping students learn Cation Analysis. Competence in the field of cation analysis has been achieved as indicated by high achievements in the field of analytical chemistry skills and knowledge. The three thinking skills in the HOTS category have been achieved because students are systematically given the challenge of conducting inquiry activities according to the subject being studied [25,26]. Inquiry activities have helped students think analytically in solving qualitative determination problems. Analytical skills have led students to systematically carry out analytical steps in answering the question of what target analyte is in the sample through the following stages: sample treatment, determining the appropriate precipitating compound, separating cations, identifying and confirming the presence of analytes using chemical reactions. Evaluate thinking is also built through inquiry assignments, where students can evaluate the effectiveness of qualitative determination, especially assessing the effectiveness of the method chosen for qualitative determination. The steps taken are considering several precipitating compounds that can selectively separate the target analyte, and the determination of specific reagents that can correctly identify the target compound. For the success of qualitative analysis of cation determination, students develop creative skills, namely determining good strategies in implementing new cation analysis methods in qualitative determination.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analytical field.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4.34±0.83</strong></td>
</tr>
</tbody>
</table>

*Likert scale: (5) Strongly Agree; (4) Agree; (3) Neutral; (2) Disagree; and (1) Strongly Disagree*
The learning resource package and its supporting facilities guide and motivate students to study actively, carry out inquiry tasks correctly, and solve problems in the field of cation analysis. Inquiry learning is very appropriate to be implemented in teaching chemistry because it can promote analytical thinking, practice critical thinking in evaluating qualitative determination activities, and encourage new thinking in determining cations in the target sample. The inquiry step requires systematic scientific thinking in the HOTS category, starting from asking questions, identifying problems, researching, reporting investigation results, and sharing finding information [27,28]. All of these steps make students directly involved in learning, and ultimately increase knowledge and skills that can be implemented in analysis in solving qualitative determination problems in real life. The availability of guided inquiry-based innovative learning resources has been proven to be effective in bringing students to think critically in problem solving, and has succeeded in improving learning outcomes. This learning model has motivated students to actively study analytical chemistry, and optimize their learning styles independently to achieve competence in the field of analytical chemistry [29-31]. This learning model can be applied to other courses that require increased knowledge and skills, and can be implemented in normal or abnormal situations as a strategy for achieving competence.

5 Conclusion

The guided inquiry model as part of active learning can guide students to carry out systematic investigations. Inquiry-based innovative learning resources have been successfully developed for the teaching of Analytical Chemistry. Learning resources have been implemented in the teaching of Cation Analysis, and are useful to facilitate students' active learning to conduct investigations. The inquiry stage starts from asking questions, conducting an investigation, reporting the results of the investigation, and finally sharing information on the findings of the qualitative determination. Higher order thinking skills in three aspects of skills such as analyzing, evaluating and creativity for the inquiry activity plan (M=80.51±4.32) and inquiry reports (M=85.07±1.70) are classified as good and very good. Students' knowledge in Cation Analysis is very good (M=83.16±4.82). Student competence in analytical field has been achieved for both qualitative chemistry skills and knowledge. The availability of innovative guided inquiry-based learning resources is a good strategy in facilitating students in achieving competence in the field of analytical chemistry, and can be implemented in normal situations and abnormal conditions caused by restrictions on access to work in laboratories during the Covid-19 pandemic.

Acknowledgments. Thanks are conveyed to the Ministry of Education, Culture, Research, and Technology (MoECRT), Directorate of Research, Technology, and Community Service (DRTPM), Through the implementation of the PDUPT Research scheme, Contract No 006/UN33.8/DRTPM/PL/2022.

References


Creative Thinking and Problem-solving Skills for Class X High School Students in Padangsidimpuan City on Climate Change Based on Socioscientific Issues

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Abstract. This study aims to find out how the creative thinking and problem-solving skills of high school students in the city of Padangsidimpuan in the 2021/2022 academic year. This research is descriptive. Where the research subjects were high school students of class X in the city of Padangsidimpuan with a sample of 505 students from SMA N 1 Padangsidimpuan, SMA N 4 Padangsidimpuan, and SMA N 6 Padangsidimpuan. The instrument used in this research is an essay test. The results of this study found that students' creative thinking skills were enough creative with a percentage of 84%. Problem-solving skills of students have a proportion of 79% are in enough category. The relationship between creative thinking skills and students' problem-solving skills is very strong and positive with a coefficient of 0.929. The higher the creative thinking skills, the higher the students' problem-solving skills.

Keywords: Creative Thinking, Problem Solving, SSI.

1 Introduction

The development of the times is increasingly advanced in various fields in human life. Such as education, health, economy, society, and culture. Evidence from the development of the times is marked by a balance between developing science and technology. The development of science and technology started from the first-generation industrial revolution which gave birth to a new history where human power was replaced by a steam engine in the 18th century. This revolution succeeded in raising the value of the economy dramatically.

The industrial revolution developed from the 1.0 industrial revolution to the 4.0 industrial revolution. the developmental stages of the industrial revolution changed the way we worked before. The industrial revolution 4.0 that has developed in our lives can advance economic growth and competitiveness. To deal with this, there is a need for innovation in learning and improving the competence of 21st-century graduates, namely in Learning and Innovation Skills. These skills are human resources to be skilled and master science, especially in the fields of science, technology, engineering, and mathematics. The ability to master science can
understand life processes and the ability to participate in decision-making that affects their lives. Humans who are skilled or understand technology are very useful for the nation to facilitate it in analyzing technology and influencing society, and the State. Mastery of engineering can help humans understand and develop technology. Then mastering mathematics can be useful for human life in analyzing, communicating ideas appropriately, and finding solutions to various problems. These four fields can facilitate human life and advance a country if the education sector can influence others such as the economy, society, and culture. So, the goal of national education is directed at efforts to form the skills and attitudes of individuals in the 21st century.

21st-century skills and attitudes as ways to think (knowledge, critical and creative thinking), ways to learn (literacy and soft skills), and ways to learn with others (personal, social, and civic responsibilities). The US-based Partnership for 21st Century Skills, identifies critical thinking skills, creative thinking skills, communication skills, and collaboration skills as competencies needed in the 21st century. These competencies are known as 4C competencies. [1]

Critical thinking skills are fundamental skills in solving problems. This skill is important for students to have in finding the source of the problem and how to find and find the right solution to the problem at hand. Critical thinking skills can be instilled in various disciplines. Teachers play an important role in designing and developing learning programs that are more focused on empowering these skills. Creative thinking skills are skills related to the skills to use a new approach to solve a problem, innovation, and discovery. This skill is an act that is completely new and original, either personally (original for individuals only) or culturally. [2]

The willingness of students to think about problems or challenges, share those thoughts with others and listen to feedback, are some examples of creative thinking that can be shown by students in their learning. [3] Communication skills are skills to express thoughts, ideas, knowledge, or new information possessed both in writing and orally. These skills include listening, writing, and public speaking skills. Collaborative skills are the skills to work together effectively and show respect for diverse teams, exercising fluency and willingness to make decisions needed to achieve common goals. Group work skills; leadership, decision making, and collaboration. [4]

21st-century education in Indonesia is also developing according to the curriculum. In the character curriculum, there is an explanation of the skills that are needed by students. Therefore, participation from various parties in the world of education is very important. Namely the school and teachers/educators and students. The school prepares students to have several 21st-century skills to play a role in their lives. The role of teachers/educators is

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required to develop student skills so teachers need to prepare all learning tools, namely
curriculum, learning implementation plans, models, or methods that are integrated with 21st-
century learning.

The development of 21st-century skills and attitudes in learning is expected to be owned by
students as one of the keys to progress and success in life. 21st-century skills and attitudes in
learning affect various areas of students’ thinking, namely the cognitive, affective, and
psychomotor domains. The cognitive domain emphasizes intellectual aspects such as
knowledge, understanding, and thinking skills. The affective domain emphasizes aspects of
feelings and emotions such as interests, attitudes, appreciation, and ways of adjustment. Then
the psychomotor domain emphasizes aspects of motor skills such as handwriting, typing, and
operating machines.

The cognitive domain studied in this discussion is students’ thinking skills. According to
Bloom’s taxonomy, thinking skills are divided into two, namely low-level thinking skills and
higher-order thinking skills. Low-level thinking skills are the thinking skills of students who
are still in the stages of C1 (remembering), C2 (understanding), and C3 (applying). These
skills are still in the early stages that must be possessed by kindergarten, and elementary
school students and then gradually move into high-level skills.

According to Bloom's taxonomy, higher order thinking skills (HOTS) in the learning process
are the skills to analyze, evaluate and create. Higher order thinking skills (HOTS) are sought
to be applied in Senior High Schools/Madrasah Aliyah (SMA/MA) and equivalent in various
fields of study, especially learning Biology. One of the four conditions of higher order
thinking skills (HOTS) that students learning Biology must possess is higher order thinking
skills that are more specific, namely, creative thinking skills and problem-solving.

Biology learning is a part of science and has a significant contribution to the development of
technology, namely as the basic science underlying the development of technology. This is
what unites the two into a unit known as Science/IPTEK. Biology learning is also related to
how to find out about nature systematically, mastery of a collection of knowledge in the form
of facts, concepts, or principles, and is a process of discovery.

Biology with the object of study in the form of the real world has consequences for presenting
subjects that relate to everyday life. However, in reality, it is not necessarily implemented in
Biology learning. The world is currently experiencing the effects of the Covid-19 pandemic.
The impact on the world of education has resulted in the inhibition of teaching and learning
activities in larynx schools. So that schools carry out online and offline learning. Teachers are
expected to be able to design media, models, and learning strategies that are appropriate to the
situation that occurs and remain within the 2013 curriculum line. And students are expected to
understand Biology learning.

We know that Indonesia's PISA scores in 2018 placed Indonesian students in 6th place from
the bottom (74) with an average score of 371. This value is low because it is below the
average in the category (literacy, math, and science skills). PISA questions are made by
following per under higher-order thinking skills so that it can be seen roughly that students do
not have overall higher-order thinking skills.

In 2018 and 2019 the average UN scores of Padangsidimpuan city students in Biology
learning were 43.56 and 46.94. Students are not familiar with the UN questions that are made
based on higher-order thinking skills, therefore low scores are obtained. In 2020/2021 the UN
was abolished by the government. With the elimination of the National Examination, it is hoped that schools in Indonesia will familiarize students with learning and solving Higher Order Thinking Skills questions. Especially at this time of online and offline learning teachers are not maximally supervising students for real.[5]

Although learning is carried out online. This does not affect the learning of Biology. Because learning Biology can be pursued by presenting real materials that occur in students' lives so that the essence of the material taught can be fully applied in everyday life. One of the Biology learning materials for SMA/MA, especially class X, which can present material in real terms is the KD. 3.10 and 4.10. About Climate Change. We can feel the phenomena of climate change in everyday life such as low rainfall intensity in some areas that should be high, for example, the Padangsidimpuan city area has a rainfall intensity of 4000 mm in 2016 which is lower than the city of Sibolga with rainfall intensity reaching 4500 mm in 2016. From this phenomenon, students can learn in real terms about climate change. [6]

The presentation of material can be done in Biology learning with the Socioscientific Issues (SSI) approach. SSI is an approach that aims to stimulate intellectual, moral and ethical development as well as awareness of the relationship between science and social life. In addition to thinking skills, students can develop moral and ethical reasoning and integration scientific concepts that have an impact on people's lives. [7]

In a structured way, it is expected that class X high school students in the city of Padangsidimpuan have high-order thinking skills (HOTS) and moral reasoning, especially on climate change material. However, it is not yet known whether higher-order thinking skills (HOTS) have developed. Therefore, this research will use the SSI approach to reveal the creative thinking and problem-solving skills of students of SMA N Class X in the city of Padangsidimpuan on climate change material based on the Socio-Scientific Issue.

Science literacy
Science learning is identical to scientific literacy. Especially with learning the field of Biology. Where this research focuses on learning Biology based on SSI (Socioscientific Issues) with Climate Change material. Therefore, it is necessary to know in advance about scientific literacy. According to Aqil (2017), literacy is a measure of the success of science education in schools, especially biology science lessons. This illustrates the true nature of science learning. [8] Meanwhile, according to Yuliati (2017), scientific literacy is the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence, to understand and make decisions regarding nature and changes made to nature through human activities.

Scientific literacy can be concluded as the ability to use scientific knowledge and participate in scientific learning related to political, economic, social, cultural, state and technology issues in everyday life. Scientific literacy in this research focuses on learning Biology based on Socioscientific Issues. Social issues are a high level of scientific literacy. So high-level thinking skills are needed to achieve high-level scientific literacy and the impact of Socioscientific Issues-based Biology learning.

Creative Thinking Skills

Creative thinking skills are higher-order thinking skills that must be possessed by high school/MA students in the 2013 curriculum. Creative thinking is an ability that most of us are born with and are not natural creative thinkers. Special techniques are needed to help use our brains in different ways. The problem with creative thinking is that by definition almost any idea that has not been examined will sound strange and far-fetched and even insane. But a good solution might sound weird at first. ([9])

Creative thinking can be imaginative thinking, generating many possible solutions, different, and lateral. Critical and creative thinking skills play an important role in preparing students to become good problem solvers and able to make mature decisions and conclusions and be able to be accountable academically. ([10]) Creative thinking ability is the ability or thought process to provide new ideas that can be applied in problem-solving. ([11])

Meanwhile, Brookhart (2010) states that "creative thinking is the brainstorming or putting together of new ideas, and then critical thinking takes over and evaluates how successful the new ideas are". ([12]) Johnson (Suripah, 2019) states, "Creative thinking is a habit of a mind trained based on intuition, imagination, new possibilities, fresh perspectives, and unexpected ideas". ([13]) Then Fogarty & Mc. Tighe (King, Goodson & Spiritual, 2012) states, "Creative Thinking is generating and producing ideas through brainstorming, visualizing, associating relationships, making analogies, inventing, inferring, and generalizing". ([14])

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[10] ibid


The opinion of the experts above can be concluded that creative thinking skills are the ability to train the mind by exchanging thoughts, intuition, and imagination and summing it up to get new ideas, fresh ideas, and solutions to solving problems. The components of creative thinking skills have each indicator listed in table 1 made by Torrence (1969) from http://repository.fkip.unja.ac.id and Setiawan (2016). [15]

Table 1. Indicators of Creative Thinking Skills

<table>
<thead>
<tr>
<th>No.</th>
<th>Aspect</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fluency</td>
<td>• Fast see faults and weaknesses from something object or situation</td>
</tr>
</tbody>
</table>
| 2.  | Flexibility| • Give Miscellaneous interpretation to something pictures, stories, or problems.  
  | | • Apply something draft or different principles.  
  | | • Thinking Miscellaneous different ways to complete problem |
| 3.  | Originality| • Thinking about problems or things that don't once other people think.  
  | | • Give new ideas in complete problem |
| 4.  | Elaboration| • Tends to give a broad and satisfactory answer.  
  | | • Able to build linkages between concept |

The four indicators of creative thinking skills relate to students' creativity. Student creativity can be explored more deeply. Through instruction and practice, all students can develop and improve their ability to think in this so-called higher-order thinking. Creativity involves finding and solving problems. An innovative approach is used to evaluate deficiencies accurately and actions are taken to correct the problem. Creativity involves the relevant aspects of a problem and integrating the parts into a suitable system that integrates new information with what students have already learned.

Treffinger, Young, Selby, and Shepardson. (2002) stated that a person's creativity must have the openness and courage to explore categories of ideas. It includes several personality traits related to a person's interests, experiences, attitudes, and self-confidence. Characteristics in this category that we refer to as openness and courage to explore ideas include; problem sensitivity, aesthetic sensitivity, curiosity, sense of humor, excitement, fantasy and imagination, risk-taking, tolerance for ambiguity, tenacity, openness to experience, emotional sensitivity, adaptability, intuition, willingness to grow, unwilling to accept authoritarian statements without critical examination, and dichotomous or opposite integration. Creative people are naturally curious and open to new experiences and ideas. They usually identify problem areas before others notice them. As a result, they are not afraid of the unknown and can tolerate ambiguity. [16]


The conclusion that can be drawn from the statements above is that creativity is a creative thinking skill that is growing with the support of the environment to get a positive response from oneself such as self-confidence, courage, tenacity, imagination, tolerance, and joy.

**Problem-Solving Skills**

Higher-order thinking skills such as problem-solving are needed in the learning process because learning designed with a learning approach is oriented towards high-level skills that cannot be separated from a combination of thinking skills and creativity skills for problem-solving. Then problem-solving skills are needed in the science learning process because science learning cannot be separated from a combination of thinking skills and creative skills to create new products.

Problem-solving skills are skills that have a strong desire to be able to solve problems that arise in everyday life. According to Picus, Saches, and Smith (1983) problem solving is a process or set of mental operations used in acting from the current situation to the desired goal. [17] Meanwhile, George Polya (Picus, Saches, and Smith, 1983) states that problem-solving is finding an unknown way to a clearly understood ending. [18]

Meanwhile, according to Rahmawati, Sajidan, and Ashadi (2018), problem-solving skills are a kind of expert thinking who has a strong desire to solve problems in life. [19] Krulik and Rudnick (Carson, 2007) also define problem-solving as a method used by individuals who previously gained knowledge, skills, and understanding to meet the demands of unfamiliar situations. The student must synthesize what he has learned, and apply it to new and different situations. [20]

Based on previous statements about problem-solving skills, it can be concluded that problem-solving skills are students' skills in finding solutions by gathering information, knowledge, and understanding to be applied and synthesized in solving problems in everyday life. The steps in problem-solving skills (problem-solving skills) according to Polya (1957) are taken from sources Novitasari, Murni, and Maridi, (2015) in table 2. [21]

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Indicator</th>
</tr>
</thead>
</table>

Table 2. Indicator Problem solving Skills

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[18] Ibid


No. | Component | Indicator |
--- | --- | --- |
1. | Defining the problem | • State the facts regarding the problem.  
• Define a concept or category.  
• Determine the information/data related to the given problem.  
• Determine the details of the problem (time, place, perpetrator). |
2. | Checking the problem | • Identify root causes.  
• Examine the interrelationships (cause and effect) of a given problem.  
• Check the severity of the problem.  
• Checking the solutions that have been done to solve the related problem. |
3. | Planning a solution | • Develop a problem-solving plan based on the root of the problem.  
• Mapping sub-problems and sub-solutions.  
• Choose theories, principles, and approaches to solving related problems. |
4. | Carry out the plans that have been made | • Make a list of problems to be solved.  
• Sequencing work steps related to solutions that have been made.  
• Determine who needs to be contacted for information on implementing the solution. |
5. | Evaluate | • Check the feasibility of the solution made.  
• Make assumptions regarding the solutions made.  
• Estimating the results that will be obtained through the solutions that have been made.  
• Choose the right media to convey and communicate the solutions that have been made. |

Furthermore, according to Winarso, problem-solving is a level that must be solved by an understanding amount of knowledge and work skills and is the result achieved by students after the students concerned experience a problem-solving learning process taught by certain knowledge.

According to Rahmat (Winarso, 2014), 4 factors influence the process of problem-solving, namely motivation, wrong beliefs and attitudes, habits, and emotions.\(^{[22]}\)

Problem-solving skills encourage thinkers to fully understand the practical nature of complex problems and identify approaches to problem-solving. Learning involves self-regulation. Good students can think to monitor themselves, develop their learning strategies, and learn from experience and mistakes. Higher-order thinking is effort. Motivation allows the thinker to initiate creative activities beyond rote memorization and emulation.\(^{[23]}\)

The relationship between creative thinking skills in problem-solving activities is shown by several findings according to Hwang et al, (2007) in Yuliani, Dharmono, Naparin, and Zaini, (2018) defining creativity as the ability to solve problems or produce something useful and new.\(^{[24]}\)


views creativity as the ability to find solutions to problem flexibility. The important role of creativity in problem-solving is also explicitly stated by Nakin (2003) in Yuliani, Dharmono, Naparin, and Zaini, (2018) who view creativity as a problem-solving process.

Problem-solving skills and generating something new are complex activities and are closely related to one another. A problem generally cannot be solved without thinking, and many problems require new solutions for students or study groups. On the other hand, producing something new (objects, ideas) for students, and creating something, includes problem-solving. This means that factual information and concepts are not important. As we have seen, mastery of information is necessary to acquire concepts; both of which must be remembered and considered in problem solving and creativity.

In conclusion, problem-solving skills with creative thinking skills are not related to creative thinking skills to generate new ideas and ideas that can solve a problem. Problems that can be solved are problem-solving skills.

A good problem solver identifies exactly what the problem is with facts and information, what might be a barrier to solving it, and what solutions are expected to work. Then look for creative solutions or strategies and plan them. A good troubleshooter then tries at least one of the solutions. For more complex problems, good problem solvers can prioritize and evaluate the relative effectiveness of different solution strategies. After planning, it is implemented in solving the problem.

**Socioscientific Issue (SSI) in Biology Learning**

Biology learning in SMA/MA equivalent in class X about environmental change is discussed in chapter 10 environmental/climate change and waste recycling. Climate change occurs in both natural and artificial ways. Climate change naturally occurs in time with nature. However, artificial climate change occurs due to human actions in a short time and destroys nature. Climate change due to human actions are caused by science and technology used by humans. The increasingly sophisticated science and technology have a negative side in the globalization of civilization on this earth. The negative effect that penetrates various fields such as social, economic, and others are called the Sosisintifik Issue.

According to Janasoff, advances in science and technology are constantly creating new intersections between science and society which result in complex and often controversial issues. One of the problems discussed above is climate change. According to research by the National Research Research Council and the NGSS Lead States, SSI instructional instruction has emerged as effective instruction for students to contextualize their science learning in complex social and political contexts.
According to Putriana, Suryawati, Suzanti, and Zulfarina (2020), SSI learning has several benefits, namely, (1) growing awareness or science literacy in students so that they can apply evidence-based scientific knowledge in everyday life, (2) the formation of social awareness where students can reflect on the results of their reasoning, (3) encourage argumentation skills in the process of thinking and reasoning scientifically on a phenomenon that exists in society, and (4) improve critical thinking skills which include analyzing, making conclusions, providing explanations, evaluating, interpret, and perform self-regulation. Therefore, learning Biology based on Socioscientific issues (SSI) is following the development of technology and science in this era.

According to Evagorou et al., (Espeja and Digna, 2015), Socio-scientific Issues (SSI) are socially controversial (or socially living) topics or issues that have a scientific component but also include other disciplines and interests (politics, economics, ethics, etc.) and which involves the evaluation of moral and ethical aspects. Meanwhile, Anagüna and Muhammet (2010) stated that the features of the socioscientific issue are current events, having a scientific basis, and effects on the lives of individuals and society. The socioscientific issue in science and technology education is to inform individuals in society through education and create awareness about the effects of scientific and technological developments on human life or health.

Ratcliffe (2003) states that this problem lies within scientific knowledge. According to him, socioscientific issues consist of everyday issues and affect the lives of individuals and society negatively or positively. Bossér (2018), in his book on Socioscientific issues (SSI), implies that utilizing issues that have a basis in science and have an impact on society addresses personal, local, national, and global dimensions. Typically, dealing with SSI involves evaluating sometimes incomplete, conflicting information, and considering values, both one's own and that of others, regarding the issue under consideration.

Based on the statements of the researchers about the Socioscientific issue (SSI) is an educational approach with the topic of discussing issues of technology and science that have an impact on society, which aims to stimulate students' cognitive, affective and psychomotor

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abilities. The component of the Socioscientific issue (SSI) taken from Ziedler et al. (2005) can be seen in table 3.

Table 3. Socioscientific issue (SSI) Components in Biology Learning

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Scientific content</td>
<td>Climate change</td>
</tr>
<tr>
<td>2.</td>
<td>Life experience</td>
<td>Surrounding environment</td>
</tr>
<tr>
<td>3.</td>
<td>Cognitive and Moral development</td>
<td>1. Creative thinking skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Problem-solving skills</td>
</tr>
</tbody>
</table>

The socioscientific issue (SSI) in this study is focused on showing students’ creative thinking skills and problem-solving skills which are discussed on the topic of climate change in class X SMA/MA or equivalent. So that the material is adjusted to the 2013 Curriculum with an analysis of KD material on environmental/climate change and waste recycling in table 4.

Table 4. Basic Competency Analysis for class X SMA/MA Materials on Environmental/Climate Change and Waste Recycling with Potential Socioscientific Issues (SSI)

<table>
<thead>
<tr>
<th>Code</th>
<th>Basic Competence</th>
<th>Climate Change Socioscientific Issue (SSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.10</td>
<td>Analyze data on environmental changes and the impact of these changes on life.</td>
<td>1. Environmental damage/environmental pollution</td>
</tr>
<tr>
<td>4.10</td>
<td>Solving environmental problems by designing waste recycling products and environmental conservation efforts.</td>
<td>2. Solutions and efforts for environmental preservation.</td>
</tr>
</tbody>
</table>

Materials on environmental/climate change and waste recycling with potential Socioscientific issues (SSI) are associated with environmental problems that occur in the area. focuses on the province of North Sumatra and specifically in South Tapanuli.

2 Method

Study descriptive done in the city Padangsidimpuan with subject study students of SMA N 1 Padangsidimpuan, SMA N 4 Descriptive research was conducted in the city of Padangsidimpuan with the research subjects of 505 students of SMA N 1 Padangsidimpuan, SMA N 4 Padangsidimpuan and SMA N 6 Padangsidimpuan. The instrument used is an essay test on creative thinking skills with as many as 5 questions and problem-solving skills with as many as 5 questions. The essay questions are adapted and modified from PISA questions and Biology olympiad questions where the material is adapted to the issues of everyday life. This is supported by the statement of Ratcliffe (2003), which states that Socioscientific Issues consist of everyday issues and affect the lives of individuals and society negatively or positively. Then the essay questions were validated by three expert lecturers and declared

valid. Then the students answered the essay questions in 75 minutes. After the students answered the researcher assessed the students’ essay questions. On creative thinking skills, students’ answers are assessed based on each indicator. Can be seen in table 5.

Table 5. Category Each Indicator of Creative Thinking Skills

<table>
<thead>
<tr>
<th>Category</th>
<th>Fluency</th>
<th>Flexibility</th>
<th>Originality</th>
<th>Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Writing down the answer correctly with a total score of &gt;5</td>
<td>Writing answers from various aspects with 3 answers</td>
<td>Having original information with a score of 3</td>
<td>Having an elaboration with a score of 3</td>
</tr>
<tr>
<td>Moderate</td>
<td>Writing the answer correctly with a total score of 3-5</td>
<td>Writing down answers from different aspects with 2 answers.</td>
<td>Having the original answer with a score of 2</td>
<td>Having the original answer with a score of 2</td>
</tr>
<tr>
<td>Low</td>
<td>Having the original answer with a score of 3</td>
<td>Writing answers from different aspects with 2 answers.</td>
<td>Having an original answer with a score &lt; 2</td>
<td>Having an elaboration with a score &lt; 2</td>
</tr>
</tbody>
</table>

After the assessment is based on table 5, the student scores are categorized based on table 6 below.

Table 6. Category Creative Thinking Skills Score

<table>
<thead>
<tr>
<th>No.</th>
<th>Creativity Value</th>
<th>Percentage (%)</th>
<th>Category Ability Think Creative Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>66-75</td>
<td>88-100</td>
<td>Creative</td>
</tr>
<tr>
<td>2.</td>
<td>56 – 65</td>
<td>74-87</td>
<td>Enough creative</td>
</tr>
<tr>
<td>3.</td>
<td>46 – 55</td>
<td>61-73</td>
<td>Less creative</td>
</tr>
<tr>
<td>4.</td>
<td>35-45</td>
<td>47-60</td>
<td>Not creative</td>
</tr>
</tbody>
</table>

Students’ answers on problem-solving skills were scored based on each indicator. The indicator for defining the problem is given a value of 4, the indicator for examining the problem is given a value of 4, the indicator of planning a solution is given a value of 3, and the indicator of implementing the plan that has been made is given a value of 3 and the indicator of evaluating is given a value of 4.

Table 7. Category Problem Solving Skills Score

<table>
<thead>
<tr>
<th>No.</th>
<th>Student Problem Solving Skills Score Interval</th>
<th>Percentage (%)</th>
<th>Category Student Problem Solving Skills Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15-18</td>
<td>83-100</td>
<td>High</td>
</tr>
<tr>
<td>2.</td>
<td>10-14</td>
<td>56-82</td>
<td>Enough</td>
</tr>
<tr>
<td>3.</td>
<td>5-9</td>
<td>28-55</td>
<td>Low</td>
</tr>
</tbody>
</table>

Then, the correlation test was carried out. This test was conducted to determine the degree of relationship between the variables in the study. Is the relationship between variables closely related and unidirectional or not related at all? This is done by using a non-parametric correlation test using SPSS 25. The correlation test on the variable creative thinking skills with problem-solving skills using the Spearman Rho correlation test.

3 Results and Discussion

The creative thinking skills of class X IPA students of SMA N Padangsidimpuan for the 2021/2022 academic year for more details can be seen in table 8 below:

Table 8. Creative Thinking Skills of Class X Science Students at SMA N Padangsidimpuan on Climate Change

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Score</th>
<th>Percentage (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fluency</td>
<td>84</td>
<td>84%</td>
<td>Enough</td>
</tr>
<tr>
<td>2.</td>
<td>Flexibility</td>
<td>95</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Originality</td>
<td>80</td>
<td>Enough</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Elaboration</td>
<td>76</td>
<td>Enough</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>84%</td>
<td></td>
<td>Enough</td>
</tr>
</tbody>
</table>

Based on table 8 which has been shown, it shows that the students of class X IPA SMA N in the city of Padangsidimpuan have enough creative thinking skills which are shown in an average percentage of 84%. Of the five indicators of students' creative thinking skills on climate change material, the highest indicator of flexibility is obtained with an acquisition of 95%. The percentage of students who have not achieved creative thinking skills is around 16%. More details can be seen in the image below.
Table 9. Profile of Creative Thinking Skills of Class X Science Students at SMA N Padangsidimpuan on Climate Change

<table>
<thead>
<tr>
<th>Category</th>
<th>Interval</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative</td>
<td>66-75</td>
<td>96</td>
<td>19.01%</td>
</tr>
<tr>
<td>Enough Creative</td>
<td>56-65</td>
<td>13</td>
<td>2.57%</td>
</tr>
<tr>
<td>Less Creative</td>
<td>46-55</td>
<td>167</td>
<td>33.07%</td>
</tr>
<tr>
<td>Not Creative</td>
<td>34-45</td>
<td>229</td>
<td>45.35%</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td>505</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 9 shows that students have creative thinking skills with a very high category as many as 96 students with an overall percentage of 19.01%. Then the high category has 13 students with an overall percentage of 2.57%. Furthermore, in the category of less creative as many as 167 students with an overall percentage of 33.07%. And the not creative category has 229 students with an overall percentage of 45.35%. So, the students of class X IPA SMA N Padangsidimpuan from the number of subjects 505 students obtained different categories according to their ability to answer and analyze questions. The following can be seen in the general description of the level of creative thinking skills of students in class X IPA SMA N Padangsidimpuan:

Fig. 2. Profile of Creative Thinking Skills of Class X IPA SMA N Padangsimpan on Climate Change

Creative thinking skills possessed by students on climate change material are based on students' ability to come up with answers with the indicators being in enough creative category with a percentage of 84%. We look at the average indicators that often appear are indicators of fluency and flexibility. Students can display 2 indicators of the four indicators of creative thinking skills categorized as enough creative. While the indicators of originality and elaboration are still not shown in the students' answers. Then the students in the low category were 45% with a total of 229 students. Then the second highest category is less creative with a
total of 167 students and a percentage of 33%. In the next category, namely the creative
category as many as 96 students with a percentage of 19% and the last category is quite
creative as many as 13 students with a percentage of 13%. This shows that students have low
creative levels. So that after totaling it can be concluded that all students have creative
thinking skills, students are in the category of enough creative.

The level of creative thinking skills of students is enough creative, which means that students' creativity needs to be improved to enter the high category. The times are getting higher and the quality of education must be improved. students' creative thinking skills are in the sufficient category because other indicators are still in the sufficient and low categories.

The creative thinking skills possessed by students are still in the sufficient category because the learning process has not been handled properly. And the need to encourage students' motivation to learn actively and improve students' creative thinking skills. In the Biology learning process in the city of Padangsidimpuan, much online learning is carried out. In this learning, many students do not fully focus on the teacher's direction in learning. When the teacher gives the exercise there are still many students who do not understand the steps to completing it.

Students do not fully carry out the tasks given by the teacher. There are still many parents or other people who do the student's practice assignments. so that students do not get an adequate learning experience. The learning method given by the teacher is still boring for students. so that the need for teachers to teach with a learning method approach that attracts students' interest and makes students experience firsthand such as the socioscientific issues learning approach. Students also need to be stimulated so that they can develop their creative thinking skills by carrying out mini projects and reading information on surrounding phenomena. So that students remember and stimulate different ideas. Next, Problem-solving skills student of class X IPA SMA N Padangsidimpuan Year The teaching of 2021/2022 is in the following table 10:

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Score</th>
<th>Percentage (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Defining the problem</td>
<td>82%</td>
<td>Enough</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Checking the problem</td>
<td>75%</td>
<td>Enough</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Planning a solution</td>
<td>75%</td>
<td>Enough</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Carry out the plans that have been made</td>
<td>79%</td>
<td>Enough</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Evaluate</td>
<td>85%</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>79%</td>
<td>Enough</td>
<td></td>
</tr>
</tbody>
</table>

Based on table 10 which has been shown, it shows that the students of class X IPA SMA N in the city of Padangsidimpuan on climate change have problem-solving skills in the good category which are shown in the average percentage of the overall indicators of 79%. The percentage of problem-solving skills that have not been achieved is 21% of the total 100%. For clearer data acquisition of each indicator of student problem-solving skills can be seen in Figure 3 below:
Problem-solving skills of students have a percentage of 79% which is in the high category. What can be explained by the data on the number of students who answered the questions? Students who answered each question were assessed and categorized by their percentage and on a pie chart. The category of problem-solving skills for students of Class X IPA SMA N Padangsidimpuan in Biology learning for the 2021/2022 academic year is presented in Table 11 as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>interval</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>15-18</td>
<td>308</td>
<td>60.99%</td>
</tr>
<tr>
<td>Enough</td>
<td>10-14</td>
<td>124</td>
<td>24.55%</td>
</tr>
<tr>
<td>Low</td>
<td>5-9</td>
<td>73</td>
<td>14.46%</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td>505</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 11 shows that students have problem-solving skills with a very high category as many as 308 students with a percentage of 60.99%. Then the high category has 124 students with a percentage of 24.55%. Furthermore, in enough category, there were 73 students with an overall percentage of 14.46%. And in the low category, there are no students who answer. So, the students of Class X IPA SMA N Padangsidimpuan from the number of subjects 505 students obtained different categories according to their ability to answer and analyze questions. The following can be seen in the general description of the level of problem-solving skills of students of Class X IPA SMA N Padangsidimpuan:
The level of problem-solving skills of students is in the sufficient category, which means that students are quite capable of solving problems related to climate change material. Problem-solving skills are a kind of thinking that has a strong desire to solve problems in life. Problem-solving skills in evaluating indicators have a percentage of 85% in the high category. This indicator shows that students are declared to have been able to evaluate the solutions to be used and can estimate the results. Other indicators are in the sufficient category where students are quite able to solve problems. With an unsatisfactory solution.

The basic knowledge of students who are still lacking causes students to give inadequate answers. Less motivation to learn and less interactive learning methods cause students to feel burdened in finding knowledge information from books, the internet, and other social media. The problem of natural disasters, namely COVID-19 that occurred in Indonesia is one of the reasons students are less motivated in learning. Because the learning process is adapted to environmental conditions, students carry out online learning with insufficient time.

Lack of student creativity causes students' problem-solving skills to be lacking. This statement can be seen from the correlation test on students' creative thinking skills with students' problem-solving skills. The results were obtained by the coefficient of 0.929**. This means that the level of relationship (correlation) between creative thinking skills and problem-solving is very strong. The sign (**) means that the correlation is significant at 0.01. The coefficient of 0.929 is positive so the relationship between the two variables is unidirectional. This means that the higher the students' creative thinking skills, the higher the students' problem-solving skills.

So, the need to improve creative thinking skills so that students' problem-solving skills also increase. Student creativity is not obtained from birth but through effort and hard work. Students need to learn and get adequate information. Then the teacher becomes a facilitator by facilitating student learning. So, teachers need to improve students' teaching abilities, either directly or indirectly. Such as teaching with an interesting learning method approach, conducting experimental activities, and directing students to explore and adapt to developing
technology. Teachers should also try to understand students to know the steps for learning that can motivate and improve students' creative thinking skills and problem-solving skills.

4 Conclusion

Based on this research, the profile of creative thinking skills of SMA N Padangsidimpuan class X IPA students were in enough creative category with an average score of 84%. Then the problem-solving skills of SMA N Padangsidimpuan class X IPA students are in the good category with an average value of 79%. Between creative thinking skills and problem-solving skills are very close. So, it is necessary to increase students' creativity to improve their problem-solving skills. Teacher intervention is needed to train and help students improve students' creative thinking skills and problem-solving skills.

Acknowledgments. The authors would like to thank the principal at SMA N Padangsidimpuan who has given permission to conduct the research.

References

The Effect of Implementation of Portfolio Assessment on The Achievements of Pre-Writing Development of Children Aged 4-5 Years at The Character and Education Center Kindergarten Pekan Tolan T.A 2021/2022

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Abstract. Pre-writing is the most basic stage of writing skills. The development of pre-writing achievement is expected to be known early on. An appropriate assessment method is needed to see these developments. In the world of education, portfolios are used to see the progress of students from time to time based on a collection of learning activities. This study aims to see how portfolio assessment has an influence on the development of pre-writing achievement. The research method used is qualitative research. The research was conducted at the Character and Education Center of Pekan Tolan Kindergarten. The research subjects were children in Group A totaling seven people. The results of the study indicate that portfolio assessment has a positive impact on the process of monitoring the development of pre-writing achievement, where with the use of portfolio assessment, the development of children’s pre-writing achievement can be well known

Keywords: Pre-writing, Portfolio Assessment

1 Introduction

Since birth, children have brought their respective potentials to be ready to be developed in the environment. Every child goes through a different developmental process. Early childhood development includes physical development, cognitive development, language development, social development, moral development, emotional development, personality development, and religious development. Along with the emergence of a new paradigm that develops in society about "the importance of writing activities to be mastered by a child", it tends to encourage parents to teach their children to write as early as possible. Writing that is expected by these parents is where their children are expected to be able to write letters and words correctly and well in accordance with the direction and guidance of their parents. This is certainly contrary to the facts on the ground about the practice of writing in PAUD institutions. Early Childhood Age is the age that children are expected to be able to develop their pre-writing abilities [1]. Children's pre-writing development often experiences obstacles
because children still have difficulty in writing, even in holding a pencil the child is still stiff in moving the pencil to write. It is known from the results of the letters written by the child that do not match the example given by the teacher[2].

It's good before the child is ready to write, the teacher introduces activities to support writing skills or what are usually called pre-writing activities, namely the child can make shapes using stationery in accordance with the scope of development which includes: 1. Draw a flat, upright, right angled line, left slanted, curved over and over again with the stationery gradually. 2. Follow the cross (+ and x) shapes of circles, squares, and triangles in stages. 3. Follow the numbers 1-10. 4. Imitate simple shapes by showing them briefly. 5. Draw cross shapes, circles and triangles in stages. 6. Draw freely with the available points, circle lines, rectangles, triangles, and squares. This is an ability that must be achieved by early childhood, with good and continuous stimulation. Meanwhile, according to another opinion, there are five stages of initial writing, namely: a) the stage of crossing out (aged 2.5 to 3 years), b) the stage of linear repetition (age 4 years), c) the stage of writing randomly (age 4 to 5 years), d) the stage of writing names (aged 5.5 years), e) the stage of writing short sentences (ages over 5 years)[3].

This is confirmed by a statement that explains that the pre-writing ability of early childhood in question is the ability to write which can be done in various ways, such as drawing, crossing out, writing various forms, spelling and in a natural way or writing naturally without any guidance and support. referrals from others [4]. Therefore, in order for the development of each child's ability to develop properly and in accordance with its growth and development which can later be accepted by their respective parents, it is necessary to have an assessment process that can show the development of each child's abilities from time to time. The assessment in question is an appropriate assessment to measure (success or failure) a learning process as well as feedback for teachers and students. For students, assessment can be used as material for evaluating the extent to which their abilities have developed from the results of the learning process. Meanwhile for teachers, assessment can be used as an objective evaluation tool to measure the extent to which the ability and success of teachers in implementing and delivering the learning process.

Learning assessment is carried out by the teacher on every work made by students. Apart from the work, teacher notes containing observations about children can also be used in the learning assessment process. These (such as coloring, matching, individual checklists, teacher comments) can be archived or collected in folders or otherwise. A collection of assignments or student work and teacher notes within a certain time, for example a month, can be viewed again. Teachers and children choose a certain time to view the collection of tasks to talk about the results that have been obtained by the child as well as choose which tasks will be stored and archived later. This process is then known as assessment using a portfolio. Portfolio is a collection of assignments or works that have been selected and have been provided with comments or notes from the teacher that have been archived[5].

This is in line with research which shows that an effective portfolio is used by teachers as a strategy for developing social emotional skills in early childhood, especially in choosing activities to be carried out by children and presenting the work produced by children[6]. However, in the implementation process, this portfolio assessment still encounters several obstacles, both obstacles that come from teachers/educators, from students and from parents whose involvement in this portfolio assessment process is required. The obstacle that is still encountered in the implementation of the portfolio assessment process is that the teacher is
still unable to develop a portfolio assessment, so that the child's portfolio assessment is still in the form of children's work collected in one stopmap which will be divided at the end of the semester. Then the teacher does not have an assessment rubric for every activity carried out by the child to be able to assess how creative the child is\[7\]. In addition, the lack of understanding of the implementation of portfolio-based assessment by teachers is one of the causes of problems in the implementation of portfolio assessment. Besides that, the lack of involvement of parents in conducting portfolio assessments makes these assessments sometimes carried out by teachers outside of learning hours\[8\].

Based on observations and observations made at the Character and Education Center Kindergarten in Pekan Tolan, the achievement of the development of children's pre-writing abilities has not yet reached the desired development. This can be seen from the writing that is still not in accordance with the examples given by the teacher, the child has difficulty in imitating the letters so that the results are not appropriate, the teacher only gives examples of writing on the blackboard and only writes in a book and then asks the child to follow it also causes developmental achievements. Children's pre-writing has not been maximized. This problem is increasingly difficult to overcome because in the process the achievement of the development of children's pre-writing abilities is not monitored properly and correctly. The process of carrying out an assessment of the achievement of children's pre-writing development has not been carried out optimally, the assessment that has been carried out is carrying out a collection of documents made by children and then archived into a folder. From some of the portfolio data obtained from the TK Character and Education Center to date, there is no specific portfolio assessment to see the development of children's pre-writing abilities starting from the stage of doodling until the child is able to write a simple sentence. This is due to the teacher's lack of understanding and awareness of what aspects of development should receive important attention for an assessment in order to determine the development of each student's ability so that in the end there are some aspects of development that are overlooked.

Some of the reviews above and the results of the observations obtained are then the background for conducting research related to the influence of Implementation of Portfolio Assessment of Pre-Writing Development Achievements Children Age 4-5 Years at Kindergarten Character And Education Center Pekan Tolan T. A. 2021/2022.

2 Theory

Pre-writing begins with the development of fine motor skills, giving children a lot of experience to manipulate objects, touch and feel things, pick up beads, turn on switches, rotate objects, operate keys is very helpful in developing small muscle development. Pre-writing is the most basic stage of advanced writing skills. Pre-writing is a stage of the process of developing the basic abilities of children through scribbles, whether it is scribbles and lines without real meaning, which are made by children before writing letters, words and sentences. Pre-writing skills provide children with the necessary tools so that, when they are mature and chronologically prepared, they can write fluently without frustration. Pre-writing skills cover many aspects such as the ability to hold a pencil, thicken lines and patterns, bold shapes, copy letters, and so on. There are several types of pre-writing activities that have been used such as drawing, copying, and tracing\[9\].

Portfolios were first used by photographers and artists. Through portfolios, photographers can show their work to customers. In general, a portfolio is a collection of documents in the form of an assessment object used by a person, group, institution, organization or company that aims to document and assess the progress of a process.\[10\].

In the world of education, portfolios can be used to see the progress of students from time to time based on a collection of works as evidence of a learning activity. The results of the work of students is a process used by teachers to find out how the learning process of their students.

The Portfolio Assessment itself is a collection of child and teacher work data from informal assessments and performance to evaluate development and learning. Portfolio assessments can be kept only by and for children, with examples of work over a period of time. These can also be arranged by the teacher and contain observation reports, checklists, work samples, lead assignment notes, interviews, or other evidence of accomplishment. There are child portfolios, teacher portfolios, and combinations that include entries made by both the child and the teacher\[11\].

In principle, every action student learning must be given an assessment. The purpose of the assessment to motivate and encourage students. These assessments will later become material for portfolio assessments. In addition, portfolio assessment materials can also be taken from the results of student work, such as Student Worksheets, summary results, pictures, clippings, group work results, test results, notebooks and other personal matters of students. Audio-visual equipment, video or diskettes can also be a source of portfolio assessment material.

3 Result and Discussion

Some of the results obtained which are discussed in this study are that the environmental arrangement in the process of implementing a portfolio assessment can be carried out in several stages, where one of the most important stages is the stage before the learning process begins. At this stage what needs to be prepared is how to arrange the environment such as classroom arrangement both indoors and outdoors. Classes prepared to carry out learning activities are in accordance with the theme and arrangement of activities as outlined in the RPPH daily learning implementation plan. The management and arrangement of the learning environment cannot be separated from efforts to create a good learning environment for children. Starting from the management in choosing a learning location to setting a place for children to learn. As for realizing a learning environment that meets expectations, the learning environment needs to be developed based on the following principles: (1) reflecting the child's taste, (2) oriented towards optimizing children's development and learning, and (3) based on learning efficiency. Structuring the learning environment needs to be done so that learning activities can be carried out optimally with the hope that the results obtained by children are also in accordance with the expectations of the desired developmental achievements. A supportive learning environment will certainly make it easier for children to understand every lesson given by the teacher, so that in this way children are expected to develop well according to the desired developmental achievements, especially in this case the achievement of children's pre-writing development.

After the preparation stage has been completed, the next step that needs to be considered is the process of implementing the portfolio assessment itself, where in its implementation, the portfolio assessment can be carried out through three stages, namely: 1) the preparation stage,
at this stage the teacher makes a plan and pours the plan into a guide which in this case is called the RPPH, 2) the implementation stage, at this stage the teacher carries out learning activities in full based on the guidelines previously made in the RPPH, and 3) the assessment stage, the teacher evaluates the work or tasks that have been done by the child using the assessment standards that have been made previously.

To carry out this portfolio assessment stage, documents are needed that will later support the implementation process, these documents can later be obtained from work (work) for a certain period of time. It can also be organized by the teacher from the results of observation reports, interviews or other evidence. All this data which will later be collected into one and stored in a folder or folder that has been given the name of each child.

The documents that have been obtained will be the main data that will be used in the implementation of the portfolio assessment that will be carried out. Portfolio assessment is a class-based assessment of a collection of children's work that is systematically and organized which is taken during the learning process within a certain period of time, used by teachers and children to monitor the development of children's knowledge, skills and attitudes in certain learning. The teacher's assessment must be in accordance with the needs to be seen. This means that all possible assessments that have been entered can be analyzed. Assessment at the TK Character and Education Center uses a BB (not yet developed), MB (starting to develop), BSH (developing as expected), BSB (very well developed) scale. Where this scale will be a benchmark for child development.

Meanwhile, the instruments used at the Character and Education Center of Pekan Tolan Kindergarten are daily, monthly and semester instruments. At this stage in making the portfolio instrument consists of determining the assessment criteria that will be used in accordance with the achievement indicators. All the assessment criteria are outlined in an assessment format. The assessment format used to see children's pre-writing achievements is in accordance with the achievement indicators that have been determined in the curriculum. 13. The thing that the teacher needs to do is that the teacher must present the task according to the guidance of the core competencies and basic competencies. After that, the teacher observes and assesses the children's documents. From the structured instruments, we can see step by step the child's development to what extent the child is developing and what the child lacks so that the teacher takes action or what solutions are taken to help the child's growth and development, especially the child's pre-writing ability.

In carrying out a portfolio assessment, parental involvement is very important in assessing a child's portfolio. In accordance with the results of existing research, it is said that a portfolio assessment based on parental participation can be applied in learning. This means that communication between teachers and parents is increasing. Meanwhile, parents feel happy to be involved in the assessment of their children. Parents are more active in paying attention to their children's learning abilities [12]. However, in reality, the involvement of parents in portfolio assessment at the Character and Education Center of Pekan Tolan Kindergarten has not gone well. The involvement of parents is only at the time of taking the report card where the teacher explains the child's development to the parents. Meanwhile, the involvement of children in their own assessment is an advantage to develop a mental process of self-regulation and encourage children to apply, analyze, synthesize, and evaluate the achievements they have obtained during the learning process [13]. The involvement of children in portfolio assessment includes children doing activities by producing a work where
the child is asked to explain the results of the work then the teacher writes it down on a portfolio document sheet.

Based on the results of research conducted at the Character and Education Center of Pekan Tolan Kindergarten on the impact of portfolio assessment on the achievement of pre-writing development of children aged 4-5 years, it is concluded that the use of portfolio assessment helps in monitoring the achievement of pre-writing development of children. With a portfolio assessment of children's developmental achievements, this makes it easier for teachers to provide further learning that is needed in accordance with the current developments achieved by children. In other words, the portfolio implementation carried out by the teacher has provided a comprehensive picture of a child's pre-writing development, because the portfolio can be used as a means to obtain a dynamic picture of a child's ability, understand and be critical about interpreting information, using creativity and innovation in solving problems, and express ideas concisely and effectively.

4 Conclusion

From the results of the portfolio assessment that has been obtained, it can be concluded that the implementation of the portfolio assessment conducted at the Character and Education Center of Pekan Tolan Kindergarten has had a positive impact on the process of monitoring the achievement of each child's pre-writing development, this can be seen from the results of developmental achievement 7 children who are the subject of research where, from the available data, it can be seen clearly the achievement of children's pre-writing development. 5 children have been able to reach the stage where they are able to carry out their own activities independently, namely writing their own names, while 2 children still need help or guidance from the teacher in carrying out their own name writing activities. From these results, it is hoped that in the future this can provide convenience for teachers to determine further learning that can be given to children so that the achievement of these developments can be more perfect and maximal.

References

Analysis Of Technological, Pedagogical, Content Knowledge (TPACK) Biology Teachers Ability In Medan City Toward Genetically Modified Organisms (GMO) Socioscientific Issues

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Abstract. This study aims to analyze the ability of Technological Pedagogical Content Knowledge (TPACK) in high school biology teachers in Medan Toward Genetically Modified Organisms (GMO) Socioscientific Issues. The method used is descriptive research, where researchers do not provide treatment to the object of research. Researchers only retrieve data without any changes. The sampling technique used is total sampling by 43 teachers from 21 state senior high school (SMA) in Medan City. Data collected through the charging instrument TPACK. Analysis of data by encoding based on seven categories in the framework TPACK (CK, PK, TK, PCK, TPK, TCK, TPACK) by using descriptive qualitative techniques. In details, Pedagogical Knowledge (PK) average score was 57.6 (good enough). Content Knowledge (CK) was 53.49 (quite good). Technological Knowledge (TK) was 81.8 (very good). Pedagogical Content Knowledge (PCK) was 60.9 (quite good). Technological Content Knowledge (TCK) was 60 (fairly good). Pedagogical Knowledge (TPK) was 40 (bad). Technological Pedagogical Content Knowledge (TPACK) was 60.47 (quite good).

Keywords: Analysis, Cognitive Ability, TPACK

1 Introduction

In the 21st century, the latest science, technology, and art in the field of education are experiencing developments. 21st century teachers are required to have knowledge of technology and its use in learning and learning in addition to having knowledge of the material being taught and how to teach it. Technological knowledge in question is knowledge and skills in using various technological devices, both traditional and modern to facilitate learning and improve learning outcomes.

Material knowledge and pedagogic knowledge possessed by teachers must be balanced with technological knowledge. According to Prensky (2001) [1], educators currently referred to as "Digital Immigrants" must be able to adjust planning and learning activities that are suitable for students who are referred to as "Digital Natives", themselves and learn with the latest aspects of digital technology. Meanwhile, Digital Natives are the generation who were born in the digital
era and have been treated to technology from an early age. They live in an environment that is familiar with computers, the internet, cellular phones, and video games. on the digital technology.

Teachers or educators according to Law Number 20 of 2003 (Undang-Undang Nomor 20 Tahun 2003), National Education System Article 39, paragraph 2 (, Sistem Pendidikan Nasional Pasal 39, ayat 2 ) concerning Education Personnel states that "educators are professionals in charge of planning and implementing the learning process, assessing learning outcomes, conducting guidance and training and conducting research. and community service". Furthermore, Law Number 14 of 2005 (Undang-Undang Nomor 14 Tahun 2005 ) concerning Teachers and Lecturers states that teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing and evaluating students in early childhood education through formal education, basic education and education. medium. From the two definitions above, it can be concluded that the role of teachers is very important to create a quality generation in the future.

Teachers have a role in planning and implementing the learning process, as well as conducting assessments, research, assessments and communication liaisons with the community [2]. One of the important factors for the success of a learning process can not be separated from the quality of the teacher. This is in line with the notes in the McKinsey report which states that "the quality of the education system is unlikely to exceed the quality of its teachers" [3]. So it is expected that today's teachers must have the ability in accordance with the times.

According to the Kemdikbudristek Team (2020) [4], there are various issues that contribute to the low learning outcomes of Indonesian students. First, the pedagogy and teaching effectiveness of Indonesian teachers still need to be improved. Teachers often act as knowledge transmitters, not learning facilitators. Many teachers allegedly do not focus on character development and arouse the desire to learn. In the case of the teacher asking questions, about 90% (ninety percent) of the student responses are only one-word answers. The teacher's way of asking questions is shallow, does not support the emergence of higher order thinking skills and the ability to explain logical thinking.

In this 21st century, science, technology, social context and the environment in which science technology operates must be able to be connected by science education itself. It is an important goal for teaching science, scientific literacy and technology of the entire population [5].

Material knowledge as a combination of pedagogic knowledge was developed by Shulman (1987) [6], namely Pedagogical Content Knowledge (PCK). Teachers as educators are required to have pedagogical abilities, including curriculum development, syllabus and lesson planning. In Law Number 20 of 2003 (undang – undang nomor 20 Tahun 2003) concerning the National Education System, the function is to develop the capabilities and character and civilization of a dignified nation in the context of the intellectual life of the nation. For this reason, teachers must be able to develop ability and character-based learning tools to become a means of achieving national education goals. It can be concluded that teachers have a role in educating as learning resources, facilitators, managers, demonstrators, mentors and motivators [7].

The tough challenge faced by the world of education in Indonesia in a global complex is the ability of teachers to design teacher competency development plans called TPACK or Technological Pedagogical Content Knowledge. TPACK is a comprehensive integration of knowledge and skills in terms of material, and pedagogy that is integrated into technological developments. TPACK was first coined by Shulman (1987) [6], and developed by Koehler & Mishra (2008) [8]. TPACK is considered as a potential framework that can provide new
directions for teachers in solving problems related to integrating ICT into teaching and learning activities in the classroom [9].

The purpose of this study was to analyze the TPACK abilities of state high school teachers throughout Medan.

2 Research Method

This research is a descriptive research with a quantitative approach. The sample is a total sample, namely biology teachers who teach at 21 public high schools throughout the city of Medan with a total sample of 43 teachers. The data obtained in the field through a knowledge test in the form of a google form which is processed using descriptive analysis.

Techniques and tools used to collect research data is the GMO material knowledge test sheet. The research data obtained will be analyzed with descriptive statistics.

To analyze the teacher's TPACK ability test data, it is done by looking for percentages and presented in descriptive form. For the correct answer was given a score of 1 and for the wrong answer was given a score of 0. Descriptive analysis using the formula according to Sugiyono (2011) [10]. as follows:

\[
\text{Score} = \frac{B}{N} \times 100
\]  

Note:
B= Number of items answered correctly
N= Number of multiple choice items

The data obtained were then converted into qualitative criteria in Table 1.

<table>
<thead>
<tr>
<th>Range of Value</th>
<th>Qualitative Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 28</td>
<td>Not Very Good/ Very Bad</td>
</tr>
<tr>
<td>29 – 46</td>
<td>Not Good/ bad</td>
</tr>
<tr>
<td>47 – 64</td>
<td>Fairly Good</td>
</tr>
<tr>
<td>65 – 83</td>
<td>Well</td>
</tr>
<tr>
<td>84 – 100</td>
<td>Very good</td>
</tr>
</tbody>
</table>

3 Results And Discussion

The teacher's TPACK ability data was obtained by giving a test of 35 validated questions. The questions given are divided into seven TPACK aspects and the results are scored. Overall the average value of each aspect of TPACK can be seen in Figure 1.
The results of the TPACK ability test for biology teachers throughout Medan City were on average 50.6 ± 14.65 (X ± SD). For each aspect of TPACK, data is obtained as shown in Figure 1 with the following details: Pedagogical Knowledge (PK) has an average of 57.6 ± 25.15 in a fairly good category. Content Knowledge (CK) has an average of 53.49 ± 22.13 quite good category. Technological Knowledge (TK) has an average of 81.8 ± 20.84 very good category. Pedagogical Content Knowledge (PCK) has an average of 60.9 ± 23.48 quite good category. Technological Content Knowledge (TCK) has an average of 60 ± 27.26 fairly good category. Technological Pedagogical Knowledge (TPK) has an average of 40 ± 29.27 bad categories. Technological Pedagogical Content Knowledge (TPACK) has an average of 60.47 ± 29.11 quite good category.

From Figure 1 it is clear that the standard deviation of each aspect of the teacher's TPACK ability is different. The lowest standard deviation value is in the Technological Knowledge (TK) aspect, which is 20.84. Meanwhile, the highest standard deviation value is found in the Technological Pedagogical Knowledge (TPK) aspect, which is 29.27. This shows the data obtained from the results of the teacher's TPACK ability with heterogeneous data distribution. Where the greater the value of the standard deviation of a data, the greater the distance between each data point and the average value.

Based on the test results, the average TPACK ability in the Technological Knowledge (TK) aspect has the highest score of 81.8 compared to other aspects. This shows that the ability of biology teachers who teach at SMA Negeri in Medan City in terms of mastery of technology in
learning is very good. While the average value of the TPACK ability test results in the Technological Pedagogical Knowledge (TPK) aspect has the lowest value compared to several other aspects, namely 40, this shows that biology teachers at SMA Negeri in Medan City on average are still not able to integrate technology with teacher pedagogic mastery.

3.1. Pedagogical Knowledge

Pedagogical knowledge is knowledge that includes how to manage classes, provide assessments, develop lesson plans and student learning processes[11]. Teachers must develop teaching skills such as being able to manage and organize classes, be able to achieve learning objectives well, knowledge to know how to organize conducive class activities.

Analysis of the ability of the pedagogical knowledge aspect of 43 school teachers has an average of 57.6 ± 25.15 quite good category. The results of the TPACK ability test on the Pedagogical Knowledge (PK) aspect can be seen in Figure 2.

Based on the data shown in Figure 2, there are 34.9% of respondents in the fairly good category. The percentage of good and very bad categories is in the same percentage, namely 18.6%, while the bad category is 16.3% and the very good category is 11.6% of the respondents. This explains that the pedagogic ability of biology teachers who teach in high schools throughout the city of Medan is quite good. The ability referred to in the aspect of ability to understand constructivism, behavioristic, cybernetic learning theories in learning in accordance with the circumstances of students. In addition, the ability to develop learning plans that support the achievement of the cognitive domain according to Bloom's taxonomy level. And quite good in compiling instruments for collecting and processing information on student learning outcomes correctly.
3.2. Content Knowledge

Content Knowledge is knowledge to develop that knowledge which includes concepts, theories, ideas, frameworks, knowledge of evidence, as well as practices and approaches. So the teacher must master teaching materials broadly and deeply about the material that is their field. The data from the analysis of the ability of content knowledge for 43 school teachers has an average of 53.49 ± 22.13 in a fairly good category. The results of the TPACK ability test on the Content Knowledge (CK) aspect can be seen in Figure 3.

![Figure 3: The results of the TPACK ability test on the Content Knowledge (CK) aspect.](image)

Based on Figure 3, the ability of the content knowledge aspect of biology teachers in Medan City is 37.2% in the fairly good category, in the good category as much as 20.9%, and 2.3% in the very good category. However, there are 23.3% of the content knowledge abilities of biology teachers in Medan City which are in the bad category and 16.3% in the very poor category. Genetic engineering, able to describe the process of genetic engineering on examples of genetically modified food in everyday life, and able to direct students to understand the advantages of transgenic plants as a food security solution.

3.3. Technological Knowledge

Technological Knowledge (TK) is knowledge of how to operate computers and relevant software. Teachers and technology take an active role in shaping the learning environment. Teachers recognize that the existence of technology is very useful and needed. Teachers need good knowledge of certain technological abilities to assist students in learning certain topics or skills with the help of technology. From this point of view, technological knowledge not only refers to the instrumental skills needed to operate a technology but also implies knowledge of the ability of technology to achieve personal and professional goals [12].

The data from the analysis of the ability of content knowledge for 43 school teachers has an average of 53.49 ± 22.13 in a fairly good category. The results of the TPACK ability test on the Technological Knowledge (TK) aspect can be seen in Figure 4.
Figure 4 The results of the TPACK ability test on the Technological Knowledge (TK) aspect.

The results of the TPACK ability test on the Pedagogical Content Knowledge (PCK) aspect can be seen in Figure 4.4. The ability of Pedagogical Content Knowledge (pedagogical and content knowledge) of biology teachers in Medan City is 48.8%, including in the very good category, and the good and fairly good categories have the same percentage of 20.9%. And 9.3% is included in the bad category. The aspects in question include having knowledge of online learning support applications, understanding the use of appropriate online applications to measure students' cognitive abilities, and being able to understand the use of learning video applications that support learning.

3.4. Pedagogical Content Knowledge

There are five components of Pedagogical Content Knowledge: (1) science learning oriented, (2) knowledge and beliefs about curriculum science, (3) knowledge about students' understanding of science, (4) knowledge about scientific literacy assessment, and (5) knowledge about instructional strategy.

The data from the analysis of the ability of Pedagogical content knowledge on 43 school teachers has an average of $60.9 \pm 23.48$ fairly good categories. The results of the TPACK ability test on the Pedagogical Content Knowledge (PCK) aspect can be seen in Figure 5.
The results of the TPACK ability test on the Pedagogical Content Knowledge (PCK) aspect can be seen in Figure 4.6. Based on the picture, the TPACK ability in the Technological Content Knowledge (TCK) aspect of teachers is 11.63% in the very good category, namely 5 respondents from 43 people, 14 respondents or 32.56% in the good category, 8 respondents or 18.60% for quite good category, 10 respondents or 23.26% for the bad category, and 6 respondents or 13.95% for the very bad category.

The aspect in question is that the teacher is able to implement learning characteristics that make students active in biotechnology learning. The teacher is able to choose appropriate learning media to explain genetically engineered materials in plants and be able to make an instrument for assessing student learning outcomes that is in accordance with the material on GMO socio-scientific issues.

3.5. Technological Content Knowledge

Technological Content Knowledge is knowledge about the interrelationship between technology and content [13]. This knowledge invites teachers to understand that the use of certain technologies can change the way they understand concepts in certain content because Technological Content Knowledge is knowledge of how technology can create a new picture in certain materials.

The data from the analysis of the ability of Technological content knowledge on 43 school teachers have an average of $60 \pm 27.26$ in a fairly good category. The results of the TPACK ability test on the Technological Content Knowledge (TCK) aspect can be seen in Figure 6.
The results of the TPACK ability test on the Technological Content Knowledge (TCK) aspect can be seen in Figure 4.6. Based on the picture, the TPACK ability in the Technological Content Knowledge (TCK) aspect of teachers is 11.63% in the very good category, namely 5 respondents from 43 people, 14 respondents or 32.56% in the good category, 8 respondents or 18.60% for quite good category, 10 respondents or 23.26% for the bad category, and 6 respondents or 13.95% for the very bad category.

The aspect in question is that the teacher understands the use of appropriate media for genetic engineering process material. The teacher understands the use of applications for making student learning outcomes assessment instruments that are in accordance with the pandemic situation. The teacher understands the use of applications to make learning videos about genetic engineering and socio-scientific issues in society.

3.6. Technological Pedagogical Knowledge

Technological Pedagogical Knowledge is knowledge about how various technologies can be used in teaching and the use of these technologies can change the way teachers teach [11].

Analysis of the ability of aspects of Technological pedagogical knowledge on 43 school teachers has an average of 40 ± 29.27 not good category. The results of the TPACK ability test on the Technological Pedagogical Knowledge (TPK) aspect can be seen in Figure 7.
The results of the TPACK ability test on the Technological Pedagogical Knowledge (TPK) aspect can be seen in Figure 4.7. Based on the picture there are 2 respondents from 43 people or 4.65% in the very good category, 7 respondents or 16.28% in the good category, 5 respondents or 11.63% in the fairly good category, 11 respondents or 25.58% in the good category, not good category, and 18 respondents or 41.86% in very bad category. In the sense that teachers are still not able to adapt ICT to the learning model used to create interactive learning. Teachers are less able to choose the appropriate technology for learning media.

3.7. Technological Pedagogical Content Knowledge

TPACK is the knowledge needed by teachers to integrate technology in the learning process so that it becomes a complete package. Teachers must have an intuitive understanding of the complex interactions between the three basic components of knowledge, namely PK, CK and TK, by teaching certain materials using appropriate pedagogic methods and technology [11].

The data from the analysis of the ability of Technological Pedagogical content knowledge on 43 school teachers has an average of 60.47 ± 29.11 quite good categories. The results of the TPACK ability test on the Technological Pedagogical Content Knowledge (TPACK) aspect can be seen in Figure 8.
The results of the TPACK ability test on the Technological Pedagogical Content Knowledge (TPACK) aspect can be seen in Figure 4.8. In the picture, it can be seen that the TPACK ability in the Technological Pedagogical Content Knowledge aspect of biology teachers at SMA Negeri in Medan is spread in 5 categories, namely the very good category, there are 13.95%, namely 6 people from 43 respondents, in the good category there are 13 respondents, namely 30.23%, the category is quite good, there are 25.58%, namely 11 respondents, the category is not good, there are 5 respondents, namely 11.63%, and the category is very bad, there are 8 respondents, namely 18.60%. In this case, the aspect in question is that the teacher is able to choose the right learning media for the material on the positive and negative impacts (socio-scientific issues) of genetic engineering. Teachers are able to use learning video maker applications to describe the genetic engineering process on examples of genetically modified food in everyday life. Teachers are able to bridge between science researchers and students related to the development of biotechnology by using trusted sources. Teachers are able to provide students with an understanding of the impact of biotechnology developments in the food sector by providing supportive and interesting sources.

4 Conclusion

The research result shows that in details, Pedagogical Knowledge (PK) average score was 57.6 (good enough). Content Knowledge (CK) was 53.49 (quite good). Technological Knowledge (TK) was 81.8 (very good). Pedagogical Content Knowledge (PCK) was 60.9 (quite good). Technological Content Knowledge (TCK) was 60 (fairly good). Pedagogical Knowledge (TPK) was 40 (bad). Technological Pedagogical Content Knowledge (TPACK) was 60.47 (quite good).

References


Lifestyle, Knowledge of Sport Injury, and Physical Conditions of North Sumatera Futsal Athletes on PON XX

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{ Imamlukmanhakim50@gmail.com}

Sport Education Program Study of Postgraduate School of Universitas Negeri Medan, Indonesia

Abstract. This study aims to obtain information on lifestyle, knowledge of sports injuries, and the physical condition of North Sumatera futsal athletes in XX PON. The method used is a mixed method. the research sample amounted to 14 people. The instruments used are questionnaires, and physical condition tests. Research results: 1). The lifestyle category gets very good results 2). Category of sports injury knowledge obtained 3). The category of physical condition obtained moderate results. The factor that influenced the results of this study was that the training program prepared by the coach was not carried out as well as possible by the athletes.

Keywords: Knowledge of sports injuries, Lifestyle, Physical condition.

1 Introduction

In the XX PON which was held in Papua, the Sumatera futsal team was unable to qualify for the group stage and was only able to finish in 4th place. To achieve sports achievements, it takes a long time. The training time required for each branch is different. The peak achievements of each branch are different from each other, but no achievement can be achieved instantly in a short time. Today what athletes need is not only to train but to be able to maintain their lifestyle. Lifestyle is basically a comprehensive program regarding health, physical fitness, nutrition and recreation as an effort to balance between physical and mental activities, such as sports activities carried out in a planned manner will not only shape the physical, intellectual, moral, morale, and individual service, but will also improve the quality of life of the perpetrator as a member of a group in society (Pangkahila et al, 2015)[1]. In addition to the athlete’s lifestyle factors, knowledge in sports injuries is also an important thing to pay attention to. It is unfortunate if precisely because of these sports injuries, sports players find it difficult to improve or maintain their achievements or fitness. Sports injury is pain caused by exercise, so that it quickly causes disability, injury and damage to muscles or joints and other parts of the body. Sports injuries if not handled quickly and correctly can result in disruption to physical conditions, both in carrying out daily living activities and carrying out relevant sports activities (Sanusi, 2020)[2]. According to Bompa (2000) injuries are caused by lack of knowledge about proper exercise and weight gain, wrong posture when lifting weights, and weak abdominal muscles [3]. In this case, all
athletes, both beginners and those who have excelled, especially teenagers and children who have not developed their skills have the potential to experience injury. Physical condition is an important factor in achieving achievement in the field of sports. According to Pesurnay (2007) physical conditions in sports are all physical abilities that determine achievement whose realization is carried out through personal abilities (ability; motivation). With all physical physical abilities, of course consisting of physical elements whose roles vary from one branch to another, we can perform better and optimally [4].

Based on the description above, the researchers are interested in examining futsal athletes by looking at the lifestyle, sports injuries, and physical conditions of futsal athletes in North Sumatra at the 2021 PON. With the title "Lifestyle, Knowledge of Sports Injury, and Physical Condition of North Sumatera Futsal Athletes in PON XX". Based on the background, problem identification, and problem boundaries, the problem can be formulated as follows:

- What is the lifestyle of North Sumatra futsal athletes in XX PON?
- How is the knowledge of sports injuries for North Sumatra futsal athletes in XX PON?
- How is the physical condition of the North Sumatera futsal athletes in XX PON?

2 Method

2.1 Data collection technique

Data collection techniques greatly affect the success of research because data collection is intended to obtain information that can be accounted for and can be trusted. The data collection technique is a tool used by researchers to obtain valid data so that it does not cause doubt. The data needed in this study is in the form of information regarding the implementation of a healthy lifestyle, knowledge of sports injuries, and the physical condition of North Sumatra futsal athletes which can be obtained through several methods and tools. The technique of collecting data in this research is the method of interviews, questionnaires, and observation. Interview and documentation methods as a complement to data collection from all research dimensions in the analysis process.

2.2 types of research

This research is classified as a quantitative descriptive research. The design used in this study is a mix method that uses two research approaches at once, namely a qualitative approach and a quantitative approach, which in this study a qualitative approach and is supported by a descriptive quantitative approach. Mix method is a research approach that combines or combines qualitative and quantitative forms (Creswell, 2014: 5) [5]. According to Sugiyono, 2013: 20) [6] mixed method research will be useful if quantitative or qualitative methods are not accurate enough to be used alone in research problems, or using quantitative and qualitative methods in combination will be able to obtain the best understanding when compared to one method.

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4 Sugiyono, 2013, Metodelogi Penelitian Kuantitatif, Kualitatif Dan R&D. (Bandung: ALFABETA)
So this research procedure, will produce descriptive data with a quantitative approach used to obtain in-depth and comprehensive evaluation results, this approach is used to explain quantitative data (numbers) obtained through research questionnaires. Meanwhile, a qualitative approach was used to obtain information about the implementation of a healthy lifestyle, knowledge of sports injuries, and the physical condition of North Sumatera futsal athletes at PON 2021.

### 3 Research Subjects and Objects

#### 3.1 Research Location and Time

The location of this research was conducted at GOR PEMPROVSU for data collection in the form of interviews, giving questionnaires and filling out questionnaires. This research was conducted from June 2021 to February 2022.

#### 3.2 Sample Population and Sampling Technique

a) Population

The population is the entire object of research or the object under study (Notoatmojdho, 2010) [7]. The population used in this study were all futsal athletes of North Sumatra.

b) Sample

The sample is the object under study which is considered to represent the entire population (Notoadmojdho, 2010) [7]. The sampling technique in this study was carried out with total sampling, namely all athletes were used for data collection. The total sampling of PON athletes in futsal is 14 people.

### 4 Research results and discussion

#### 4.1 Lifestyle

Table 1. Percentage of Lifestyle Questionnaire for North Sumatra PON Futsal Athletes

<table>
<thead>
<tr>
<th>Name</th>
<th>Amount</th>
<th>P(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satria Yudhistira</td>
<td>72</td>
<td>90</td>
</tr>
<tr>
<td>Calliestein Saragih</td>
<td>68</td>
<td>85</td>
</tr>
<tr>
<td>Aulia Rahmad Siregar</td>
<td>53</td>
<td>66.25</td>
</tr>
<tr>
<td>Sauqy Saud Lubis</td>
<td>56</td>
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</tr>
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<td>M. Rifaldy Tanjung</td>
<td>63</td>
<td>78.75</td>
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<tr>
<td>Irvan Situmorang</td>
<td>62</td>
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<tr>
<td>Aji Sutria Bagus</td>
<td>70</td>
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</tr>
<tr>
<td>M. Zuhri Nur Akbar</td>
<td>61</td>
<td>76.25</td>
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<tr>
<td>Arif Fahirzi</td>
<td>68</td>
<td>85</td>
</tr>
<tr>
<td>Mahyar Siddiq</td>
<td>76</td>
<td>95</td>
</tr>
<tr>
<td>M. Reza P Harahap</td>
<td>60</td>
<td>75</td>
</tr>
</tbody>
</table>

From table 4.1, the results of the questionnaire on the lifestyle of PON XX athletes for the Sumatera Futsal Branch 2021 obtained 7 athletes (50%) in the very good category, 6 athletes (42.86%) in the good category, and 1 athlete (7.14%) in the moderate category. Factors that affect the results of 66.25% in the moderate category are irregular eating patterns, eating vegetables and fruit, consuming milk, sleeping 6-8 hours, rest schedules, exercise schedules, socialization with other athletes, and regular exercise.

### 4.2 Knowledge of Sport Injury

**Table 2** Percentage of Sport Injury Questionnaire for North Sumatra PON Futsal Athletes

<table>
<thead>
<tr>
<th>Name</th>
<th>Jumlah</th>
<th>P (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satria Yudhistira</td>
<td>61</td>
<td>9.32</td>
</tr>
<tr>
<td>Calliesticin Saragih</td>
<td>57</td>
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</tr>
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<td>Aulia Rahmad Siregar</td>
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<td>3.64</td>
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<td>Irvan Situmorang</td>
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<td>Aji Sutria Bagus</td>
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<td>Arif Fahrozi</td>
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</tr>
<tr>
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<tr>
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<td>M. Ripai Saragih</td>
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<td><strong>Jumlah</strong></td>
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<td>69.32</td>
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</table>

From table 4.2 the results of the sports injury knowledge questionnaire for XX PON Sumatra Futsal Sports in 2021 obtained 6 athletes (42.86%) in the good category, and 8 athletes (57.14%) in the moderate category. Factors affecting the results of 57.14% in the moderate category were frequent cramps, bruising, and muscle tension. Injuries experienced by athletes are also caused by lack of warm-up, fatigue, movement or technique errors, not following the coach's directions, training equipment that does not meet training standards and the process of handling injuries experienced is not handled as quickly and optimally as possible by athletes.
4.3 Physical Condition

<table>
<thead>
<tr>
<th>Name</th>
<th>VO2max</th>
<th>Speed</th>
<th>Flexibility</th>
<th>Strength</th>
<th>Average</th>
</tr>
</thead>
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<td>55,15</td>
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<td>Caliisstein Saragih</td>
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<td>42,60</td>
<td>65,13</td>
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<td>38,42</td>
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<td>42,77</td>
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<td>Aji Sutria Bagus</td>
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<td>56,19</td>
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<td>48,27</td>
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<td>60,18</td>
<td>50,97</td>
<td>43,53</td>
<td>52,07</td>
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</table>

Average 50

Norm Classification Categorization Formula for Physical Condition Test

<table>
<thead>
<tr>
<th>Formulas</th>
<th>Category</th>
<th>Tally</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>X &gt; M + 1,5 SD</td>
<td>Sangat Baik</td>
<td>X &gt; 58,726,78308</td>
<td>58,726,78308</td>
</tr>
<tr>
<td>M + 0,5 SD &lt; X &lt; M + 1,5 SD</td>
<td>Baik</td>
<td>52,908,927,69 &lt; X &lt; 58,726,78308</td>
<td>52,908,927,69</td>
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<tr>
<td>M - 0,5 SD &lt; X &lt; M - 0,5 SD</td>
<td>Sedang</td>
<td>47,091,072,31 &lt; X &lt; 52,908,927,69</td>
<td>47,091,072,31</td>
</tr>
<tr>
<td>M - 1,5 SD &lt; X &lt; M - 0,5 SD</td>
<td>Kurang</td>
<td>41,273,216,92 &lt; X &lt; 47,091,072,31</td>
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<td>Sangat Kurang</td>
<td>X &lt; 41,273,216,92</td>
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</table>

From table 3 based on the results of the T-score obtained, it is stated that the physical condition of the North Sumatra futsal athletes at the 2021 PON is dominated by the average physical condition of the futsal athletes being 50.00 in the Medium category.

5 Conclusion

Based on the results and discussion of the research, the following conclusions can be drawn:

The lifestyle of North Sumatra futsal athletes at PON 2021 is very good. Knowledge of sports injuries for North Sumatra futsal athletes at PON 2021 is moderate. The physical condition of the North Sumatra futsal athletes at the 2021 PON is moderate.
Suggestions. Coaches can make better training programs, so that training programs can be created that can improve athletes' physical conditions, regulate healthy lifestyles, and tell athletes to prevent themselves from injury. For athletes, if you want to excel, you must maintain a lifestyle, especially resting and eating patterns, then improve the performance of physical conditions so that they can play optimally in PON 2024, and understand injury knowledge so that when injured they can help themselves. To the management, in order to maximize experts in injury knowledge, to maximize the role of coaches in improving the physical condition of athletes and to provide punishment to athletes who are not disciplined in carrying out their lifestyle.

Research Implications. Implication is a consequence or direct result of the findings of a scientific research. The results of this study are about lifestyle, knowledge of sports injuries, and physical condition of North Sumatra futsal athletes at PON 2021. A study that has been carried out has implications for further research, the implications are as follows: The defeat that hit the North Sumatra futsal team at PON 2021, then the loss of achievement of one of the North Sumatra futsal athletes due to lack of knowledge of athletes, coaches, or administrators about lifestyle, sports injuries, and less than optimal physical conditions. Based on the theory that has been formulated, it can be seen that lifestyle, sports injuries, and physical conditions have a significant influence on the achievements to be achieved by an athlete or team.

References

Types of Code-Switching and Code-Mixing Used by EFL Teachers in the Context of Pedagogical Translation at SMAN 1 Aceh Singkil

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Abstract. This study aims to investigate: 1) The types of code-switching and code-mixing used by EFL teachers in the context of pedagogical translation. This research was conducted in SMA Negeri 1 Singkil as the place of the research. In this research, the researcher chooses two English teachers in SMA Negeri 1 Singkil as the research subject. The English teachers conducted male and female, the teachers were WY (female) and SY (male). This research was conducted in one meeting for every teacher for around 2 hours. This study employed a qualitative descriptive method to explain teachers’ strategies in the EFL classroom. The research data were obtained through observations and interviews. The data from the recording revealed that there are types of differences between code-switching and code blending utilized by EFL teachers in the context of pedagogical translation during classroom engagement, such as Intra-Sentential, Intra-Lexical Code-Mixing, and Random Code-Mixing.

Keywords: Code-Switching- Code-Mixing- Pedagogical Translation.

1 Introduction

The value of translation in helping students improve their English skills cannot be emphasized. Translation, along with listening, reading, speaking, and writing, is a very significant language skill, according to researcher Ross (2000), since it enhances involvement and understanding. Translation operations necessitate interaction and collaboration among students, students, and English teachers, which is good for improving students' abilities to teach foreign languages. English teachers use translation in their classrooms for applied linguistics, English instruction, and translation in a variety of settings and elements Mohamed (2014). However, the use of translation is problematic, as competing opinions usually disagree. For starters, translation is not permitted in foreign language classrooms since it disrupts the language Shiyab (2012). Translation into a foreign language might stifle thought and result in more complex bilingualism than interrelated bilingualism.

The use of translation in the classroom by English teachers at Aceh Senior High School has been recognized. The use of translation is extremely beneficial in facilitating the teaching and learning process, particularly for low-level pupils. The teacher also claimed that the translation was beneficial to SMAN 1 Aceh Singkil pupils, particularly in terms of understanding and
clarifying grammatical and lexical ideas. As a result, the teacher used translation as a means of persuading the students to use the materials provided. Furthermore, the teachers employed pedagogical translation as a tool to connect the interaction between the teachers and the students.

In the process of conveying information to students, teachers take the lead. As a result, teachers must employ communicative and easy-to-understand language for communication to be effective. It is not improbable that in the process of teaching and learning in the classroom, two or more languages will be used, with variances due to the employment of master languages by the teacher. This leads to purposeful or inadvertent code-mixing and code-switching in teacher communication behavior.

In this study, the English instructor at SMAN 1 Aceh Singkil will be examining the translational elements that she uses. The goal of this study was to utilize a methodical, scientific approach to ascertain how and why English teachers employed pedagogic translation as a teaching tool. One specific research question is specifically addressed in this study: 1. What kinds of code-switching and code-mixing do EFL teachers use in the context of pedagogical translation?

Thus, the focus of this study is on recording teachers’ strategies and their opinions on interaction in their classroom using code-switching code mixing in the context of pedagogical translation by EFL teachers. The research's findings, When the researchers observed classes, they saw many instances of code flipping and code blending being used by English teachers to facilitate teaching and learning. The researcher in this study categorizes the results into two groups: code-mixing in the form of a word and code-mixing in the form of a phrase. Additionally, code-switching in terms of interlanguage (English to Indonesian and Indonesian to English) and language form (formal and informal language) as well as the variables influencing the use of code-mixing and code-switching in classroom interactions by English teachers.

2 Literature Review

Code-switching, as used in linguistics, describes the use of more than one language or variety in discourse. When speaking with another bilingual person who is also bilingual, they sometimes have trouble communicating, so they switch between codes in their sentence structure to make it easier for the other person to grasp. They might repeat this with the same linguistic backdrop several times. One strategy for incorporating two or more languages into a conversation is code-switching. In contrast to Bokamba (1989), who describes code-switching as "a common term for alternative use of two or more languages, varieties of a language, or even speech styles," Waris (2012) defines code-switching as "the mixing of words, phrases, and sentences from two distinct grammatical (sub) systems across sentence boundaries within the same speech event." Code swapping is a teaching technique used by instructors who teach foreign languages in the classroom to help students become more fluent in English. In the beginning, the teacher explains the topic in the target language before returning to Indonesian to make sure the students have understood. While trying to speak as much in the target language as possible, the student will occasionally switch to their native tongue to complete sentences. For instance:
Good morning class..., ok students, today we will study about part of body..., “selamat pagi anak-anak...”, hari ini kita akan belajar tentang bagian-bagian tubuh... “now, listen your name! Dengar namanya!! (when teacher absentees) “Present sir! Hadir pak!” (student answers “good!! Bagus!!”) (when the student has answered the question well).

Code-switching is generally seen from many angles. Sociolinguistics' main line of investigation is the social incentives for switching, with an emphasis on both more distant discourse elements like the speaker or group identification and relationship-building and immediate discourse factors like lexical need and the topic and location of the debate (solidarity). Code-switching may also reflect how frequently a person uses specific expressions from one or the other language in conversation.

2.1 Types of Code-Switching

There are three kinds of Code-switching such as:

1. Intrasentential code-switching
   Intrasentential code-switching is the alternation between two languages when the switching occurs in a sentence.

2. Intersentential code-switching
   Intersentential code-switching happens between two clauses or two sentences.

3. Extra-sentential code-switching
   Extra-sentential code-switching is the switching that happens in utterances. Like exclamation words: Hei! What's up! Watch out!

2.2 Types of Code-Mixing

Code-mixing is another occurrence that is very similar to code-switching. It frequently happens when speakers use both languages at once and switch back and forth between them to the point where they do so within a single phrase. Without changing the sub-code-mixing mixing might incorporate phonology, morphology, grammar, or lexical items at different levels of language. It was inevitable that the first language would have a big influence on the second. A diversity of languages is created as a result of linguistic mixing and interaction. While some people in society continue to be influenced by their first language, the bulk of people in society blend their language with others' language by borrowing or using fragments of other languages.

Code-mixing, according to Nachru in Nusjam (2004), is the constant transfer of linguistic units from one language into another using one or more languages, as well as the creation of a new, more or less restricted code of linguistic interaction as a result of such a language mixture. In keeping with what Kachru describes, we can observe the reality in the classroom when students use a combination of languages to express themselves in English when they are unable to do it in that language. For example: “have you done your homework, Jess? Yes sir, saya sudah kerja my homework.” Maaf sir, kemarin I was sick.
Code-mixing, a more nuanced kind of code-switching, is a linguistic decision. The speaker is using a distinct language while using bits and pieces of another language in code-mixed utterances. The most prevalent "pieces" of the other language are words, but phrases and larger units can also be employed. The definition of code-mixing, as shown by the description above, is limited to code shifts that take place inside the same clause or sentence.

There are several different types of code-switching, such as:

a) **Insertation**

Insertation is the process when the speaker inserts a word from borrowing. Consider the following examples:

b) **Alternation**

Alternation is the code-mixing of Indonesian and English between clauses in a sentence. Let us look at an example of Code-mixing:

c) **Congruent Lexicalization**

Congruent Lexicalization is the influence of dialect within language use.

The researcher discovered the forms of code-switching after observing the teachers' discourse in the classroom. Specifically, code-switching in the form of inter-language terminology (English to Indonesian and Indonesian to English) and code-switching in the form of the language used (formal and informal language).

2.3 **Translation**

The Latin words trans, which means across, and datum, which means to carry, are combined to form the word translation. Translation, as its name suggests, is the process of connecting two different languages. Translation is the process of transmitting messages from one language (the source language) to another (the target language), and code-switching is defined by Bokamba (1989) as "a frequent word for alternative use of two or more languages, an event" (target language). It suggests that the message delivery, whether equal or not, is the most important consideration for the translator. Catford (1969:20) says that translation is the process of replacing text in one language (SL) with the same text in another language. Sugeng Haryanto (p. 12), like Zuchridin Suryawinata, asserts that the equivalent of mind that lurks behind its multiple language expressions enables translation.

Some experts define translation as the expression in a different language or target language of what has been conveyed in a different source language while maintaining semantic and stylistic equivalents (scientific, literary, conversational). Bell, Nida, and Taber (1974:12) say that the closest natural equivalent of the message in the source language is copied into the receptor language, first in terms of meaning and then in terms of style. Brislin (1976, p. 43) adds that "translation" is a general term that refers to the transfer of ideas from one language (the source language) to another (the target language), regardless of whether the languages are spoken or written, have established orthographies or not, or whether one or both languages are based on signs, such as the deaf's sign languages.
According to the experts' definitions of translation, translation is the process of replacing textual material in one language with a target language that is the closest natural equivalent of the source language.

2.3 Pedagogical Translation

For readers to access the final product, textual material in one language is replaced with similar content in another language (Marqués Aguado & Sols-Becerra, 2013; N. J. Ross, 2000). This process is known as "translation." However, translation will only be taken into account as a potential teaching tool in an EFL classroom in this article; it will not be taken into account as a way to train translators. Delisle (1984: 41–42), Nord (1991: 140), Holmes (1994: 77), Hurtado Albir (2001: 52), and Pastoriza-Santos et al. (2009) have all drawn attention to the difference between translation and so-called educational translation. According to Holmes, the requirement to distinguish between two sorts (or applications) of translation—translation in translator training courses and translation as a general activity in any FL teaching and learning (FLL) setting—seems to be the root of this differentiation. He blames the absence of translation on the mix-up between the two (1996: 108). In a similar vein, Marqués Aguado and Sols-Becerra (2013), echoing Klaudy (2003: 133), have recently proposed that differentiating pedagogical from practical translation in terms of function, subject matter, and the addressee is an essential criterion for recognizing translation as an acceptable teaching tool. The most useful aspect of educational translation allows students the opportunity to use the translated text as a tool to advance their proficiency in a second language (L2).

As a result, rather than being a goal in and of itself, it acts as a tool. True translation, on the other hand, has the translated text as it all. The information that can be acquired through instructional and authentic translated texts differs significantly in terms of the subject: while the former provides information about the language proficiency of the learners, the latter provides information about reality (i.e. content). The language teacher, who may utilize the translated information as an assessment tool, is the only audience for educational translation. False translation, on the other hand, has the potential to reach a larger audience, particularly readers in the target language who are hungry for news. However, the target audience for any educational translation could be widened: Depending on the strategy, classmates might be added to the list of people who would benefit from a work that one of their peers translated. Following Klaudy (2003: 133), Vermes (2010: 84) makes a distinction between two types of pedagogical translation: translation used to teach and learn an FL and translation used in translator training courses. However, each focuses on learning about L2 proficiency and translational competence, with each having a different goal in mind.

2.3 The role of Pedagogical Translation in foreign language learning

Translation has evolved through three stages in the teaching and learning of foreign languages: hegemony, rejection or absence, and increasing reinstatement (Canga Alonso & Rubio Goitia, 2016). During the hegemony stage, translation was a very valid method of teaching and learning classical languages like Greek and Latin. The Grammar-Translation Method was used to teach grammar and vocabulary, but it neglected to speak and listening abilities, leaving most students unable to use the language for communication. As a result, the
use of this method, which has not been as well-liked when it comes to learning modern languages, has led some people to believe that using the mother tongue and translation to teach and learn a second language is not a successful tool for doing so (Atkinson, 1987; Duff, 1989; Cuellar Lázaro, 2004).

Translation as a way to learn and teach a language has been ignored and called "a pariah in almost all of the popular high-profile ideas about language education of the 20th century" (Cook, 2010, p. 15). The emphasis of language-teaching approaches has been on teaching reading, writing, speaking, and listening (Vermer, 2010). Accordingly, translation and the learners' native language were seen as detrimental and counterproductive to successful foreign language learning since FLT posits that people learn a language to thrive in a monolingual environment. Because of this, many language teachers have to use old methods that only work for teaching one language. Despite the persistent efforts of some authors to do away with translation as a teaching tool, all of their arguments might be disproven because none of them has ever been proven through practical research (Malmkjaer, 1998).

Additionally, it has been established that the first languages of learners cannot be entirely separated from language acquisition since "the mother tongue is the womb from which the second language is born" (Deller and Rinvolucri, 2002: 4). In this way, it is normal for people to mentally convert a foreign language into their native tongue when they encounter it (Duff, 1989; Widdowson, 1990; House, 2009; Cook, 2010; Leonardi, 2010; Marqués Aguado and Sols Becerra, 2013). Therefore, if students naturally want to utilize their mother tongue and translate it to their L1, it is fair to encourage translation in the FL classroom. Due to the advantages translation offers for FL learners, such as enhancing verbal agility and boosting students' L2 vocabulary, teachers have restored the use of L1 and translation methods in the classroom.

So, in a few years, translation might be seen as the fifth skill in FLT. The consolidation and comprehension of structures in the target language by pupils are also aided by pedagogical translation (Schäffner, 1998).
3. Research Method

This research will be descriptive and qualitative in nature. Qualitative research involves obtaining and analyzing non-numerical data to comprehend thoughts, opinions, or experiences (e.g., text, video, or audio). The purpose of qualitative research is to understand how people see the world. Despite qualitative research employs a wide range of approaches, it always centers on preserving rich meaning when analyzing data. Common methodologies include grounded theory, ethnography, action research, phenomenological research, and narrative research. Despite certain similarities, they have very different mindsets and agendas.

A descriptive qualitative design was used in this project. The research was dubbed descriptive because it detailed the use of code-mixing and code-switching English teachers in classroom
interactions at SMA N 1 Aceh Singkil Senior High School. The author will select twenty students and two English teachers.

In this study, the technique of collecting the data was done by asking the students via interview and observation. The data was acquired by capturing the teachers' words in the classroom interaction, and the results were subsequently recorded into field notes. The researcher recruited two English teachers from SMAN 1 Aceh Singkil as the research subjects for this study. The English teachers were Wahyuni, S. Pd. (female) and Syarifuddin, S.Pd.I. (male), who taught in class XI 20 IPA on Thursday from 13.00 p.m. to 14.00 p.m. On Saturdays, from 13.00 p.m. to 14.00 p.m., Syarifuddin, S.Pd.I (male) teach in class XI IPS. Every teacher spends about 2 hours in the classroom.

All equations and formulas should be referred to in the text using consecutive numbers in parentheses; for example, consider equation (1). Equations or formulas that are displayed should be centered and placed on a separate line with extra space above and below. For easy reference, they should be numbered, with the next number wrapped in parentheses and aligned to the right margin.

Table 1. Demographic Summary of Teachers.

<table>
<thead>
<tr>
<th>No</th>
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<th>Age</th>
<th>Level of Education</th>
<th>Major</th>
<th>Duration of Teaching English</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Female</td>
<td>32</td>
<td>Bachelor</td>
<td>English Education</td>
<td>8 years</td>
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<tr>
<td>2</td>
<td>B</td>
<td>Male</td>
<td>38</td>
<td>Bachelor</td>
<td>English Education</td>
<td>13 years</td>
</tr>
</tbody>
</table>

4. Results and Discussion

The researchers also present their findings and discussions. Researchers provide all data on code mixing and code switching when in classroom interaction from English teachers. For the Discussion, the researcher uses the theory from the previous chapter to discuss the data discovered during the interaction in the classroom.

Findings

During the researchers’ classroom observation, the researcher discovered numerous examples of code mixing and code switching employed by English teachers in the process of teaching and learning. In this study, the researcher divides the findings into two categories: code-mixing in the form of a word and code-mixing in the form of a phrase. While code-switching terms of interlanguage (English to Indonesian and Indonesian to English) and language form (formal and informal language), as well as the factors influencing the usage of code-mixing and code-switching classroom interaction by English teachers

1. The Form of Code Mixing
After monitoring and recording the English teacher's language in the classroom, the researchers note that the teacher regularly combines Indonesian and English phrases, as well as translating English into Indonesian and local expressions. During the teaching and learning process, the English teacher utilized code-mixing and code-switching as a communication tool with the students.

When a teacher teaches a foreign language in the classroom, code-switching becomes a tactic for improving English proficiency. At the beginning of the meeting, the teacher employs the target language to impart the content, then switches back to Indonesian to confirm that the pupils comprehend. The student uses the target language as much as is necessary but reverts to his or her native tongue for any utterance element that cannot be expressed in the target language.

a) **Insertion**

Insertation is the process when speaker in the sentence when speaker f code-mixing mixes the word from borrowing. Consider the following examples:

When aku balik kesini ke Indonesia, dan dengan support ayah dan ibu yang sepertinya never ending, aku jadi semangat untuk melanjutkn studi aku di Indonesia

b) **Alternation**

Alternation is the code-mixing of Indonesian and English between clauses in a sentence. Let us look at an example of code-mixing:

Saya rencana mengambil jurusan focus on Language Art, Classic Art, Traditional Art, pokoknya yang berhubungan dengan seni

c) **Congruent Lexicalization**

Congruent Lexicalization is the influence of dialect within language use.

The researcher discovered the forms of code-switching after observing the teachers' discourse in the classroom. Specifically, code-switching in the form of inter-language terminology (English to Indonesian and Indonesian to English) and code-switching in the form of the language used (formal and informal language).

Code-switching is also possible between sentences (intersentential) and within sentences (intrasentential). Code-switching can be divided into four distinct categories: Tag switching is the technique of incorporating tags and specific phrases from one language into an otherwise foreign utterance. For instance:

(1) Teacher : Mathematics English. Pas nya tulisannya ini?  
   Students: Pas…

(2) Teacher : Tunggu… Example… What is the number?  
   Students: this is number dua sir
Intrasentential switching occurs when switches take place within a phrase or sentence boundary. It can include code-switching, code-mixing, insertion, and congruent lexicalizations. For example:

(1) Teacher: Bapak menguji your focus… What’s number is this?
   Students: One hundred plus two

Intersentential switching occurs when a change of language occurs at the sentence level, with each clause or sentence being in one of two languages. For example:

(1) Teacher: Good Morning
   Students: Morning sir
   Teacher: Ok now, you are standing up.
   Students: Stand up, please… Greeting to our teacher.
   “Assalamualaikum Wr Wb…
   Teacher :Waalaikum salam wr. Wb
   Students : Sit down
   Teacher : Let’s Pray

Intra-word switching is the occurrence of a change within the confines of a single word. As an example:

(1) Teacher: Okay Terima kasih.. thank you for you. Next time we study English together. Belajar.. okay. Yang penting tetap spirit

5. Conclusion

This study aims to investigate: 1) The types of code-switching and code-mixing used by EFL teachers in the context of pedagogical translation. This research was conducted in SMA Negeri 1 Singkil as the place of the research. Two English instructors from SMA Negeri 1 Singkil were chosen as the research subjects in this study. The instructors for the English classes were WY (a girl) and SY (a male), the two subjects in this study. The instructors for the English classes were WY (a girl) and SY (a male). Each teacher participated in this study in a single meeting, which lasted around two hours. This study employed a qualitative descriptive method to explain teachers’ strategies in the EFL Classroom. The research data were obtained through observations and interviews. The data from the recording revealed that there are types of differences between code-switching and code blending utilized by EFL teachers in the context of pedagogical translation during classroom engagement, such as Intra Sentential, Intra Lexical Code Mixing, Random Mixing, and English Indonesia translation or vice versa. The findings of this study reveal that the participants hope the EFL Classroom must focus on the pedagogical translation of the teachers using types of code-switching and code-mixing with an emphasis on drilling their skills into four types of categories. In addition, it also shows that teachers use Intra Sentential, Intra Lexical Code Mixing, Random Mixing, and English Indonesia translation or vice versa. The study's conclusions also said that the EFL classroom should concentrate on the many types of code-switching and code-mixing used by
English teachers in the process of teaching and learning in a pedagogically relevant setting. During the researcher's observation of the classroom, multiple instances were found. English teachers use many types of code-switching and code-mixing.

References


The Effect of Problem Based Learning (PBL) Assisted by PhET Applications on Physics Problem Solving Ability of Students

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Abstract. This study aims to analyze the effect of the problem-based learning model assisted by the PhET application on students' ability to solve physics problems. The type of research was quasi-experimental. The design used is a two-group pretest-posttest design. The population tested was class X, science students. For the experimental group, the learning process uses a problem-based learning model assisted by the PhET application, while the control class uses a conventional learning model. The data collection instrument used an essay test. The average post-test result in the experimental group (73.9) was higher than the control group (54.7) with a t-test obtained $t_{\text{count}} > t_{\text{table}}$. The physics problem-solving ability of students in the experimental group was significantly higher than the control group. The result of N-gain in the experimental group was 0.61 with a good category. It can be concluded that the problem-based learning model is effective in improving students' problem-solving abilities in physics.

Keywords: problem-based learning, PhET, problem-solving skills

1. Introduction

The problem of Indonesian education today and in the future is wide and complex. One of the most important problems in the world of education is efforts to improve the quality of education, namely by improving the quality of human resources through education.

Education itself has a very important role in the life of the nation¹. This was emphasized by Hasibuan who said that one of the strategies to improve the quality of human resources is to build the education sector as one of the main tools in development². One of the most important lessons in the world of education that is learned at the secondary school level is Physics.

Physics is one of the subjects given by schools at the secondary level which plays a very important role in the success of educational goals. Physics is a subject that can foster students' thinking skills that are useful for solving problems in everyday life³. According to Hastuti, physics also discusses concepts and laws as products and makes observations, experiments, and investigations as processes. One of the objectives of learning physics contained in the 2013 Curriculum is to master concepts and be able to solve problems in developing knowledge and self-confidence as a provision to continue education at a higher level.⁴.
Problem-solving ability is one of the higher-order thinking skills used in the current curriculum. Problem-solving is generally described as developing a solution to the problems encountered based on the knowledge of understanding the basic concepts studied previously. Problem-solving not only emphasizes quantitative aspects such as mathematical equations and procedures but also emphasizes qualitative analysis aspects in the form of choosing the right concepts and principles in solving problems.

Based on observations in the classroom, the learning process at SMA Negeri 7 Medan currently does not improve students' problem-solving abilities because teachers still use conventional learning models in classroom learning activities. This is reinforced by teacher interviews at SMA Negeri 7 Medan that teachers lacked in exploring students' physics problem-solving abilities. In the 21st century, physics research focuses on problem-solving because problem-solving skills are considered necessary for students to produce creative and innovative solutions in dealing with current world problems. Conventional learning is learning that focuses on pouring knowledge from teacher to student, without paying attention to students' preconceptions or ideas that already exist in students. This makes the learning process passive and students only become recipients of the information.

This conventional learning causes learning to be less meaningful, and as a result, students’ ability to understand physics concepts is low and has implications for students' physics problem-solving abilities. This can be seen from the scores they get in odd semesters. A total of 21% of students scored 80-90, 66% of students scored 50-70 and 13% of students scored 0-40.

Based on these conditions, there is an effort that must be made to overcome the students' physics learning process, especially at SMA Negeri 7 Medan, so that students can improve their understanding of physics concepts and problem-solving abilities. Efforts to solve the problems faced by students are to determine a learning model that can actively involve these students in learning activities. Viewed from the context of improving the quality of education, the problem-based learning (PBL) model is one of the learning models that can be used to improve the learning system. We realize that so far the ability of students to be able to solve problems has not been paid attention to by every teacher. The PBL model puts the problem as the keyword of the learning process. A learning model that can help students to understand physics concepts correctly and improve students' physics problem-solving skills is problem-based learning.

According to the Hudha model problem-based learning (PBL) is a model that uses problems in real everyday life as a context for students to learn about how to solve problems and acquire knowledge and concepts that are essential to the subject matter, so PBL will make students independent learners.

The problem-based learning (PBL) model will lead students to understand concepts and be able to solve physics problems well. This is in line with research by Dwi & Setot that problem-based learning (PBL) can significantly improve students' understanding of physics concepts and problem-solving abilities. Halim, et al said that problem-based learning (PBL) showed indicators of concept understanding had increased, as well as Ekawati showed that problem-based learning (PBL) could improve students' physics problem-solving abilities.

Based on the above problems, it is necessary to do a method to overcome these problems by using a problem-based learning (PBL) model for students to more easily understand the concepts of physics in solving physics problems in everyday life, especially in the material of
simple harmonic motion. Another thing that the author uses is to use a virtual lab in the form of PhET (Physics Education Technology) to make it easier for researchers to manage the time used during research.

2. Literature

2.1. Problem-Based Learning (PBL)

According to Duch problem-based learning (PBL) or problem-based learning is a teaching model characterized by real problems as a context for students to learn critical thinking and problem-solving skills and gain knowledge.\textsuperscript{10}.

The problem-based learning (PBL) model is the most significant innovation in education, Margetson further said that the problem-based learning (PBL) model helps to improve the ability to understand concepts and facilitate success in solving problems.\textsuperscript{11}.

Based on the opinions of several experts, it can be concluded that the problem-based learning (PBL) model is a learning model that begins with providing authentic/real problems where the problem is experienced in the daily lives of students. Students solve problems to find new concepts or knowledge.

2.2. Problem Solving Skill

Tarhadi, defines problem-solving as a way of thinking, analyzing, and reasoning using experience and knowledge related to the problem. There are several types of problems, namely; (1) Problems whose solution procedures already exist and are known to students; (2) Problems whose solution procedures are not yet known by students; (3) Problems for which the solution procedure is not known at all and or the data needed to find the solution is not known. Sintha defines a problem as a situation in which a person or group of people is asked to complete a task for which there is no available algorithm that matches the solution method\textsuperscript{13}.

The ability to problem-solving is a basic ability that must be possessed by each individual to solve a problem. Ekawati (2018) states that physics has a large enough role in providing various abilities to students for structuring thinking skills and problem-solving abilities in everyday life.\textsuperscript{14}.

3. Methodology

This type of research is a quasi-experimental study, which aims to determine whether there is a consequence of something imposed on students, namely students. This study involved two classes of samples that were given different treatments. The experimental class was given treatment in the form of learning using a problem-based learning model. The control class was given treatment in the form of learning using conventional learning.

This study involved two classes that were given different treatments, to determine the students' physics problem-solving ability, a test would be conducted on both classes before and after being given treatment. The design of this quasi-experimental research was the two-group pretest-posttest design.
4. Results & Discussion

In the SPSS 16.0 calculation results, the output of statistical test data from the post-test results of students' physics problem-solving abilities who were given the PhET-assisted Problem Based Learning and the results of students' physics problem-solving abilities using conventional learning can be seen in Table 1.

<table>
<thead>
<tr>
<th>T Uji Test Value</th>
<th>DK</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.634</td>
<td>69</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Based on Table 1 obtained the value of Sig. of 0.001. Therefore, the value of Sig. 0.000 <0.05, it can be said that the test results reject Ho or accept Ha in the 5% alpha level. Thus, it can be concluded that there is a significant difference in the problem-solving abilities of students who are taught physics with the problem-based learning (PBL) model assisted by PhET with students who are taught using conventional learning. In other words, the results of students' physics problem-solving abilities who were given the PhET-assisted Problem Based Learning (PBL) learning model were better than conventional learning.

Students who were taught by the PhET-assisted Problem Based Learning (PBL) learning model ((x ) postes=73.9) were higher than the average post-test results of students' physics problem-solving abilities taught by conventional learning, namely (x postes=54.7). These results prove that the Problem Based Learning (PBL) learning model gives good results in students' physics problem-solving abilities. The principles developed in the Problem Based Learning (PBL) model such as asking clear and straightforward questions, providing opportunities for students to correct questions, pointing out points that do not fit, providing guidance on the theory used, and providing an atmosphere of intellectual freedom, providing encouragement and support for student interactions, exploration results, formulations, and generalizations can make students better understand the material taught by the teacher. This is what causes differences in students' physics problem-solving abilities between these two lessons.

5. Conclusions

There are differences in the results of the post-test on the physics problem-solving ability of students who are taught using the Problem Based Learning (PBL) model with the help of PhET applications with students who are given conventional learning. The experimental class obtained an average of 73.9 and the control class obtained an average of 54.7. Problem Based Learning (PBL) learning model assisted by the PhET application is better at improving students' physics problem-solving ability than conventional learning.

References

Design and Development of PISA-Based Test Instruments on Temperature and Heat Materials Based on Field Analysis Results

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Abstract. This study aims to design and develop a PISA-based test instrument. The test instrument designed is based on the results of the analysis that has been carried out including needs analysis, material and literacy studies. The test instrument used is multiple choice considering that multiple choice has a high level of difficulty in choosing the correct answer among the available answers, so that it will train students' analytical skills. The initial PISA test instrument which was designed was 40 items which were arranged based on PISA scientific literacy competence, namely: explaining scientific phenomena; evaluate and design scientific research; and interpret scientific data and evidence. The designed PISA test instrument will be developed by looking at the content validity aspects carried out by the validator.

Keywords: PISA Test Instruments, Temperature and Heat, Multiple Choice

1. Introduction

The development of technology and information in the 21st century has had a significant influence on the world of education. Education is required to produce students with superior human resources in order to compete in the international market. 21st century national education focuses on realizing the ideals of the Indonesian nation, by realizing a prosperous society, having an honorable position and being able to compete with other countries, through the formation of quality human resources.¹

Scientific literacy is a skill that is very much needed in the 21st century among 16 other skills that have been identified by the World Economic Forum. Scientific literacy is a knowledge to understand scientific facts and the relationship between science, technology and society and their application in real life². It is believed that good students' scientific literacy skills will be able to understand the environment, economy, social, modern and technology. Given the

importance of scientific literacy, creating a scientifically literate society is the main goal of any educational reform.

It is important to measure students' scientific literacy in order to evaluate and improve students' scientific literacy, so that students are able to master one of the 21st century skills. One of the main international-scale assessments that measure scientific literacy skills is PISA. PISA (Programme for International Students Assessment) is a test program in the field of education initiated by countries that are members of the OECD (Organization for Economic Cooperation and Development). The OECD's objective in conducting the PISA assessment is to improve the quality of education, especially in the fields of scientific literacy, reading literacy, and numerical literacy.

The PISA test has been carried out eight times, starting in 2000, 2003, 2006, 2009, 2012, 2015, and lastly 2018. This test has been followed by several countries, both those who have joined the OECD (United States, Canada, Mexico, etc.) non-OECD countries (Argentina, Panama, Chile, Peru, etc.). Indonesia itself has taken the PISA test several times, from 2000 to 2015. Since Indonesia first took the PISA test, Indonesia has consistently been ranked at the bottom. Indonesia's PISA results in 2018 for scientific literacy competence were ranked 9th from the bottom, namely 71 out of 79 countries, this shows that Indonesia's PISA ability is still relatively low. PISA scores for scientific literacy achieved by the Indonesian people in 2000, 2003, 2006, 2009, 2012,

The low Indonesian PISA test occurs because students are not trained in solving PISA questions and the questions available in physics learning are generally still limited to the LOTS criteria. The results of observations and interviews with several students and physics teachers obtained information that the questions given to students were still rote and calculating, not questions related to life and the world of technology. This kind of learning causes students to become unaccustomed to working on questions that lead to the measurement of scientific literacy, especially scientific literacy questions on PISA. If this process is maintained, it is highly likely that Indonesia will continue to be ranked at the bottom of the PISA test next year.

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2 PISA Science Literacy

PISA (Program for International Student Assessment) is one of the assessment programs in the field of international education. At first PISA was created by OECD (the Organization for Economic Cooperation and Development) countries as an answer to their own needs, now PISA has become an educational policy tool for countries other than OECD. PISA (the program for international student assessment) is a program to measure achievement for 15 year olds in the areas of math, science and reading literacy skills. The assessment carried out by PISA is carried out every 3 (three) years with a focus on the education of a country. There are three aspects that are assessed in PISA, namely mathematical literacy, scientific literacy, and reading literacy, with the following details:

a. Mathematical literacy, which includes the ability to identify and understand, to use the basics of mathematics in life, which a person needs in dealing with everyday life.
b. Scientific literacy includes the ability to use knowledge, identify problems in life in order to understand facts and make decisions about nature and the changes that occur in life.
c. Reading literacy includes the ability to understand, use, and reflect in written form.

Scientific literacy according to the OECD is defined as the ability to engage with science-related issues, and with scientific ideas, as a reflective citizen. Adholpus (2012) states scientific literacy is knowledge and understanding of scientific concepts and processes needed for personal decision making, participation in civic and cultural affairs, and economic productivity. The dimensions of knowledge measured in the PISA assessment for scientific literacy are knowledge of content, procedural and empirical. Meanwhile, the measured competencies related to the three knowledges are as shown in table 1 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Competence</th>
<th>Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explain the phenomena scientific</td>
<td>• Remembering and applying appropriate scientific knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify, use, and explain a model and representation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Make and justify correct predictions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Offer a clear hypothesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Explain the potential implications of scientific knowledge for society</td>
</tr>
<tr>
<td>2</td>
<td>Evaluating and designing scientific research</td>
<td>• Identifying questions in a scientific study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Distinguishing questions to investigate scientifically</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Propose and evaluate ways of exploring a given question scientifically</td>
</tr>
</tbody>
</table>

---


The questions formulated in PISA are generally based on real-life situations that contain problems in everyday life and focus on mastering the process, understanding concepts and the ability to apply them.

### 3 Research methods

This research uses research and development methods (Research & Development). According to Sugiyono, development research methods are research methods used to produce certain products, and test the effectiveness of these products. The research was conducted through 3 stages, namely analysis, design and development. The flow of the research procedure can be seen in Figure 1 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Competence</th>
<th>Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Interpreting data and evidencescientific</td>
<td>• Explain and evaluate the various ways that scientists use to ensure data validity and objectivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Converting data from one representation to another</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Analyze and interpret data and draw appropriate conclusions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify assumptions, evidence, and reasoning in science</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Distinguish between arguments based on scientific evidence/theories and other considerations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evaluate scientific arguments and evidence from different sources (eg: newspapers, internet, journals)</td>
</tr>
</tbody>
</table>

(OECD, 2019)

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4 Discussion

1. Stage of Analysis (Analysis)
   - Needs Analysis

Needs analysis aims to determine the basic problems encountered in learning. This analysis will be carried out by observing and interviewing teachers in the field of study to see the characteristics of students, the teaching and learning process, and documenting the value of student learning outcomes. The results of interviews with teachers in the field of study found that the average character of class XI IPA MAN 1 Tapanuli Tengah students had an interest in learning in the medium category. Students' scientific literacy skills are
also still minimal, this is because variations in assessment make students less able to
develop scientific literacy skills and students are also less socialized about PISA-based
questions. While students' knowledge of PISA is still very minimal, many students are still
not familiar with PISA, and have never encountered PISA questions.

- **Material Analysis**

  The material in the research is temperature and heat material, the selection of material is
  chosen based on the needs of students who still rarely get PISA-based questions on
temperature and heat material. In addition, the material temperature and heat are very
closely implemented in everyday life. Many problems that often occur in everyday life are
related to temperature and heat. The qualifications of the materials used in the research are
indicators obtained from scientific literacy competence in the PISA assessment, namely;
explain phenomena scientifically; evaluate and design scientific research; and interpreting
scientific data and evidence.

- **Study of literature**

  Literature studies are carried out by looking for accurate information either through books
  or scientific publications about PISA, PISA questions on temperature and heat material,
  various questions used in PISA and validators.

2. **Stage of Design (Design)**

   The initial stage of planning is determining the purpose of the test and determining the form of
   the test that is in accordance with the analysis. The design analysis stage is completed,
   followed by making a grid of questions that refer to the indicators of achievement of scientific
   literacy competencies that have been determined. The purpose of the developed test is to train
   students to get used to solving science literacy-based questions that are usually given in PISA
   competitions. The form of the test instrument used is multiple choice, by looking at the
   advantages of the multiple choice test, the researcher believes this test will be better and able
to be used to measure the level of understanding or ability of students about scientific literacy
   on temperature and heat material, because this test has serious difficulties. in selecting the
   most appropriate answer among the other answer choices.

3. **Development Phase (Development)**

   This stage aims to produce a draft of a scientific literacy-based test instrument that serves to
   identify students' scientific literacy skills on temperature and heat materials. Activities at this
   stage include:

   - **Preparation of Scientific Literacy-Based Test Instruments**

     At this stage, the preparation of scientific literacy-based test instruments consists of: a grid
     of questions, scientific literacy-based test questions, and scoring guidelines which are used
     as draft I.

   - **Validator Rating**

     The scientific literacy-based test instrument that has been compiled (Draft I) is then
     validated by an expert validator. Validators are asked to provide an assessment of the
scientific literacy-based test instrument that has been developed based on the items on the assessment sheet and provide criticism and suggestions. The validation carried out is the completeness and feasibility of the material content, constructs, and grammar that have been developed. This validity is done by asking for advice or consideration from the experts as many as 5 people.

The results of the assessment given by the validator will be grouped into 3 essential levels, namely essential (3), useful but not essential (2), and not needed (1) and their validity is calculated using the Content Validity Ratio formula, namely:

\[ CVR = \frac{n_e - N}{2} \]  

Information:
- \( n_e \) = the number of SME’s who rate an item as essential
- \( n \) = number of SME’s who do the assessment

CVR is interpreted relatively in the range of -1.0 to +1.0. All items that have a negative CVR must be eliminated, while items that have a positive CVR can be used. The validity category can be seen in Table 3.1.

<table>
<thead>
<tr>
<th>CVR Category</th>
<th>CVR Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>0.5 – 1.0</td>
</tr>
<tr>
<td>Valid, Need Revision</td>
<td>0.1 – 0.4</td>
</tr>
<tr>
<td>Invalid, Replaced</td>
<td>-0.1 – 1.0</td>
</tr>
</tbody>
</table>

The following are the results of the validation carried out on the test instrument shown in Table 3:

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria</th>
<th>No Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Essential</td>
<td>1, 5, 10, 12, 13, 22, 23, 29, 30, 33, 34, 35, 36, 37, 38, 39, 40</td>
</tr>
<tr>
<td>2</td>
<td>Useful but not Essential</td>
<td>2, 3, 6, 7, 8, 14, 18, 19, 20, 21, 27, 31, 32</td>
</tr>
<tr>
<td>3</td>
<td>Not required</td>
<td>4, 9, 11, 15, 16, 17, 24, 25, 26, 28</td>
</tr>
</tbody>
</table>

Based on the results of the validators carried out by experts, it can be concluded that from a total of 40 questions that have been designed, those in the Essential category are 17 questions and the Useful but Not Essential category are 13 questions and 10 questions are not needed according to Table 3 above. Questions that are in the essential category can be used immediately, while questions in the useful but not essential category must be revised and corrected first in accordance with the suggestions given by the validator, and questions that are in the unnecessary category must be discarded or deleted and cannot be used. The results of the validator showed that there were 30 questions that were valid or that could be used after revision.
5 Conclusion

Based on this description, it can be concluded that Indonesia's low PISA score occurs because of the limited availability of PISA questions and their application in learning activities. The questions that have been designed in the first draft are 40 questions and after being validated against the validator the questions become 30.

References

Teacher Performance Analysis Review From The Implementation Of Academic Supervision at The State TK Kampung Rakyat District

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Abstract. The research focuses on analyzing in depth the academic supervision carried out by the principal in improving the performance of teachers at the State Kindergarten in the Kampung Rakyat District. The research method uses qualitative data collection techniques, observations, interviews, and conclusions. The results of the research related to the description of teacher performance at the State Kindergarten of Kampung Rakyat Subdistrict: 1) aspects of learning planning, 2) aspects of learning implementation and 3) aspects of learning evaluation. The description of the work motivation of the Kampung Rakyat State Kindergarten teachers is in a good category. This can be seen from the observation aspect, namely: 1) The teacher's responsibility in carrying out tasks, 2) Carrying out tasks with clear targets, 3) Having clear and challenging goals, 4) There is feedback on the results of his work, 5) Always trying to exceed other people, 6) Enjoys getting praise for what he does, and 7) Work to get achievements. The planning, implementation, and follow-up of academic supervision have been carried out by the principal through the stages of preparing direct face-to-face administration. The implementation of academic supervision is carried out by the principal at the State Kindergarten of Kampung Rakyat Subdistrict three times in one semester. Academic supervision has a positive impact on improving teacher performance. The research is only two months, therefore it is recommended that researching the variables of academic supervision, work motivation, and teacher performance should be more than two months to get better results.

Keywords: Academic Supervision, Teacher Performance

1 Introduction

Teacher performance is the result of teacher work that has been carried out in carrying out their main duties and functions. The teacher's performance should be optimal in carrying out learning to achieve the goal of educating the nation's life by the goals of national education. This is as the function of national education is stated in Article 3 paragraph 1[1] namely: National education plays a role in improving skills and shaping the character and civilization of a dignified nation in the context of educating the nation's life, aiming at developing
students’ abilities so that people who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen of the country.

Teacher performance is the work achieved by the teacher in carrying out all teacher duties with all competencies and professionalism, based on skills, experience, and sincerity in work. [2]. The teacher’s work performance which is described through his skills at work will form into experience, experience in teaching requires seriousness. Seriousness in teaching will be seen through the display of performance levels.

The professionalism of teachers in learning and learning activities is clearly illustrated by the seriousness of teachers in carrying out a series of professional activities. Therefore, the quality of teachers becomes a reference in maintaining the quality of teaching in the classroom. The learning carried out by the teacher is the main demand in learning with high competence and professionalism in learning activities [3].

Competence and criteria for a competent teacher are listed in [4] described in Chapter IV part one, including: (1) minimum qualifications for Bachelor of Education (Strata 1 and Diploma IV), (2) competencies (pedagogic, reliable, character and social), (3) have educational certificates, (4) healthy physically and spiritually, (5) have expertise in achieving national goals.

The professional competence of teachers is stated in the Regulation of the Minister of National Education Number 16 of 2007 concerning teacher competency standards which include the core competencies of teachers, namely: 1) teachers understand modules, structures, concepts, and scientific mindsets that support the subjects being taught, 2) understand standards competencies and basic competencies of the subjects taught, 3) improving the educational modules that are taught creatively, 4) improving professionalism in a prolonged manner by carrying out reflection actions, 5) using information and communication technology as an effort to develop themselves.

Pedagogic competence is embodied in [5] which includes: (1) understanding the characteristics of learning in the physical, moral, spiritual, social, cultural, emotional, and intellectual aspects; (2) understanding learning theory and educational principles that educate; (3) improve the curriculum that is related to the subjects it teaches; (4) organize educational education; (5) using data and communication technology for learning purposes; (6) facilitating the development of students' learning abilities in actualizing the various abilities mastered; (7) speak efficiently, empathically, and politely by learning; (8) conduct evaluations and assessments of learning processes and outcomes; (9) using the results of the evaluation and assessment as educational interests; (10) carry out reflection actions as an effort to improve the quality of education. [6] Explaining teacher competence is understood as a scientific unity, attitudes, and skills that are reflected in intelligent behavior with the responsibility of the teacher to carry out all professional activities. The same explanation is also described by [7] means that competency is a person's perspective ability from the environment as a source of learning. [8] dividing teacher competencies, namely: motives, traits, self-concept, knowledge, and skills.

Social competence is the main aspect for teachers to create innovative and effective learning so that learning for students is more optimal [9]. The same thing was said [10] that social competence is the ability of teachers as social beings in communicating with students. Social competence relates to the ability of teachers as members of society and social beings,
including 1 the ability of teachers to communicate and interact with colleagues to improve professional abilities; 2) the ability of teachers to communicate with leaders; 3) the ability of teachers to communicate with parents or guardians of students; 4) the ability of teachers to interact with the community; 5) the ability of teachers to recognize and understand the functions of each social institution; an, and the ability of teachers in moral education [7].

Based on the observation that today many teachers are not yet professional in carrying out their duties. This is evidenced by the results of research [11] states, "The problems faced by teachers include: Weak teacher performance in 3 main aspects of the teacher's duties in the teaching and learning process, namely: the performance of kindergarten teachers is still not optimal in learning planning. In the teaching and learning process it appears that teachers have not been able to implement learning strategies which are varied so that what the community captures activities in kindergarten are just playing and singing”.

The same thing is also according to the results of the study [12] stated, "The lack of professionalism of teachers towards their profession as teachers so that their performance is not good. This is due to a lack of motivation in a teacher. He lives his profession just to get a job."

The low performance of teachers and the lack of professionalism of teachers in their profession can also be seen in South Labuhanbatu Regency. This is a review of data from the Education Office of South Labuhanbatu Regency in 2022 that there are 6 State Kindergartens in South Labuhanbatu Regency. A total of two State Kindergarten schools are located in Kampung Rakyat District, namely TK Negeri 1 Air Merah and TK Negeri 2 Tanjung Selamat.

The results of initial observations in the field that the work achievement of teachers in TK Negeri 1 Air Merah and TK Negeri 2 Tanjung Selamat is in the medium category. This is evidenced by the results of the teacher work assessment (PKG) in 2021, there are several 3 people or 37.5% who get a score in the less category, as many as 3 teachers or 37.5% in the medium category, and as many as 2 teachers or 25% who get an assessment. Teacher Performance (PKG) in the good category. Similar research results by [13] stated that the initial understanding of the meaning of academic supervision was still ambiguous in Tunas Kasih PAUD, both from the principal and the teacher. Misunderstanding of the concept of academic supervision was also reported by [14] who found limited understanding of the principal and supervisors that influenced the planning and implementation of less effective supervision.

The factors of academic supervision and teacher work motivation can be predicted to provide an overview of teacher performance. To what extent this description has an impact on teacher performance, it is necessary to conduct an assessment with the teacher entitled, "Teacher Performance Analysis in terms of Work Motivation and the implementation of Academic Supervision in State Kindergarten, Kampung Rakyat District, South Labuhanbatu Regency”.

2 Finding and Discussion

[15] said supervision from the words "super" and "vision" which means seeing or observing and assessing carried out by the leadership on all work activities of subordinates. In line with this opinion, [16] explains "supervision is a series of assistance in the form of professional services provided by more skilled people (principals, school inspectors, supervisors, and other experts to teachers)”. Similar explanation by [17] Supervision is an activity aimed at
improving leadership to improve the achievement of goals based on goals, targets, and work results. The supervision scheme can be seen in Figure 1 below:

**Fig. 1. Academic Supervision Scheme**

In planning for academic supervision carried out by the principal of the State Kindergarten of Kampung Rakyat Subdistrict, the planning of an academic supervision program consists of disseminating the supervision program to teachers, compiling instruments, and determining appropriate supervision techniques. This is evidenced by the principal's document as shown in Table 1 below:

<table>
<thead>
<tr>
<th>Need for Design</th>
<th>Supporting Matters</th>
<th>Related Elements</th>
<th>Time</th>
<th>The place</th>
</tr>
</thead>
<tbody>
<tr>
<td>formulate goals</td>
<td>As the result of previous supervision, Mrs. Christy Prahastaty has not used a varied model</td>
<td>Principal</td>
<td>27 April 2022</td>
<td>Principal's office</td>
</tr>
<tr>
<td>Make schedule</td>
<td>The results of the identification of the implementation of learning. Direct approach and class visit technique.</td>
<td>Principal</td>
<td>27 April 2022</td>
<td>Principal's office</td>
</tr>
<tr>
<td>Determining approaches and techniques</td>
<td>The results of the identification of the implementation of learning. Hands-on approach and class visit technique.</td>
<td>Principal</td>
<td>27 April 2022</td>
<td>Principal's office</td>
</tr>
<tr>
<td>Selecting an instrument</td>
<td>Integrated supervision instrument</td>
<td>Principal</td>
<td>27 April 2022</td>
<td>Principal's office</td>
</tr>
</tbody>
</table>
The information on the findings of the supervision results above is used as a basis for reference to formulate the objectives of academic supervision and is also used as a consideration in preparing the agenda for the next supervision activity as a criterion for achieving the goals of academic supervision. Formulate the objectives and criteria for the output of academic supervision to improve the quality of the education process in Kampung Rakyat District. Based on the problems above, the principal determines the objectives of academic supervision activities clearly and measurably and can formulate the output criteria expected by the principal for the teachers of TK Negeri 1 Air Merah and TK Negeri 2 Tanjung Selamat as shown in the table below:

**Table 2. Objectives of Academic Supervision Activities and Criteria for Achievement of Goals**

<table>
<thead>
<tr>
<th>No</th>
<th>Teacher name</th>
<th>Group</th>
<th>Supervision Purpose</th>
<th>Output Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Christy Prahastaty</td>
<td>B</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>teacher pedagogy on</td>
<td>field of pedagogy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>learning models</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dian Supristiana</td>
<td>A</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>especially in the</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>assessment</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nuraini Insane</td>
<td>B</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
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<td></td>
<td></td>
<td></td>
<td>especially in time</td>
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<td></td>
<td></td>
<td></td>
<td>management</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Supristiana</td>
<td>A</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
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<tr>
<td></td>
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<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
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<td></td>
<td></td>
<td></td>
<td>especially in using</td>
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<td></td>
<td></td>
<td></td>
<td>media</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Hasmala Desi</td>
<td>A</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>especially in learning</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>models</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Sinta Andi Kurnia</td>
<td>B</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
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<td></td>
<td></td>
<td></td>
<td>especially in the</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>assessment</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Ayu Kesuma</td>
<td>A</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>especially in learning</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>models</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Risma Jayanti</td>
<td>B</td>
<td>improve competence</td>
<td>increase teacher professionalism in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in teacher pedagogy,</td>
<td>field of pedagogy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>especially in the use</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>of language</td>
<td></td>
</tr>
</tbody>
</table>

Based on data on learning developments in Kampung Rakyat State Kindergarten and the teacher, the principal discusses and determines with the teacher what needs to be improved through academic supervision. The supervision carried out is arranged and designed for implementation time but is only known to the supervisor or principal. The academic supervision schedule designed and implemented is as shown in the table below:

**Table 3 Academic Supervision Schedule**

<table>
<thead>
<tr>
<th>No</th>
<th>Date and time</th>
<th>Teacher name</th>
<th>Theme</th>
<th>Group</th>
<th>Problem Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Friday, April</td>
<td>Christy</td>
<td>my country</td>
<td>B</td>
<td>The learning model is</td>
</tr>
</tbody>
</table>
Furthermore, in determining the Approach and Technique of Academic Supervision at the State Kindergarten of Kampung Rakyat Subdistrict, it appears that the principal has used a directive approach (direct and collaborative approach, while the technique used is an individual technique and class observation, this is the result of an interview with the Acting Head of TK Negeri 2 Tanjung Congratulations as follows: "In planning academic supervision using a directive approach (direct and collaborative approach, while the technique used is an individual technique and class observation”

The implementation of supervision begins with an initial meeting conducted by the principal of the teacher who wants to be supervised. By the agreed schedule, the principal calls the teacher to the principal's office. The principal asked what theme and sub-theme would like to be carried out tomorrow related to the supervision of learning activities. Teacher Christy Prahastaty replied, “The theme of my country and the sub-theme of Traditional Games”. The principal asked, “Have you prepared the RPPH for tomorrow's lesson? The teacher answered, "Yes ma'am, I have prepared the lesson plans, tools and materials, and the assessment rubric”.

At the time of observing the implementation of learning the principal brought the RPPH and assessment instruments, the principal entered the class B group and asked for permission to sit in the back. The principal saw the teacher preparing rubber media, RPPH, and instruments to be used. The theme that was taken during today's supervision was the theme of my country, the sub-theme of traditional games. The principal sees pays attention and hears both in terms of voice, intonation, motion, and teaching aids used by teachers. The principal also looks at the appropriateness of the time according to the RPPH, core activities, and closing activities. The principal also pays attention to the activity of children learning, also sees how the teacher explains and uses intonation language, the suitability of teaching aids, the language used, class mastery, and stimulates children's interest or interest in carrying out activities that day related to themes related to the sub-themes of traditional games. The principal observes as well as assesses according to the assessment format. Based on information from interviews with school principals at TK Negeri 2 Tanjung Selamat, Kampung Rakyat Subdistrict, it was concluded as follows: "The principal has carried out academic supervision by studying teacher
administration, studying RPPH, studying instruments, observing directly in class, using learning implementation instruments, finding strengths and teacher weaknesses.

Based on the results of these interviews, it can be concluded that the implementation of academic supervision at TK Negeri 2 Tanjung Selamat is good. This is evidenced by the results of the study of teacher administration, studying RPPH, reviewing instruments, observing directly in class, using learning implementation instruments, and finding teacher strengths and weaknesses. The results of the observation of the implementation of academic supervision on 8 teachers at the State Kindergarten in the Village of the People's District tend to be in a good category. This is evidenced by 6 teachers or 75% getting the results of the implementation of academic supervision in learning with good categories.

Based on observations, document analysis, and interviews with the principal of the State Kindergarten in the Kampung Rakyat sub-district, the results of the academic supervision carried out found that the power of 8 teachers in preparing lesson plans was categorized as good, while in terms of implementation of learning there was a tendency for a sufficient category of 4 teachers. , and totaling 4 teachers get the less category. The tendency of teachers in implementing learning is less precise in managing time, besides that it is also seen that some teachers are less precise in using learning media, and are incomplete in having assessment instruments.

Based on these findings, the principal carried out the socialization of the results of supervision to all teachers, the principal also prepared a follow-up plan and guided all TK Negeri teachers in the Kampung Rakyat District.

Based on the results of research in the follow-up to academic supervision, it can be seen that the teacher's tendency in implementing learning is less precise in managing time, besides that it is also seen that some teachers are less precise in using learning media, and are incomplete in having an assessment instrument. The findings showed that the principal carried out the socialization of the results of the supervision to all teachers, the principal also developed a follow-up plan and guided all TK Negeri teachers in the Kampung Rakyat sub-district.

The principal consistently follows up on supervision that should be carried out face-to-face. The purpose of supervision is to increase teacher competence in teaching quality. The principal as supervisor provides space for teachers to understand the administration of educational features made by each teacher. Education planning will be related to the expertise of teachers in teaching so that teacher performance increases. [18] said "the key to the success of a school essentially lies in the efficiency and effectiveness of the principal, because the success of a school is the success of the principal itself, one of the criteria for school success requires the existence of quality principal leadership. The need for the leadership quality of school principals so is always emphasized the meaning of the 3 bottom skills that need to be possessed by principals, and schools, namely conceptual skills, human skills, and technical skills.

No further academic supervision of teachers is a form step to improve teacher shortages in teaching and urge teachers to improve their skills in teaching better. The principal visits the teacher's room to directly check the teacher's condition in terms of administration. [15] said that supervision is an activity designed to improve teaching at all levels of schooling, related to the development and development of children, supervision is also an encouragement in the growth of teaching and learning well. Universally the appearance of the principal. Until then, the principal can improve teacher performance with academic supervision.
The results of the research show: 1) The academic supervision program is tried by preparing and compiling an academic supervision program. The aspects that are supervised are the completeness of educational features, including the preparation of syllabus arrangement and development, annual programs, semester programs, minimum completeness criteria (KKM), and education preparation plans (RPPH), 2) Techniques for applying academic supervision are tried with 2 methods, namely the method of group behavior and the method of individual behavior. 3) The obstacles to implementing academic supervision by school principals are the lack of training and socialization of the concept of academic supervision, and limited knowledge, and expertise on academic supervision techniques. The principal is busy with other environmental tasks, such as completing a school rehabilitation project. 4) Follow-up on the implementation of academic supervision begins with carrying out an analysis and assessment process, followed up by sending teachers to explore upgrading/training and carry out sharing in the Teacher Group Activity forum (KKG).

### 3 Conclusion

From the discussion of this research, it can be concluded: The description of teacher performance at the State Kindergarten of Kampung Rakyat Subdistrict has implemented: 1) learning planning aspects, 2) learning implementation aspects, and 3) learning achievement assessment aspects. The quality of the content of learning plans in the arrangement of the Daily Learning Implementation Plan (RPPH) appears to have formulated learning objectives in the RPPH by observing the personality of students, compiling teaching materials in a coherent, logical, contextual manner, designing efficient learning activities, and sorting out learning resources/educational media. according to the module and strategy.

The description of the work motivation of the Kampung Rakyat State Kindergarten teachers is a good category tendency. This can be seen from the observation aspect, namely: 1) The teacher's responsibility in carrying out tasks, 2) Performing tasks with clear goals, 3) Having clear and challenging goals, 4) There is feedback on the results of his work, 5) Always trying to exceed others, 6) Happy to get praise for what he does, and 7) Work to get achievements.

Teachers are expected in preparing lesson plans not to focus on completing administration, but it is very important to develop quality learning plans. This can be done by formulating learning objectives, taking into account aspects of children's character, planning collaborative learning, and selecting relevant learning resources. Teachers also have work motivation from the aspect of receiving interesting and challenging assignments and have clear targets for learning. This aims to maximize motivation in carrying out duties and principal as a teacher. Principals and supervisors should carry out academic supervision not only as a formality, but as academic supervision must consider guidelines consisting of planning, implementation, and follow-up.

### Acknowledgments

Thank you to all research supporters, especially to the supervisors and teachers of the PPs State University Primary Education Study Program, Medan State University.
References

The Influence of Organizational Culture, Academic Supervision and Work Motivation on PAUD Teacher Performance in Medan Selayang District

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Abstract. This study aims to determine and examine the direct influence of: (1) organizational culture on teacher work motivation; (2) organizational culture on teacher work motivation; (3) academic supervision of teachers' work motivation; (4) academic supervision on teacher performance and (5) work motivation on teacher performance. The population of the study was PAUD teachers in Medan Selayang Subdistrict totaling 141 people. By using the Slovin formula, a sample of 105 people was obtained which was determined by proportionate simple random sampling. The research method is path analysis which aims to test the theory and obtain information about the research. Based on hypothesis testing, it can be concluded that there is a direct effect: (1) organizational culture on teacher work motivation with $31 > r_{table}$ ($0.328 > 0.159$) and $t_{count} > t_{table}$ ($3.652 > 1.645$); (2) academic supervision of teachers' work motivation with $32 > r_{table}$ ($0.253 > 0.159$) and $t_{count} > t_{table}$ ($2.813 > 1.645$); (3) organizational culture on teacher performance with $41 > r_{table}$ ($0.270 > 0.159$) and $t_{count} > t_{table}$ ($2.994 > 1.645$); (4) academic supervision on teacher performance with $42 > r_{table}$ ($0.211 > 0.159$) and $t_{count} > t_{table}$ ($2.396 > 1.645$) and (5) work motivation on teacher performance with $43 > r_{table}$ ($0.264 > 0.159$) and $t_{count} > t_{table}$ ($2.822 > 1.645$). The results of the study provide an overview of organizational culture, academic supervision, and work motivation which together affect teacher performance by 29.1% and the rest is determined by other conditions.

Keywords: Organizational culture, Academic supervision, Work motivation, Teacher performance

1 Introduction

Early childhood education is a form of education that focuses on physical growth and development of fine and gross motor skills, thinking power, creativity, emotional intelligence, spiritual intelligence, socio-emotional such as attitudes and behavior as well as religion, language and communication. Improving the quality of education is also inseparable from activities to improve the quality of teacher resources who have responsibility for learning activities in the classroom. In this case the teacher's performance is highly demanded to experience improvements towards expertise in teaching, managing or organizing classes,
motivating students, conducting appropriate assessments, and making improvements and enrichment according to student needs (Priyanto, 2015: 1021-1022).

To achieve a quality education, it is necessary to have professionalism and optimal performance from various elements, both principals, teachers, and students in carrying out their duties. Sagala (2013:179) considering the important role of education personnel in schools, school management must have education and training programs to improve skills and knowledge while improving the quality of school performance. With high performance quality, it is hoped that it can make a very significant contribution to the performance and ability of schools, especially the quality of education. Based on this statement, it can be concluded that to achieve an educational goal, especially in achieving a better quality of education, it is necessary to have high ability, professional quality and performance.

A good teacher in carrying out his duties and functions will try to develop the potential that exists in students, as mandated by the National Education System Law Number 20 of 2003. But in reality education in Indonesia is still experiencing many problems such as teachers who do not meet the standards, ineffective teaching methods, incompetent principals, suboptimal school management, and community involvement in education which are in accordance with UNICEF observations in 2011. Based on data released by UNDP in 2020, Indonesia's HDI in 2019 is at 107 from 189 countries. Even in Southeast Asia, it still loses to Singapore which is ranked 11th, Brunei Darussalam is ranked 47th, Malaysia is ranked 62nd and Thailand is ranked 79th, this data shows that the quality of Indonesian education is still low.

Early childhood education (PAUD) is part of the pre-school education unit which is held on formal, non-formal and informal channels, the PAUD Unit in its implementation must carry out performance accountability to the public, accountability can be carried out in the form of accreditation. According to the head of the North Sumatran Early Childhood Education Accreditation Agency that there are still many PAUD units in North Sumatra that have not been managed properly, and shown by the accreditation data from 2015-2019 of 8820 units, there are still 2035 units or 23.07% that have been accredited, and not yet accredited 6,785 units 76.93%; of the total units accredited, the value of A = 66 units or 3.24%; the value of B = 751 units or 36.90% and the value of C = 1218 units or 59.85%.

Of the 43 PAUD units in the Medan Selayang sub-district, there is only 1 institution that is accredited A, 7 units are accredited C, and there are 35 units or 81.39 that have not been accredited, this shows that the quality of PAUD units in the Medan Selayang sub-district is still far from what is expected.

Accreditation data from 2015-2019 the number of PAUD units is 8820, the number that has been accredited is 2035 units or 23.07% and has not been accredited 6,785 units 76.93%; of the total accredited units the value of A, 66 units or 3.24%, the value of B, 751 units or 36.90% and the value of C, 1218 units or 59.85%. Based on BP-PAUD and Dikmas North Sumatra (2019) the average quality achievement is met every standard in the 8 National Education Standards (SNP) Against 987 PAUD units in North Sumatra Province shows (1) the achievement of the standard level of child development achievement is 46%; (2) standard content of 34%; (3) 52% process standard; (4) the standard of educators and education personnel is 35%; (5) standard of facilities and infrastructure 59%; (6) management standard 38%; (7) 35% financing standard and (8) 48% valuation standard.
The quality achievement data above illustrates that the average quality achievement of PAUD units in North Sumatra is still low, namely 44%, and the average quality achievement of educators and education personnel is also low. Data on Average Quality Achievements in Medan City Sub-districts 2019 are: Medan Sunggal 48.04%; Medan Baru 49.04%; Medan Denai 48.04%; East Medan 48.13%; Sandpaper Field 48.14%; Medan Tembung 48.35%; Medan Deli 48.33%; Medan Johor 48.37%; Profit Field 48.73%; West Medan 48.93%; Medan City 49.3%; Medan Area 48.81%; Medan Marelan 48.31%; Medan Labuhan 48.54%; Helvetia Terrain 49.07%; Medan Maimun 49.52%; Petisah Field 49.54%; Medan Polonia 49.55%; Field of Struggle 48.83%; Medan City Belawan 48.41% and Medan Selayang 48.02%. Based on the data above, it can be concluded that the Medan Selayang Subdistrict has the lowest average PAUD quality achievement in the city of Medan. This shows that the achievement of PAUD quality in Medan Selayang District must be improved.

Furthermore, it can be seen in the results of the 2019 North Sumatra PAUD educator competency test of 50 participants, only 20 people were declared competent. The success of an education cannot be separated from the performance of a teacher in carrying out his duties. For this reason, it is very important for a teacher to improve his performance in order to improve the quality of education.

According to Purba (2013: 25) in general, principals must lead from the center (lead from the center), be democratic, delegate responsibilities, give power in decision making, and develop elaborate efforts that bind students, teachers and parents. In other words, it can be interpreted that the principal should be in the middle of the organizational components. In line with the statement of Fitria et al (2018: 190) having supervisory knowledge can be used to provide direction by the principal to the teacher. This means that the principal has a strategy or effective way to provide assistance in the form of direction. The principal with the abilities possessed is not only tasked with regulating but also being able to provide more effective and motivating work.

This is also emphasized by Sutisna (1983) that principals serve and support teachers and provide opportunities to learn and improve teaching. The teacher is a manager in the classroom who is responsible for the learning process, this is in accordance with what Hasruddin (2008) stated that the teacher's role in the learning process includes many things including as a teacher, class leader, supervisor, environmental regulator, participant, planner, supervisor, motivator, and counselor. Through supervision, a PAUD teacher is motivated to change, grow and improve abilities and work in order to increase the effectiveness and efficiency of the learning process (Ittihad, 2019:102) Thus, teachers as the backbone of education are expected to be able to carry out their duties and functions as teachers in order to achieve goals education. The teacher is an important component in learning, this is in accordance with what Mutmainah (2007) expressed, namely the important and main element that determines the quality of education is the teacher. Furthermore, according to Hasruddin (2008) the teacher's role in learning includes many things, including teachers, class leaders, supervisors, environmental regulators, participants, planners, super visors, motivators, and counselors.

Teacher performance is basically focused on teacher behavior in meeting school goals. Teacher performance can have an influence on students. Specifically, performance goals also require teachers to make specific decisions where learning objectives are clearly stated in the form of
insights which are then transferred to students. Teacher performance is the behavior of teachers who contribute, both positively and negatively to the fulfillment of school goals.

The reality on the ground states that the teacher's performance is still said to be unsatisfactory. This was obtained based on interviews conducted by researchers to the Head of BP PAUD, North Sumatra Province, it was found that teacher performance was still not as expected. Based on the information from the Head of BP PAUD, it shows that there are still teachers who have not carried out lesson planning, and there are still teachers who do not carry out assessments of learning outcomes, so that in the implementation of learning they have not. Based on this, it can be said that the performance of PAUD teachers is still not satisfactory and needs to be improved optimally to achieve quality education.

Robbins (2006) describes the organization as a consciously coordinated social unit with a reactive boundary that can be identified by working continuously to achieve goals. Within the school organization there are interrelated components, namely human resources which is the most important factor for the activities in it. The human resources that are components include school principals, teachers, employees, counselors, students, and school management. All human resources in the school organization work together to achieve the goals that have been set. This is in accordance with Fattah's (1996) opinion which states that school is a place for the educational process that has a complex and dynamic system.

According to Mc. Shane and Glinow (2008) organizational culture is the basic pattern of shared values and assumptions governing the way employees within an organization think about and act on problems and opportunities. What can be interpreted as organizational culture is the basic pattern of values and assumptions that are thought and carried out by organizational members in an organization. Organizational culture is a characteristic of a school that is embraced by school members. Furthermore, according to Wheelen and Hunger (2004) is The collection of beliefs, expectations corporation's and transmitted from the one generation of employees to another which can be interpreted as organizational culture is a set of beliefs, organizational expectations that are passed down from one generation to another. next generation. Paais and Jozef's research results (2020:577); A. Kadir, et al (2016: 50); Amtu, et al (2020:885) and Widodo (2011) state that there is a significant and significant influence between school culture on teacher performance by 34.60%. It is further explained that school culture affects teacher performance by 33.00% in carrying out their activities by the research of Maheasy Enny Widyaningrum (2012).

Purwanto (2014: 76) suggests supervision as a coaching activity that is planned to help teachers and other school employees in doing their jobs effectively. Supervision serves as assistance in the form of encouragement, guidance, and opportunities for the growth of the skills and abilities of teachers provided by school leaders. The principal as a leader has an obligation to carry out supervisory actions against his subordinates at school. Giesscheke and Beth (210:8) state that supervisory actions from leaders lead to the achievement of organizational goals.

Robbins (2006) reveals that motivation is a process that determines the intensity, direction, and persistence of individuals in an effort to achieve goals. Supported by Uno (2007) states that motivation can encourage the desire to devote all energy to the desired goal. Motivation is a process that begins with a physiological or psychological deficiency that drives behavior or
drives aimed at goals or incentives. (Luthans, 1998). Teacher work motivation is the impetus that influences teachers to work in meeting school goals.

From the description above, it can be concluded that teacher performance plays an important role in developing the quality of education for students. Organizational culture which should be the positive values applied in schools, the implementation of the supervision of the principal which should be good and the work motivation of the teacher which should be right and will be bad if the teacher misunderstands his role which will result in the shift of the teacher's role slowly. As a result, what used to be between teachers and students needing each other becomes no longer in need of each other. Thus the learning atmosphere is no longer happy but boring. This is where conflict after conflict begins, so that the people in it become easily frustrated and end up venting it in a way that is not right.

Castetter (1981:23) suggests that there are three sources of poor performance, namely: (1) individual sources which include intellectual weakness, psychological weakness, demotivation, obsolescence/oldness, and value orientation; (2) organizational sources which include organizational systems, organizational roles, groups in organizations, behavior related to supervision, and organizational culture and (3) external environmental sources covering family, economic conditions, political conditions, legal conditions, social values, the job market, and technological change.

Colquitt (2007) suggests that performance can be influenced by organizational mechanisms, team mechanisms, and individual characteristics. Organizational mechanisms include organizational culture and organizational structure. Team mechanisms include leadership behaviors and styles, leadership power and influence, team processes, and team characteristics. Individual characteristics include personality and ethical values, and abilities in the form of intelligence including intelligence and emotional intelligence. Individual mechanisms include job satisfaction, stress or pressure, motivation, justice, and decision making. While the expected results are performance and commitment.

Based on the results of the analysis of this study, it was found that empirically organizational culture, academic supervision, and teacher work motivation on PAUD teacher performance.

2 Research Method

The research was conducted in PAUD, Medan Selayang District, Medan City, North Sumatra. The research population was all PAUD teachers in Medan Selayang District totaling 141 teachers. By using the Slovin formula and a degree of error of 0.05, the number of research samples was 105 people.

Analysis of research data was carried out by examining the effect of exogenous factors and endogenous factors using Path Analysis with an importance level of 0.05. For normality test used Liliefors test. In addition, to test the linearity of the relationship between exogenous factors and endogenous factors used Analysis of Variance (ANOVA).
3 Research Result

3.1 Results
Results of the study obtained scores of organizational culture variables (X1), academic supervision (X2), work motivation (X3), and teacher performance (X4) as Table 1.

Table 1. Summary of Research Data

<table>
<thead>
<tr>
<th>Statistics</th>
<th>organizational culture</th>
<th>academic supervision</th>
<th>Work motivation</th>
<th>Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>105</td>
<td>105</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>136.63</td>
<td>101.80</td>
<td>134.18</td>
<td>118.75</td>
</tr>
<tr>
<td>Median</td>
<td>137.00</td>
<td>102.00</td>
<td>134.00</td>
<td>119.00</td>
</tr>
<tr>
<td>Mode</td>
<td>139</td>
<td>110</td>
<td>121</td>
<td>113</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>13.742</td>
<td>10.398</td>
<td>16.017</td>
<td>12.175</td>
</tr>
<tr>
<td>Variance</td>
<td>188.835</td>
<td>108.111</td>
<td>256.558</td>
<td>148.236</td>
</tr>
<tr>
<td>Minimum</td>
<td>102</td>
<td>78</td>
<td>99</td>
<td>90</td>
</tr>
<tr>
<td>Maximum</td>
<td>164</td>
<td>123</td>
<td>172</td>
<td>145</td>
</tr>
</tbody>
</table>

a. Multiple modes exist. The smallest value is shown

The results of the normality test of the research data are as shown in Table 2.

Table 2. Summary of Normality Test Results

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>L_{observe}</th>
<th>L_{table}</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X1 on X1</td>
<td>0.065</td>
<td></td>
<td>Normal distribution</td>
</tr>
<tr>
<td>2</td>
<td>X2 on X2</td>
<td>0.078</td>
<td></td>
<td>Normal distribution</td>
</tr>
<tr>
<td>3</td>
<td>X1 on X1</td>
<td>0.037</td>
<td>0.086</td>
<td>Normal distribution</td>
</tr>
<tr>
<td>4</td>
<td>X4 on X2</td>
<td>0.065</td>
<td></td>
<td>Normal distribution</td>
</tr>
<tr>
<td>5</td>
<td>X4 on X1</td>
<td>0.055</td>
<td></td>
<td>Normal distribution</td>
</tr>
</tbody>
</table>

The results of the linearity test and the significance of the regression of the research data are as shown in Table 3.

Table 3. Summary of Linearity Test Results and Meaning

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Regression Linearity Test</th>
<th>Regression Significance Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F_{observe}</td>
<td>F_{table}</td>
</tr>
<tr>
<td>1</td>
<td>X1 on X1</td>
<td>0.890</td>
<td>1.57</td>
</tr>
<tr>
<td>2</td>
<td>X2 on X2</td>
<td>0.771</td>
<td>1.57</td>
</tr>
<tr>
<td>3</td>
<td>X2 on X1</td>
<td>1.076</td>
<td>1.57</td>
</tr>
<tr>
<td>4</td>
<td>X4 on X2</td>
<td>1.409</td>
<td>1.57</td>
</tr>
<tr>
<td>5</td>
<td>X4 on X1</td>
<td>0.887</td>
<td>1.57</td>
</tr>
</tbody>
</table>

A summary of the consequences of the coefficient assessment is carried out by using an investigation method to examining speculation by looking at the results of the calculation of direct and indirect effects as shown in Table 4.
3.2 Discussion

Organizational culture has a direct effect on work motivation. The findings of this study indicate that the magnitude of the direct influence of organizational culture on work motivation is 0.328. This illustrates that organizational culture affects teacher work motivation. These results support research conducted by Hutabarat (2015: 350) and Nurasniar (2021: 121), that organizational culture affects the increase in work motivation.

Organizational culture is the basis and becomes a role model for all members of the organization in carrying out their activities, both in work, socialization or other work outside and inside so that the activities that take place become valuable and meaningful. While motivation is an encouragement from within or from outside a teacher to work better at school.

Teacher motivation can also be influenced by organizational culture that is able to create a comfortable and safe work environment. With the creation of a safe and comfortable work environment, as well as supportive colleagues at school, teachers will be more motivated in carrying out their responsibilities and obligations. Thus a good and conducive organizational culture is very much needed in order to provide motivational support to teachers in carrying out their duties.
Academic supervision has a direct effect on work motivation. The results of this study indicate that the magnitude of the direct influence of academic supervision on work motivation is 0.253. This illustrates that academic supervision affects the work motivation of teachers. These results support the research conducted by Geraldine (2021:121); Ardansyah (2011:98); Prasetyono et al (2018:188) and Santos et al (2020:25), that academic supervision affects the increase in work motivation.

Academic supervision is a supervisory function relating to aspects of coaching and developing professional abilities or teacher abilities in learning in order to improve the quality of school learning. While motivation is an encouragement from within or from outside a teacher to work better at school.

As the principal and has the task of supervision, the principal is required to be able to assist teachers in developing the ability of these teachers in order to achieve educational goals. As a supervisor, the principal must be able to assist, supervising can evaluate the work of teachers optimally. Thus teachers can be motivated to carry out their duties and responsibilities in order to realize quality education.

Organizational culture has a direct effect on teacher performance. The results of this study indicate that the magnitude of the direct influence of organizational culture on teacher performance is 0.270. This illustrates that organizational culture affects teacher performance. These results support the research conducted by Hafni et al (2020:26); Hasan et al (2021:310); Mesnan (2021:432); Nasrun and Dody (2017:320) and Nurzal and Rodi (2019:7160), that organizational culture affects teacher performance improvement.

Organizational culture is the basis and becomes a role model for all members of the organization in carrying out their activities, both in work, socialization or other work outside and inside so that the activities that take place become valuable and meaningful. Performance is the result of showing the ability or skills of teachers in carrying out their duties, which include planning tasks, managing learning and assessing student learning outcomes.

The creation of a harmonious organizational culture is a joint effort between members in it. With the creation of conditions or a harmonious organizational culture atmosphere, the work environment, co-workers, working relationships between members within the organization or between members and leaders will be conducive. Such organizational culture conditions can have a good impact on teacher performance. Teachers can improve their performance to carry out assigned tasks because of the conditions and atmosphere as well as supportive and comfortable co-workers.

Academic supervision has a direct effect on teacher performance. The results of this study indicate that academic supervision has a direct effect of 0.211 on teacher performance. This illustrates that academic supervision affects the performance of teachers. These results support the research conducted by Amani et al (2020:804); Budiman (2020:158); Delfauzul et al (2021:1); Elenwo (2018:7) and Haryaka and Akhmad (2021:1018), that academic supervision affects teacher performance improvement.

Academic supervision is a supervisory function relating to aspects of coaching and developing professional abilities or teacher abilities in learning in order to improve the quality of school
learning. Performance is the result of showing the ability or skills of teachers in carrying out their duties, which include planning tasks, managing learning and assessing student learning outcomes.

In an organization or school there are many work climates, habits, and character of its members. The presence of a leader is needed in this case. In achieving the goals of the organization must have the same in carrying out the vision and mission of the organization. So that it can be said that leaders do not only lead but play an important role in directing teachers to be able to carry out their duties and vision and mission of an organization. For this reason, teacher performance can increase, if they can carry out adequate academic supervision, because they can do the right thing in the right way.

**Work motivation has a direct effect on teacher performance.** The results of this study indicate that work motivation has a direct effect of 0.264 on teacher performance. This illustrates that work motivation affects teacher performance. These results support the research conducted by Dias, et al (2021:10); Forson, et al (2021:1); Irhan, et al (2021:238); Margahana and Garaika (2021:3296); Romy, et al (2021:169) and Mulyana, et al (2021:99) that work motivation affects teacher performance improvement.

Activities carried out by everyone can not be separated from motivation or encouragement. This motivation is needed to be able to encourage a person to carry out or achieve his goals. Motivation can come from within oneself or from outside. If a person has a great motivation, the effort made to achieve his goals will be even greater, on the contrary if a person's motivation is low then the effort to achieve his goals is also low. If the teacher is enthusiastic and has great motivation, then the performance he does will be even better and organizational goals can be achieved properly.

### 4 Conclusion

Organizational culture has a direct positive effect on the work motivation of PAUD teachers in Medan Selayang District, meaning that the better the organizational culture, the better the work motivation of PAUD teachers in Medan Selayang District. Academic supervision has a direct effect on the work motivation of PAUD teachers in Medan Selayang District, meaning that the better the academic supervision, the better the work motivation of PAUD teachers in Medan Selayang District. Organizational culture has a direct effect on the performance of PAUD teachers in Medan Selayang District, meaning that the better the organizational culture, the better the performance of PAUD teachers in Medan Selayang District. Academic supervision has a direct effect on the performance of PAUD teachers in Medan Selayang District, meaning that the better the academic supervision, the better the performance of PAUD teachers in Medan Selayang District. Work motivation has a direct effect on the performance of PAUD teachers in Medan Selayang District, meaning that the better work motivation, the better the performance of PAUD teachers in Medan Selayang District.

### References


in State Elementary Schools in Medan City”.

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The Effect of Situational Leadership Perceptions Principal, Innovativeness, and Interpersonal Communication on Job Satisfaction of Private Junior High School Teachers in Medan Sunggal District, Medan

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Abstract. This study aims to determine the effect of Situational Leadership Perceptions, Innovativeness, and Interpersonal Communication on Job Satisfaction of Private Junior High School Teachers in Medan Sunggal District. This study used quantitative research with a path analysis approach with 171 teachers of junior high school in Medan Sunggal District as the respondents. Data collection was done by using a questionnaire through the Google form application. The questionnaire used in this study was tested first for validity and reliability. Before testing the instrument, it was necessary to test the analytical requirements as a path analysis requirement, namely the normality and linearity tests. The results of the research findings are: there is a direct positive effect of situational leadership on interpersonal communication. There is a direct positive effect between innovativeness on interpersonal communication. There is a positive direct effect of situational leadership on teachers' job satisfaction. There is a direct positive effect of innovativeness on teachers' job satisfaction. There is a direct positive effect of interpersonal communication on teachers' job satisfaction.

Keywords: Situational Leadership, Innovativeness, Interpersonal Communication, Job Satisfaction.

1 Introduction

Education is one way to improve the quality of a nation's society. The Indonesian state defines education as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation, and the State listed in Law no. 20 of 2003 National Education System. Efforts to realize the education mandated in the law consciously require the quality of professional education implementers in their fields.
Teachers have a very strategic role in efforts to improve the quality of education. The quality of education is certainly related to the quality of the teachers themselves. Teachers are the implementers of education in schools who are in direct contact with students as outputs in formal education.

One of the keys to the success of education carried out by teachers to students is the competence possessed by a teacher. This achievement of success can only be achieved if the teacher is also constantly learning and updating the abilities or skills needed in order to carry out learning better (Deporter, Reardon and Nourie, 2014:41).

In human resource management, job satisfaction is very important. Teachers as part of human resources in educational unit organizations are also influenced by the job satisfaction they receive. One of the problems that affect teacher job satisfaction is the imbalance between job demands and policies implemented by schools. This condition is feared to be counter-productive for teachers.

Another government effort is to improve the quality of education. The quality of education continues to be carried out by developing and improving the curriculum, developing learning materials, improving the evaluation system, procuring textbooks and learning tools, improving educational infrastructure, increasing teacher competence, and improving the quality of school principal leadership. The education quality improvement program that has been carried out can be seen from the increase in the percentage of teachers who are eligible to teach in 2019/2020 as much as 91.76% when compared to the previous school year of 89.33% (www.bps.go.id). expected to have a significant impact on the achievement of student competencies.

However, the reality is that it is not comparable to the expected achievement of student competencies when referring to the achievement of PISA (Program for International Student Assessment) results. PISA announced that based on the 2018 survey, Indonesia is still at the bottom of the list. For reading competence scores, it is ranked 72 out of 77 and for mathematics scores it is ranked 70 out of 78 countries. These results illustrate that the achievement of Indonesia's PISA scores has been stagnant in the last 10-15 years. (https://www.oecd.org/pisa/publications/PISA2018_CN_IDN.pdf).

Such conditions require more attention from the government. The condition of "balance" between the efforts that have been made and the results achieved can certainly be an evaluation. The government does not only look at the aspect of increasing competence but can also understand the psychological side of a teacher, especially those related to job satisfaction.

Robbins explains job satisfaction refers to an individual's general attitude towards his job. A person who has a high level of job satisfaction is certain to have a positive attitude towards work and will exert all their abilities towards the job, while someone who is dissatisfied with his job will hold a negative attitude towards work and will be reluctant to carry out his duties properly (Robbins and Timothy), (2007:85).

Job satisfaction is identified with a pleasant emotional state resulting from the appraisal of one's job. This psychological state often refers to perception. Job satisfaction is the perception, attitude and emotional response of workers to work (Ambarita, Purba and Ambarita, 2016: 130). Of course, everyone has a different perception of satisfaction at work so that the fulfillment of job satisfaction is not as simple as being able to be improved in an educational organization, namely schools.
Efforts to fulfill job satisfaction in schools for teachers are also a challenge. Teacher job satisfaction will be related to the character and fulfillment of the needs and feelings of each teacher. The needs of teachers in each school will certainly be different from other schools because of the different emotional responses of each teacher. The response can be in the form of feelings of pleasure, boredom, positive, negative when the teacher carries out his duties.

Job satisfaction also refers to the work itself such as a simple feeling about the job, the level of difficulty in completing the work so as to produce a happy feeling when the job can be completed. (Adil and Kamal, 2016:80; Burusic, 2019:2). In addition, the feeling of being able to provide benefits to others can provide satisfaction for that person (Maqbool, 2017:184). The same thing is stated by Luthans; about job satisfaction indicators (2012:142), namely the work itself, salary, promotion, supervision, co-workers and work environment. The real form of someone whose job satisfaction is fulfilled is that he does not hesitate to do the work given voluntarily and happily without considering the many things he has sacrificed.

Job satisfaction is a problem that is quite interesting and important because it has proven to be of great benefit to the interests of individuals, industry and society (Edy Sutrisno, 2014: 73) and influences behavior (Arnett, Laverie, & McLane, 2002: 54). Research on the causes and sources of job satisfaction allows the emergence of efforts to increase the happiness of life for workers, including teachers who dedicate themselves to the world of education.

2 Literature Review and Hypothesis Development

Job satisfaction is the attitude that a person shows in feeling his work. According to Colqitt, Lepine, and Wesson (2009,105) job satisfaction is defined as "as a pleasurable emotional state resulting from the appraisal of one's or job experience". Job satisfaction is a pleasant emotional state that results from an appraisal of work or work experience. The same thing is stated by Richard, Robert and Gordon (2012:312,337) that job satisfaction is related to a person's feelings or attitudes about the work itself, salary, promotion or educational opportunities, supervision, co-workers, workload and others. He goes on to state that job satisfaction is related to one's attitude towards work, and there are several practical reasons that make job satisfaction an important concept for leaders.

Newstroom (2007; 204) suggests "Job satisfaction is a set of favorable or unfavorable feelings and emotions with which employees view their work". Job satisfaction is a set of pleasant or unpleasant feelings and emotions towards work. Mullins (2005:493) defines job satisfaction as the result of individual perceptions of internal and external rewards, as shown in the following figure.
Wilson Bangun (2012; 327) states that with job satisfaction an employee can feel whether his job is fun or unpleasant to do. The various attitudes of a person towards his work reflect pleasant and unpleasant experiences in his work, reflect his experiences and expectations for future experiences. The work gives satisfaction to the owner. On the other hand, dissatisfaction will be obtained if a job is not fun to do.

Job satisfaction according to Dadang (2013: 15) is a pleasant or unpleasant emotional state towards work, job satisfaction reflects one's feelings towards his work. Job satisfaction reflects a person's feelings towards his job. According to Siagian (2013: 295) job satisfaction is a person's perspective, both positive and negative about his work.

Robbins (1996:76) defines job satisfaction as a general attitude towards a person's work, the difference between the amount of rewards received and the amount of rewards they believe should be received. Berry (1998: 54) further explains that job satisfaction is a work attitude that includes cognitive, affective and behavioral elements that influence a number of work behaviors. Furthermore, Wether and Davis (1996:35) define job satisfaction as an employee's feelings related to his work, namely feelings of pleasure or displeasure in looking at and carrying out his work.

Handoko (2011:12) says that job satisfaction is an emotional state that pleases employees to view their work. Job satisfaction reflects a person's feelings towards his job. In terms of teachers as employees in schools, job satisfaction of a teacher is an important thing to pay attention to.

Job satisfaction is one of the goals to be achieved by every employee in the workplace. The existence of satisfied employees makes work morale, dedication, love, and employee discipline increase. For this reason, it is imperative for companies to create job satisfaction for their employees.

Job satisfaction has a considerable influence on organizational productivity either directly or indirectly. High job satisfaction has an impact on the motivation of organizational members. Dissatisfaction is the starting point for problems that arise in organizations such as absenteeism, leadership-employee conflict and employee turnover. In terms of workers, dissatisfaction can lead to decreased motivation, decreased work morale, and decreased work performance both qualitatively and quantitatively.
Hee, et al. (2019:5) define job satisfaction as the degree to which a worker is happy or satisfied with his profession. While Culibrk, et al. (2018:1-12) define job satisfaction as a pleasant or positive emotional state due to an assessment of one's work or work experience. In addition, Anwar & Syukur (2015: 6), defines job satisfaction as an emotion or feeling that employees have regarding their current job. The opinion of Locke & Spector (in Shaju & Subhashini, 2017) defines job satisfaction as a positive emotional state resulting from a worker's enjoyment of his work.

2.1 Situational Leadership Perception

Perception is defined as a response or direct acceptance of something, or the process of a person knowing things through his five senses (KBBI, 2008). Perception is also defined as a process that is preceded by a sensing process, namely the process of receiving a stimulus by an individual through the senses or also called a sensory process (Desmita, 2016: 22).

Perception can affect the value of the object being responded to. The value obtained is the result of sensing received as information that spontaneously individual feelings and thoughts will provide meaning and existing stimuli so that each individual's perception will vary according to the sensing results he receives.

Siagian (2018: 146) states that at this time many leaders are using situational leadership styles. Situational leadership is needed in an organization because leaders can lead according to existing situations and conditions. The situational leadership approach focuses on leadership in unique situations according to the maturity level of the subordinates. Effective leadership will be judged from the completion of tasks assigned to subordinates and not only judged on the leader's ability to influence individuals and groups solely in following what they want.

Robbins (2012: 494) states that situational leadership is a leader who focuses on the readiness of followers. In other words emphasizing contextual factors that influence the leadership process. These factors are in the form of important situational variables such as the characteristics of subordinates, the nature of the leader's work, the type of organization, and the nature of the external environment.

Gibson (2012: 323-324) suggests that situational leadership theory is leadership that helps leaders understand the habits of subordinates and the surrounding conditions before applying the leadership model to be used. The leader must be able to adapt to the demands of the environment where he demonstrates his leadership where a leader must have varying flexibility. The different needs of subordinates make leaders have to treat them differently.

Hersey and Blanchard identified the level of maturity or readiness of subordinates with two characteristics, namely ability and willingness. The level of maturity of subordinates is divided into four levels from high ability to the lowest and for the level of willingness from the highest to the lowest.

In the development of situational leadership theory, Ken Blanchard (2013:1) explains Situational Leadership II (SLII) is a model for developing abilities on certain goals or tasks. SLII is based on the relationship between the level of development (competence and commitment) to a particular goal or task and the leadership style (direction and support) that the leader provides. Blanchard stated the importance of diagnosing the level of development of subordinates in applying situational leadership in SL II theory as shown in Figure 2:
The developmental level diagnosis in SL II focuses on the competence and commitment of subordinates. The development of good competence and commitment of subordinates is very beneficial for the leader because the nature of the dependence of subordinates on the leader or others will decrease. This is because subordinates have high motivation in completing their tasks and work with the competencies they have and strong loyalty to the leader.

2.2 Innovativeness

Innovativeness comes from the basic word innovation which has the meaning of creating something new. Greenberg and Baron (2008: 568-572) argues that innovation is the act (process) of making changes from something that has been formed into something new. Elias (2013:36) adds that innovation appears as a spark or burst of insight and at other times comes from a systematic approach, such as trial and error.

Innovation according to Schermerhorn (2012: 466-467) is the act of processing a new idea to be realized into something that has practical uses. Innovation is divided into two dimensions, namely, product innovation (new goods, products or services) and process innovation (new procedures or ways of working).

Stephen P. Robbins (2012: 571-572) stated “Innovation is a new idea applied to initiating or improving product, process, and service. And dividing innovation into three dimensions of product innovation, from small improvement to change the product, process innovation, such as introduce new ideas of doing the jobs, and services innovation, concerning all activities to improve the customer relationship and satisfaction.”. Innovation is a new idea that is applied to start creating products, processes and services and product innovation is divided into three dimensions starting from small improvements to change the product, process innovation, such
as introducing new ideas in doing work, and service innovation, regarding all activities to improve customer relationship and satisfaction.

One's innovation cannot be separated from the sources that encourage innovation. Ernest R House (2017: 125) states that there are five ideal conditions as a generator of innovative ideas, namely: 1) psychological assurance and freedom; 2) diversity of inputs within the organization; 3) internal commitment to finding solutions; 4) a certain number of structures that help define the problem; and 5) a certain amount of competition. Indicators that affect innovation are (1) Motivation, (2) Job Barriers, (3) Freedom of Work, (4) Job Challenges.

2.3 Communication Interpersonal

Communication is an important element in establishing good relations between humans, both individually and in groups within the organization. Communication is the process of delivering information or receiving messages from one person to another, either directly or indirectly, in writing, verbally or in non-verbal language (Husaini, 2008: 389). Communication is the transfer and understanding of meaning (Robbins and Coulter, 2000:198). Furthermore, communication is the sending of information from a sender to a recipient through the use of common symbols (Lunenburg and Ornstein, 2000:198).

According to Thoha (2008: 189) interpersonal communication is communication between individuals or between individuals. Communication that takes place between individuals is oriented towards behavior, behavior change, and as a basic way of uniting perception, understanding, motivation and language. Furthermore, Aida (2001: 225-236) states that effective interpersonal communication consists of three factors, namely: (1) mutual trust; (2) supportive attitude (supportive) and; (3) open attitude. In addition, self-concept which includes personal perception, self-image, self-esteem, empathy and sympathy, is a prominent factor in interpersonal communication.

Interpersonal communication can also be interpreted as communication within oneself. Within each there are communication components such as source, message, receiver channel, and feedback. Interpersonal communication affects communication and relationships with other people. Interpersonal communication is the delivery of messages from a teacher with colleagues or groups with effective direct feedback. Interpersonal communication will be said to be effective if the goal to change the opinions, attitudes and behavior of the communicant can be achieved properly.

Wenburg and Wilmat (1973: 334) state that individual perceptions cannot be checked by others but all the meanings of message attributes are determined by each individual. One's perception plays an important role in interpreting the message. All messages are created starting from oneself. Listeners react according to personal differences to the messages around them. This is what makes the communication of events personal, because it is never separated from the interaction of oneself with others.

De Vito (2005:4) reveals that an interpersonal communication can be effective by paying attention to five indicators: (1) openness, to show the quality of openness can be seen from the aspect of the desire to be open to everyone who interacts with others, and the aspect of the desire to reach honestly all the stimuli that come to him. (2) empathy, feeling as others feel, a feeling with the feelings of others i.e., trying to feel in the same way as the other person's feelings. (3) support, sometimes spoken and sometimes unspoken. Unspoken support, for example by gestures, can be a positive aspect of interpersonal communication. (4) positivity, there are at
least three different aspects or elements. First, interpersonal communication will be successful if there is positive attention to someone. Second, interpersonal communication will be well maintained, if a positive feeling towards the other person is communicated. This makes the other person feel better and have the courage to participate more at every opportunity. Third, when positive feelings are in communication, it is very useful to make cooperation more effective. (5) equality, is a special indicator because in reality no human being is the same. Interpersonal communication will be more effective if the people who communicate are in an atmosphere of equality. It's not that people who don't have equality can't communicate, but it should be known their personality equality.

According to Hartley (in Kumar, 2017: 51-58), defines interpersonal communication as a face-to-face meeting between two people. Meanwhile, according to Muhammad (in Merta, 2019: 55-62) defines interpersonal communication as a process of exchanging information between a person and at least one other person or usually between two people who know each other. The opinion of Caponetto & De Vito (in Lusiawati, 2019: 484) defines interpersonal communication as communication between people face to face so that it allows each participant to capture the reactions of others directly.

Good interpersonal communication can make other individuals more open to express themselves, more careful in providing perceptions of themselves and others, so that the communication that takes place will be more effective.

From the description above, it can be synthesized that interpersonal communication is a person's ability to communicate in the process of exchanging information individually or in groups so that it can produce an immediate reaction. Indicators of interpersonal communication are (1) Openness, (2) Empathy, (3) Support, (4) Positive Sense, (5) Equality or similarity.

3 Research Method

The location of the research was carried out at Private Junior High Schools (SMP) in Medan Sunggal District. The selection of research sites was based on considerations in terms of the suitability of the variables tested and could clearly describe the job satisfaction of private junior high school teachers in Medan Sunggal District, Medan City as a whole, amounting to 16 schools.

This research was conducted in June and July 2021. The first month was used to arrange research permits, test instruments and refine instruments. Furthermore, the last one month is used to collect data, analyze data and write research reports. This research was conducted using quantitative methods. The model used is a path analysis model or known as a causal relationship pattern.

This study analyzes the effect of one variable on another variable, namely: (1) situational leadership; (2) innovation; (3) interpersonal communication; (4) teacher job satisfaction.

The population of this study were private junior high school teachers in Medan Sunggal District, Meda City. The target population criteria in this study were (1) Private Junior High School teachers in Medan Sunggal Subdistrict, Medan City, (2) Served in A-accredited schools, (3) Possess dapodik data at the main school. The research population is 171 teachers. The study was limited to only one level of accreditation, namely Accreditation A.
The limitation of the research population in one level of accreditation is carried out so that the research sample is uniform in school conditions, attainment of 8 national education standards and teacher experience. This limitation is also the result of input from resource persons and also the approval of the supervisor with measurable considerations. Apart from that, restrictions are also made to get a specific picture of teacher job satisfaction in one level of school accreditation. The population criteria for taking data from dapodik teachers are intended so that the teachers who become the research sample are teachers who have had a minimum of 2 years of service and have administrative completeness so that they can be proposed to be recorded at the dapodik. In addition, the dapodik teachers are in the main school under study to ensure teachers have full responsibility for the content of the research carried out. This study did not take samples from the entire population. This study uses total sampling, namely the entire population in the research sample criteria due to the number of respondents that can be reached by researchers.

Data collection techniques were carried out using primary data. Primary data was obtained directly from the sample by distributing questionnaires via google form. This study uses data collection techniques, namely filling out a questionnaire. The questionnaire was designed and structured to measure teacher job satisfaction of situational leadership, innovation and interpersonal communication of principals.

4 Result and Discussion

4.1 Job Satisfaction
The results of the study confirmed that there was a difference of 0.98 in the average score of the study with the average ideal score of 105.98 with 105 meaning that the research results were 0.98 greater than the average ideal score or above the ideal score. The achievement of the maximum score of 125 is still below the ideal maximum score of 175, meaning that none of the teacher satisfaction scores are at perfect or maximum scores. The minimum score of 90 is still far above the ideal minimum score of 32, meaning that none of the teacher satisfaction scores are at the lowest value or the achievement of the minimum score is about three times the lowest ideal score.

4.2 Situasional Leadership Persepsion
The results of the study confirm that there is a difference in value of 22.89 with an average score of 73.11 with 96 which means that the average score is 22.89 smaller than the average ideal score or below the ideal score. The achievement of the maximum score of 87 is still below the ideal maximum score of 160, meaning that none of the situational leadership perception scores are at perfect or maximum scores and only about half of the maximum score. The minimum score of 59 is still far above the ideal minimum score of 32, meaning that none of the teacher satisfaction scores are at the lowest score or the achievement of the minimum score is about twice the ideal lowest score.

4.3 Innovativeness
The results of the study confirmed that there was a difference in value of 2.12 between the average score and the average ideal score, namely 104.12 and 102, meaning that the average score was 2.12 less than the average ideal score or above the ideal score.
The achievement of the maximum score of 132 is still below the ideal maximum score of 170, meaning that none of the innovativeness scores are at a perfect or maximum score. The minimum score of 90 is still far above the ideal minimum score of 34, meaning that none of the results of the innovative score is at the lowest value or the achievement of the minimum score is about three times the lowest ideal score.

4.4 Interpersonal Communication

The results of the study confirmed that there was a difference in value of 12.19 between the average score and the average ideal score, namely 84.77 with 96, meaning that the average score was 12.19 less than the average ideal score or above the ideal score.

The achievement of the maximum score of 105 is still below the ideal maximum score of 160, meaning that none of the results of interpersonal communication scores are at perfect or maximum scores. The minimum score of 68 is still far above the ideal minimum score of 32, meaning that none of the results of the innovative score is at the lowest value or the achievement of the minimum score is about twice the lowest ideal score.

Confirmation of the results of the correlation coefficient analysis of indicators on the variables of job satisfaction, perception of situational leadership, innovation and interpersonal communication shows the weak level of correlation of each variable indicator.

On the job satisfaction variable, it was confirmed that only the co-workers indicator was at the moderate level of correlation, the other indicators were at the weak level. In the situational leadership perception variable, it was found that only delegative indicators were at a weak level, other indicators were at a strong and moderate level. In the indicator of the innovativeness variable, it is only found that the obstacle indicator is at a moderate level, the other three indicators are at a weak level. In the indicators of interpersonal communication variables found three indicators at a weak level and two indicators at a moderate level.

The number of indicators that are weakly correlated with the total score of the variables in the study is not entirely due to the low relationship between indicators and variables, but is also influenced by the small number of items that affect the correlation value of the indicator to the total score of the variable.

4.5 Situational Leadership Perception (X1) has a positive direct effect on Interpersonal Communication (X3)

The test criteria is to reject H0 if the significance of the tcount <0.05 or accept H0 if the significance of the t -count value is > 0.05. Based on the results of the analysis, the path coefficient between X1 and X3, namely: $31 = 0.195$ with a value of $t_{count} = 2.944$ and a significance value of 0.004 while the $t_{table}$ value of 5% is 1.974. So, the path coefficient has a value of $t_{count} > t_{table}$ 5%, namely: $4.364 > 1.974$ with a significance level of 0.004. Thus, H0 is rejected and Ha is accepted.

By paying attention to the correlation coefficient, it is evident that the perception of situational leadership has a direct positive effect on interpersonal communication. This illustrates that teachers' perceptions of principals who have high situational leadership have a direct influence on teacher interpersonal communication.

4.6 Innovativeness (X2) has a direct positive effect on Interpersonal Communication (X3)

The test criteria is to reject H0 if the significance of the tcount <0.05 or accept H0 if the significance of the t-count value is > 0.05. Based on the results of the analysis, the path
coefficient between X2 and X3, namely: $32 = 0.469$ with a price of $t_{count} = 7.060$ and a significance value of 0.000 while the value of $t_{table} 5\%$ is 1.974. So, the path coefficient has a value of $t_{count}> t_{table} 5\%$, namely: $7.060 > 1.974$ with a significance level of 0.000. Thus, $H_0$ is rejected and $H_a$ is accepted.

By paying attention to the correlation coefficient, it is evident that innovation has a direct positive effect on interpersonal communication. This illustrates that teachers' perceptions of principals who have high innovation have good interpersonal communication skills as well.

4.7 Situational Leadership (X1) has a direct positive effect on Teacher Job Satisfaction (X4)

The test criteria is to reject $H_0$ if the significance of the $t_{count} < 0.05$ or accept $H_0$ if the significance of the $t_{count}$ value is 0.05. Based on the results of the analysis, the path coefficient between X1 and X4 is obtained, namely: $41 = 0.422$ with a value of $t_{count} = 10.517$ and a significance value of 0.000 while the $t_{table}$ value of 5% is 1.974. So, the path coefficient has a value of $t_{count} > t_{table} 5\%$, namely: $10.517 > 1.974$ with a significance level of 0.000. Thus, $H_0$ is rejected and $H_a$ is accepted.

By paying attention to the correlation coefficient, it is evident that situational leadership has a direct positive effect on teacher job satisfaction. This illustrates that teachers' perceptions of principals who have good situational leadership can increase teacher job satisfaction.

4.8 Innovativeness (X2) has a direct positive effect on Teacher Job Satisfaction (X4)

The test criteria is to reject $H_0$ if the significance of the $t_{count} < 0.05$ or accept $H_0$ if the significance of the $t_{count}$ value is 0.05. Based on the results of the analysis, the path coefficient between X2 and X4 is obtained, namely: $42 = 0.263$ with a value of $t_{count} = 5.915$ and a significance value of 0.000 while the $t_{table}$ value of 5% is 1.974. So, the path coefficient has a value of $t_{count} > t_{table} 5\%$, namely: $5.915 > 1.974$ with a significance level of 0.000. Thus, $H_0$ is rejected and $H_a$ is accepted.

By paying attention to the correlation coefficient, it is evident that innovation has a direct positive effect on teacher job satisfaction. This illustrates that high innovation will provide teacher job satisfaction.

4.9 Interpersonal Communication (X3) has a positive direct effect on Teacher Job Satisfaction (X4)

The test criteria is to reject $H_0$ if the significance of the $t_{count} < 0.05$ or accept $H_0$ if the significance of the $t_{count}$ value is 0.05. Based on the results of the analysis, the path coefficient between X3 and X4 is obtained, namely: $43 = 0.464$ with a value of $t_{count} = 10.198$ and a significance value of 0.000 while the $t_{table}$ value of 5% is 1.974. So, the path coefficient has a value of $t_{count} > t_{table} 5\%$, namely: $10.198 > 1.974$ with a significance level of 0.000. Thus, $H_0$ is rejected and $H_a$ is accepted.

By paying attention to the correlation coefficient, it is evident that interpersonal communication has a direct positive effect on teacher job satisfaction. This illustrates that teachers to principals who have skills in interpersonal communication can increase teacher job satisfaction. Efforts to increase teacher job satisfaction through situational leadership by giving instructions, consulting, supporting and delegating to subordinates according to the maturity, ability, willingness and skills of subordinates in carrying out their duties and responsibilities; Efforts to increase teacher job satisfaction through innovation by paying attention to teacher motivation, barriers to work, freedom at work and job challenges; Efforts to increase teacher job satisfaction through interpersonal communication by paying attention to information disclosure to teachers,
empathy, support, positive feelings and equality among fellow teachers; Teacher interpersonal communication in increasing teacher job satisfaction by paying attention to the work itself, salary system, promotion, supervision, co-workers and the environment.

5 Conclusion

The results of this study indicate that (1) the perception of situational leadership has a direct positive effect on interpersonal communication; (2) The perception of situational leadership has a positive effect on teacher job satisfaction; (3) Innovativeness has a positive effect on interpersonal communication; (4) Innovativeness has a positive effect on teacher job satisfaction; (5) Interpersonal communication has a positive effect on teacher job satisfaction, which is a research finding that can contribute to the development of organizational behavior theory, especially situational leadership theory, innovation, interpersonal communication and job satisfaction.

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Policy Analysis of the Arrangement and Equity of Public Elementary School Teachers (SD) Binjai

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Abstract. This study aims to analyze the structuring and distribution policy of PJOK teachers at public elementary schools in Binjai City. This study used a descriptive qualitative method. The objects in this study consists of 119 public elementary schools in Binjai Municipality. Data collection techniques in this study were carried out by means of observation, interviews and documentation studies. Data analysis uses tabulations and percentages as the basis for data interpretation and descriptions in order to make reports. The results of this study indicate that from the aspect of the adequacy of the findings of the data in the field, it is known that there are 5 sub-districts in Binjai City with a total of 119 public elementary schools. The distribution of PJOK teachers in Binjai Municipality can be said to be unequal, this can be seen from the exposure of research data which shows that there are 97 PJOK teachers with PNS status while PJOK teachers with NonPNS status are 62, of the total teachers needed as many as 159 people. The distribution of teachers in every school in Binjai City has not been evenly distributed, it can be seen from the percentage value of equity from 119 public elementary schools in Binjai City, there are 54% or 64 elementary schools that are not evenly distributed while 55 schools in Binjai Municipality are 46%. It's even. So from the results of this study it was in a policy that the education office of Binjai Municipality In order to make the results of this analysis in making a policy related to the shortage of PJOK teachers and supervision must always be carried out in implementing policies that have been carried out so that they continue to run as they should. And for the school to make reports related to the condition of PJOK teachers every month in determining the needs of PJOK teachers so that the need for PJOK teachers in schools is more evenly distributed.

Keywords: Analysis, Policy, Structuring and Equity, PJOK Teachers

1 Introduction

Education is an activity carried out by humans to get a result in the form of a more dignified thought. By carrying out a learning process, education can be used as a benchmark for the progress of a country. Education is needed to contribute to competition in an increasingly sophisticated global era. Education can also make human thinking more modern to develop abilities, thoughts, intelligence, patterns of attitude and behavior which are provisions for advancing the civilization of a country. Education for everyone is a priority for the Indonesian people. This is in accordance with the Preamble to the 1945 Constitution of the Republic of
Indonesia which mandates the Government of the Republic of Indonesia to be obliged to educate the nation's life through quality education to fulfill the rights of its citizens. Education is a human effort to humanize humans themselves.

According to the 1945 Constitution, the government is obliged to fulfill the rights of citizens to obtain education to improve the quality of life of the nation. This means that the government must be able to provide education to all Indonesian people, not only certain people who can afford it, while the poor people do not get education. In general, both the shortage and excess of teachers at the Education Unit Level is a problem. This phenomenon is found in both districts/cities, and/or provinces, as well as the transfer of teacher functions. This has created a gap in the distribution of teachers between educational units, between levels, and between types of education, between districts/cities, and between provinces. Therefore, to ensure equal distribution of teachers between educational units, between levels, and between types of education, between districts/cities, and/or between provinces in an effort to realize the improvement and equity of the quality of formal education nationally and the achievement of national education goals, based on this Regulation, Together with 5 Ministers in 2011, namely the Minister of National Education Number: 05/X/PB/2011, State Minister for Empowerment of State Apparatus and Bureaucratic Reform Number: SPB/03/M.PAN-RB/10/2011, Minister of Home Affairs Number: 48 In 2011, the Minister of Finance Number: 158/PMK.01/2011, and the Minister of Religion Number: 11 of 2011 concerning the Arrangement and Equity of Civil Servant Teachers that civil servant teachers can be assigned to education units in regencies/cities, and other provinces. Employees are one of the main assets of an agency who are planners and active actors of every organizational activity. They have heterogeneous thoughts, feelings, desires, status and educational background, age and gender which are brought into an organization. The quality and quantity of human resources must be in accordance with the needs of the organization to be effective and efficient in supporting the achievement of goals (Hasibuan, 2011:27). The administration of an efficient and effective government is a demand in the era of globalization which is full of competition and limitations in all fields. This fact demands the professionalism of apparatus resources in the implementation of government affairs which is currently happening, the expected professionalism has not been fully realized.

Measures of adequacy and relevance as well as equity are service standards that must always be pursued by local governments in order to improve the quality of education services. It is alleged that so far many teachers are scattered in urban areas or schools, while the outskirts are still experiencing a shortage of teachers. If we look at the student teacher ratio within the district, it can be seen that the student teacher ratio is relatively adequate. To ensure equal distribution of teachers among educational units, between levels, and between types of education, between districts, between cities, and between provinces and in an effort to realize the improvement and equity of the quality of formal education nationally and the achievement of national education goals, a Joint Regulation of the State Minister for the Empowerment of State Apparatus and Bureaucratic Reform has been stipulated. Minister of National Education, Minister of Home Affairs, Minister of Finance, and Minister of Religion Number 05/X/PB/2011, SPB/03/M.PAN-RB/10/2011, 48 of 2011, 158/PMK.01/2011, 11 of 2011 concerning the Arrangement and Equity of Civil Servant Teachers. In the context of implementing the Joint Regulations, it is already contained in the technical instructions governing the arrangement and distribution of PNS teachers in TK/TKLB, SD/SDLB, SMP/SMPLB, SMA/SMALB, and SMK. The scope of the technical guidelines includes planning for teacher needs, optimizing existing teachers, criteria for teachers who can be transferred to other schools, transfer mechanisms, and funding.
In education there are two main subjects that interact with each other. The two subjects are teacher and student. Teachers are the main problem in education. The progress of an education is measured by the quality of the teachers. However, the problem regarding teachers is still an unsolved problem, one of which is the problem that there are still areas that have excess or lack of educators (teachers). Based on Government Regulation Number 19 of 2017 concerning Amendments to Government Regulation Number 74 of 2008 concerning Teachers, it is stated that teachers are professionals who have a strategic role to realize the vision of implementing learning in accordance with the principles of professionalism, and to realize teacher professionalism, it is necessary to improve teacher governance. The teacher is the main factor in determining the effectiveness of the teaching and learning process. Therefore, good planning is needed about the distribution of teachers in every educational institution. More specifically, the number of teacher needs in general as well as for each field of study and each teacher is evenly distributed per region, per school and particular field of study. Because with the number of qualified teachers and followed by equitable distribution, improving the quality of education can be achieved properly. Of course, the task of developing education is not only carried out by the central government, local governments, in this case the district/city governments, are also responsible for the implementation of education development in the regions. In the global competition in the field of education, efforts continue to be made so that students get the quality of learning that is on par with other countries. Indicators of the development of the quality of education must always be observed and considered properly.

Teachers have a strategic role in strengthening national resilience and the integrity of the Unitary State of the Republic of Indonesia. The government is obliged to meet the needs of teachers, both in number, academic qualifications, and in competence equally to ensure the sustainability of primary and secondary education units organized by the government. This obligation is not only carried out by the central government but also by the provincial and district/city governments according to their respective authorities. In addition, the organizers of basic and secondary education units organized by the community are required to meet permanent teachers, both in number, academic qualifications, and competencies to ensure the continuity of education. The important thing that must get serious attention for the Education Office in various regions, is to pay attention to the distribution of schools and efforts to organize the distribution of teaching teachers, to be adjusted to the qualifications of the fields of study taught in each school. The appropriate distribution of teachers in each area can make teaching and learning activities well established. This is important, because in every place of education in schools for Elementary Schools (SD), especially in the Binjai City area, the distribution of teacher needs is not very supportive of the teaching process. The unequal needs of teachers, especially teachers of Physical Education, Sports and Health (PJOK) can interfere and make the delivery of subject matter not optimal for students so that this becomes one of the things that will be the focus of research that will be designed by researchers. Based on Ministerial Instruction No. 2 of 2011 concerning Education Data Management Activities, the official data collection system carried out by the Directorate General of basic education is through the Basic Education Data System (DAPODIK) which is set as the only data source that will be used as the basis for policy making. Based on the considerations above, the data used to analyze the adequacy of teachers at the basic education level in Binjai Municipality uses DAPODIK.

In 2020 the Binjai Municipality area has 154 public and private elementary schools (SD), 119 public elementary schools (SD), and 35 private elementary schools (SD) consisting of 5 sub-districts in Binjai Municipality. Based on data obtained from the Binjai Municipal Education Office. From these data, it can be seen that the number of teachers in each school has an average
of only 1 teacher. The highest number in each school only amounts to no more than 3 people. With this number, the Physical Education, Sports and Health teachers in each school have to teach from grade 1 to grade 3, which if observed is very inefficient for an ideal learning process. Starting from the existing data, many teachers teaching subjects Physical Education, Sports and Health have an educational background that is not relevant to the eye lessons taught. Many teachers are forced to teach Physical Education, Sports and Health. This is due to the unequal number of Physical Education and Health teachers, especially in schools that do not receive special attention from the government. In today's era there should be no more teachers who teach not in their field of expertise so that the relevance of their knowledge is maintained. With circumstances like this, the process of delivering material will be greatly disrupted due to the lack of mastery of a teacher's expertise in the subjects he teaches. The location of Elementary Schools (SD) in the Binjai Municipality area has not yet been mapped conventionally or digitally and there is no database that presents data or information in each Elementary School (SD). Maps can be used to find out various information contained in the map, for example a teacher distribution map. Maps or roadmaps can be used to see how the distribution pattern of Physical Education, Sports and Health teachers in Binjai City is and it can be seen how the pattern of distribution of these teachers is, whether the pattern of distribution of the teachers is uniform (evenly), grouped, and random (random). If it is known that the distribution pattern of teachers is not evenly distributed, it is necessary to increase access and equal distribution of affordable secondary education services for all residents carried out by local governments, through formal elementary school education (SD) or other equivalent forms of education.

This is a task for the relevant government in accordance with the National Education System Law no. 20 of 2003, namely: "The national education system must be able to ensure equal distribution of educational opportunities, improve quality as well as the relevance and efficiency of education management to face challenges in accordance with the demands of changes in local, national, and global life so that it is necessary to reform education in a planned, directed and blooming." Therefore, the City Government of Binjai must be able to optimize the application of management functions towards a more professional direction in the field of management and staffing as well as the Empowerment of other State Apparatuses through employee analysis, including teachers, especially teachers of Physical Education, Sports and Health as an effort to increase professionalism in the performance of organizational functions.

Based on observations, observations, initial interviews and dapodik data from the Binjai City Education Office conducted by researchers, it can be seen that the placement of teachers, especially sports teachers, has not been evenly distributed. This of course invites concern from Physical Education and Sports Subjects because there are teachers who are not certified as experts in Physical Education and Sports who teach in these subjects. Based on the facts above, it is hoped that by doing the mapping, it is hoped that it can be known and can examine the distribution pattern of Elementary School (SD) teachers in the Binjai MunicipalityState Elementary Schools (SD) Kota Madya Binjai in 2021".

2 Research Methodology

The type of research used in this research is descriptive with a qualitative approach. According to Sugiyono (2010:7). Descriptive method is a method of researching the status of a group of people, an object, a set of conditions, a system of thought or a class of present events. According to Sugiono (2009:15) "qualitative research methods are research methods used to examine the
condition of natural objects, (as opposed to experiments) where the researcher is the key instrument, returns with triangulation (combined) qualitative data analysis, and the results. Qualitative research emphasizes meaning rather than generalizations. According to Arikunto (1998:245) is data that is described by words or sentences that are separated according to categories to obtain conclusions. Qualitative is used to get in-depth data, a data that contains data. Has real meaning, definite data which is a visible data value.

In answering the problems that support the hypothesis, various data are needed that are in accordance with the subject matter, for this reason, various techniques are needed for data collection to be more effective and efficient. The techniques used are: (1) Field Observation, (2) Interview, (3) Documentation. The data collection techniques used in this qualitative research were carried out under natural conditions, primary data sources and data collection was mostly on participant observation, in-depth interviews, documentation and field notes. In this study, the data collection techniques used were observation, documentation and interviews.

Data analysis in qualitative research is carried out before entering the field, while in the field and after finishing in the field. Data analysis was carried out using the Miles and Huberman version, in Sugiyono (2013: 337) that the activities in qualitative data analysis were carried out interactively and took place continuously until they were completed so that the data was saturated. Activities include data reduction (data reduction) presentation of data (data display) and conclusion drawing (verification)

3 Data Description

3.1. Arrangement of PJOK Teachers for Public Elementary Schools in Binjai Municipality

The results of the data findings in the field revealed that there were 5 sub-districts in Binjai Municipality with a total of 119 public elementary schools. Of these schools, there are 956 rombel (study groups) or study classes. Public elementary schools in Binjai City use the 2013 curriculum with a total of 4 lesson hours (jp) with a time of 1 JP 35 minutes, so the total PJOK lesson hours for Binjai Municipal Elementary School are 2,230 hours. There are 97 PJOK teachers with PNS status while PJOK teachers with Non-PNS status are 62, so the ratio between PNS teachers and Non-PNS (Honorer) teachers is around 0.6. The results from the description of the research data can be seen in table 1. Below:

<table>
<thead>
<tr>
<th>No</th>
<th>Information</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>District</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>SD Negeri</td>
<td>119</td>
</tr>
<tr>
<td>3</td>
<td>Classroom</td>
<td>956</td>
</tr>
<tr>
<td>4</td>
<td>Lesson</td>
<td>2230</td>
</tr>
<tr>
<td>5</td>
<td>PJOK Teachers with Civil Servant Status</td>
<td>97</td>
</tr>
<tr>
<td>6</td>
<td>PJOK Teachers Non-PNS</td>
<td>62</td>
</tr>
</tbody>
</table>

Source: Dapodik Kota Madya Binjai
3.2. Equitable

Distribution of PJOK teachers at Madya City Madya Binjai Elementary Schools An analysis of the distribution of PJOK teachers at public elementary schools in Binjai Municipality was carried out at the school and sub-district levels in order to obtain more specific data on needs or equity. Thus, it will be able to produce a more accurate analysis related to government policy making in Binjai Municipality. The results of the analysis at the school and sub-district levels are as follows:

East Binjai District. From the results of the analysis and observations conducted by researchers in the eastern Binjai sub-district, Binjai City, North Sumatra province, there are 22 public schools at the elementary school level with the number of study groups (rombel) totaling 186 with PJOK 744 lesson hours and the number of PNS teachers is 21 people. So if it is averaged with the distribution of PJOK teachers in the sub-district of east binjai in accordance with the technical guidelines for the joint 5 ministerial regulations in 2011. Page 17. There is a lack of equal distribution and the need for PJOK teachers is around 10 teachers. The data analysis results per school from 1 east binjai sub-district can be explained as follows: that for the level of public elementary schools, the distribution of teachers is in the equal category with a total of 22 public elementary schools, there are 19 public elementary schools that have an equal level and 3 schools have not been evenly distributed for the needs of teachers, this is because many of these schools involve non-PNS teachers. If it is explained in terms of the needs of Non-PNS teachers, in the Binjai Timur sub-district there is a shortage of around 11 teachers. This is in accordance with the regulations in accordance with the technical guidelines of the joint 5 ministerial regulations in 2011. Page 17.

North Binjai District. From the results of the analysis and observations conducted by researchers in the northern Binjai sub-district, Binjai Municipality, North Sumatra province, there are 35 public schools at the elementary school level with the number of study groups (rombel) is 270 with PJOK lesson hours of 1080 lesson hours and the number of PNS teachers is 26 people. So if it is averaged with the distribution of PJOK teachers in the district of East Binjai in accordance with the technical guidelines for the joint 5 ministerial regulations in 2011. Page 17 with a total need of 45 teachers. There is a lack of equity and the need for PJOK teachers is around 19 teachers. It can be concluded that for the level of public elementary schools, the distribution of teachers is in the equal category with a total of 35 public elementary schools, there are 21 public elementary schools that have an equal level and 14 schools have not been evenly distributed for the needs of teachers, this is because many of these schools involve non-formal teachers. If it is explained in terms of the needs of Non-PNS teachers, in the northern Binjai sub-district there is a shortage of around 17 teachers. This is in accordance with the regulations in accordance with the technical guidelines of the joint 5 ministerial regulations in 2011. Page 17.

West Binjai District. From the results of the analysis and observations conducted by researchers in the west binjai sub-district, Binjai Municipality, North Sumatra province, there are 19 public schools at the elementary school level with the number of study groups (rombel) is 165 with PJOK lesson hours 660 lesson hours and the number of PNS teachers is 15 people. So if it is averaged with the distribution of PJOK teachers in the district of East Binjai in accordance with the technical guidelines for the joint 5 ministerial regulations in 2011. Page 17 with a total need of 28 teachers. There is a lack of equity and the need for PJOK teachers is
around 13 teachers. The data analysis results per school from 1 sub-district of West Binjai can be explained in table 4.4, as follows:

**District Binjai City.** From the results of the analysis and observations conducted by researchers in the sub-district of Binjai kota, Municipality of Binjai, North Sumatra province, there are 18 public schools at the elementary school level with a total of 140 study groups (rombel) with PJOK lesson hours 560 lesson hours and the number of PNS teachers is 16 people. So if it is averaged by the distribution of PJOK teachers in the district of Binjai Kota in accordance with the technical guidelines of the joint 5 ministerial regulations in 2011. Page 17. There is a lack of equal distribution and the need for PJOK teachers is around 13 teachers. It can be concluded that for the level of public elementary schools, the distribution of teachers is in the equal category with a total of 18 public elementary schools, there are 11 public elementary schools that have an equal level and 7 schools have not been evenly distributed for the needs of teachers, this is because many of these schools involve non-formal teachers, civil servant. If it is explained in terms of the needs of Non-PNS teachers, in the district of Binjai, there is a shortage of around 7 teachers. This is in accordance with the regulations in accordance with the technical guidelines for the joint regulation of 5 ministers in 2011. Page 17 with a total need of 24 teachers. From the results of data exposure that has been presented, it can be analyzed on the distribution of PJOK teachers that, at the school level, the need for PJOK teachers is fairly even, this is because many schools use honorary teachers to cover the needs of PJOK teachers in Binjai Kota sub-district. Meanwhile, at the sub-district level, public elementary schools in the Binjai Kota sub-district have not yet received the maximum equal distribution of PJOK teachers, therefore better equity is needed so that the proportion of teachers according to the needs and obligations of these teachers can be met.

**South Binjai District.** From the results of the analysis and observations conducted by researchers in the city of Binjai sub-district, Binjai Municipality, North Sumatra province, there are 25 public schools at the elementary school level with the number of study groups (rombel) totaling 195 with PJOK lesson hours 780 lesson hours and the number of teachers There are 19 civil servants. So if it is averaged by the distribution of PJOK teachers in the district of Binjai Kota in accordance with the technical guidelines for the joint 5 ministerial regulations in 2011. Page 17 There is a lack of equal distribution and the need for PJOK teachers is around 13 teachers. It can be concluded that for the level of public elementary schools the distribution of teachers is in the unequal category with a total of 25 public elementary schools there are 13 public elementary schools that have an equal level and 12 schools have not been evenly distributed for the needs of teachers this is because many of these schools involve non-formal teachers. -PNS. If it is explained in terms of the needs of Non-PNS teachers, in the Binjai City sub-district there is a shortage of around 17 teachers. This is in accordance with the regulations in accordance with the technical guidelines of the joint 5 ministerial regulations in 2011. From the data that has been collected an analysis of the distribution of PJOK teachers can be carried out that, at the school level, the need for PJOK teachers is relatively even, this is because many schools use honorary teachers to cover the needs of PJOK teachers in the South Binjai sub-district. Meanwhile, at the sub-district level, public elementary schools in the South Binjai sub-district have not yet received the maximum equal distribution of PJOK teachers, therefore better equity is needed so that the proportion of teachers that suit the needs and obligations of these teachers can be met.
4 Research Discussion

From the results of the analysis that has been carried out by researchers through interview guidelines compiled by researchers and given to resource persons, it can be explained that the mechanism for implementing the arrangement and distribution of PNS teachers at the state elementary school level, namely the education unit collects data on the shortcomings and strengths of existing teachers. in the education unit, the need for facilities and infrastructure, as well as school management. Schools can't just make reports on teacher needs analysis because the office has a supervisor who is in charge of supervising the school. Supervisors here are usually placed in each sub-district. The calculation of teacher needs here refers to the pattern of calculating teacher needs in the technical guidelines for implementing existing regulations. The school then reports the results of the needs analysis to the Binjai Municipal Education Office. The Binjai Municipal Education Office is in charge of receiving and recapitulating all reports that come from schools, and submitting them to the BKD. BKD then processes and follows up in the form of teacher arrangement. The results of the analysis related to the distribution of PJOK teachers in Binjai Municipality at the public elementary school level, there are 5 sub-districts in Binjai Municipality with a total of 119 public elementary schools. Of these schools, there are 956 rombel (study groups) or study classes. Public elementary schools in Binjai City use the 2013 curriculum with a total of 4 lesson hours (jp) with a time of 1 JP 35 minutes, so the total PJOK lesson hours for Binjai Municipal Elementary School are 2,230 hours. There are 97 PJOK teachers with PNS status while PJOK teachers with Non-PNS status totaling 62 from this data, which can be seen in Figure 1 as follows:

![Figure 1. Graph of Number of Teachers and Teacher Needs for SD Negeri PJOK Madya City Binjai](image)

The results of the analysis conducted at the school level In the field of government, there are still many schools that do not have PJOK teachers with civil servant status in these schools to cover the shortage, teachers with non-civil servant status (honorary) are placed. Based on the data obtained, there are several schools that have an even adequacy of teachers but not infrequently some schools also lack teachers, especially PJOK teachers so it can be concluded that the need for PJOK teachers in Binjai Municipality is not evenly distributed. The distribution of teachers in every school in Binjai City has not been evenly distributed, it can be seen from the percentage value of equity from 119 public elementary schools in Binjai City, there are 54% or 64 elementary schools that are not evenly distributed, while 55 schools in Binjai Municipality
are 46%. It's even. The graphic image of school equity in Binjai Municipality can be seen in Figure 2, as follows:

![Equitable distribution of schools towards teachers in the Binjai Municipality Corner](image)

**Figure 2. School Equity towards PJOK Teachers in Binjai Municipality**

There is an even distribution of schools towards good PJOK teachers in Binjai City. The analysis was also carried out through the assumption that 1 teacher with civil servant status is at least in each school and each teacher is only allowed to teach a maximum of 24 hours of lessons, which if there are excess hours in a school that is more than 24 hours of lessons, it must be filled by a PJOK teacher with civil servant status. The results of the analysis show that the need for PJOK teachers to cover the shortage of teachers with civil servant status in Binjai Municipality is 62 people. The current number of teachers with civil servant status is 97 people and 159 teachers are needed.

5 Conclusion

After conducting research through qualitative descriptive data analysis, it can be concluded that:

The results of the data findings in the field are known to be 5 sub-districts in Binjai City with a total of 119 public elementary schools. Of these schools, there are 956 rombel (study groups) or study classes. Public elementary schools in Binjai City use the 2013 curriculum with a total of 4 lesson hours (jp) with a time of 1 JP 35 minutes, so the total PJOK lesson hours for Binjai Municipal Elementary School are 2,230 hours. There are 97 PJOK teachers with PNS status while PJOK teachers with Non-PNS status are 62, so the ratio between PNS teachers and Non-PNS (Honorer) teachers is around 0.6.

From the results of the research that has been done, there are no subject teachers who teach sports teachers. The distribution of PJOK teachers in Binjai Municipality can be said to be unequal, this can be seen from the exposure of research data which shows that there are 97 PJOK teachers with PNS status while PJOK teachers with Non-PNS status are 62, of the total teachers needed as many as 159 people. The distribution of teachers in every school in Binjai City has not been evenly distributed, it can be seen from the percentage value of equity from 119 public elementary schools in Binjai City, there are 54% or 64 elementary schools that are not evenly distributed, while 55 schools in Binjai Municipality are 46%. It's even.
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Improving Academic Services Based on Management Information Systems at the SMPIT Khairul Imam Medan

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Abstract. This study aims to determine the improvement and effectiveness of management information system-based academic services at SMPIT Khairul Imam Medan. The design used in the research is planning, implementation, observation, and reflection. Improvements in academic services can be proven from the results of initial observations which were originally carried out conventionally with an achievement of 1.4 with the unfeasible category, then improvements were made by applying technology through cycle 1 to cycle 2 and the results of receiving academic services increased to 4.20 with a very decent category. Through these two stages of the cycle, an increase of 56% was obtained from the original condition. Next, the average n-gain score reached 0.7 or the equivalent of 66.7% which was categorized as quite effective, so it can be concluded that the management information system is quite effective in improving academic services at SMPIT Khairul Imam.

Keywords: Academic Services, Management Information Systems.

1 Introduction

Parents today must be critical in choosing schools for their children, ranging from schools with national standards to international standards (cooperation schools). Data from the Ministry of Education and Culture shows that the total number of education units in North Sumatra reaches 17,272 schools for elementary, junior high, high school and vocational school levels, of which the junior high level equivalent consists of 3,803 schools [1]. For the city of Medan, the junior high school level has reached 482 schools consisting of 48 schools with state status and 434 schools with private status. The large number of educational units makes the competition between educational institutions increasingly tight so that it requires leaders to innovate so that their institutions can survive in the current technological era. The operational system that has been carried out conventionally, sooner or later must change to a technology-based system. This change is not something that is difficult for the community to accept, because almost all circles of society have been side by side with technology. This can be seen from the results of the national socio-economic survey data in 2019. The data explains that the average population of North Sumatra aged 5 years and over in the use of cellular phones is 80.08% with details of 83.94% in urban areas and 75.43% in rural areas. Then, the average population of North Sumatra who owns a cellular phone is 60.66%, with details of 67.58% in urban areas and 52.33% in rural
areas. Meanwhile, the average population of North Sumatra who uses a computer (PC/desktop, laptop/notebook, and tablet) is 14.17% with details of 18.60% in urban areas and 8.84% in rural areas [2].

The data shows that more than 50% of people who use and have cellular phones, especially in North Sumatra, both in urban and rural areas and 14.17% of people who use computers are still dominated in urban areas. In addition, most people have also used internet network access. As recorded in the data from the Central Statistics Agency of North Sumatra in 2019 that the average child aged 5 years and over using internet access is 41.38% of which 50.80% are residents in urban areas and 30.04% are residents in rural areas [2].

The average internet network access user in urban communities is more than 50% and rural communities reach 30%, meaning that our society is no longer familiar with the use of internet-based technology. If you have used technology followed by internet access, then people can easily obtain information from various parts of the world so that technology and internet networks become a necessity in society and technological advances make people able to adapt so they are not outdated.

The use of technology in the field of education has been widely applied, for example the Basic Education Data Application, e-Raport, Continuous Professional Development Management Information System, Computer Based National Examination, and others. This application has been integrated with the Ministry of Education and Culture, only internal. This means that it cannot be accessed by the public, it can only be accessed by school operators and teachers. This system is very helpful for schools, especially in collecting data needed by the Ministry of Education and Culture. In addition, these systems are also used to improve services to all existing educational units.

The application provided by the Ministry of Education and Culture has not been able to fully meet the needs of education unit services to the public using education services, especially private schools. Such as the SMPIT Khairul Imam which currently still performs conventional academic services such as: acceptance of new students, provision of learning materials, subject roster, academic calendar, classroom data, student data, alumni data, educator data, and others. Services in this field are provided in the form of applications or websites that are managed by the ministry of education and culture, but can only be accessed and known by the school's internal parties. Therefore, private schools must plan and provide their own other academic services that are still needed, especially those that can be accessed by the community and become an attraction (promotion).

Academic services such as acceptance of new students, teaching and learning activities and the provision of other academic information is one of the most important services today. In accordance with the instructions of the Minister of Education and Culture that the registration of new student admissions at the Kindergarten, Elementary, Junior High, High School and Vocational Schools for the 2020/2021 academic year is carried out online or this system is always referred to as online [3]. In line with this regulation, it was followed by a circular letter from the ministry of education and culture number 4 of 2020 stating that the educational process must be carried out from home [4], then it was conveyed again in its circular letter number 15 of 2020 regarding guidelines for organizing learning from home when coronavirus disease 2019 (COVID-19) [5].

The academic services that will be provided by SMPIT Khairul Imam are based on a management information system to improve services to students, parents, and the community.
Implementation of a management information system in an organization can provide optimal services to the community, especially in terms of providing useful information and is needed by the community [6]. In addition, the use of MIS has an influence on consumers, such as: attracting new consumers and retaining existing customers, lowering offers, providing better quality, appearance and service, and offering new products and services to service users [7].

Besides being able to provide optimal services, SIM can also minimize school operational costs and service users. Transferring data electronically from computer to computer between two different organizations will save costs and time because transactions can be sent from one information system to another through computer networks [7]. With minimum costs and time used, it really helps the community during the current COVID-19 period.

On the other hand, if an organization does not have a MIS, it can have effects such as (1) the organization continues to run, but for some executive or high-end customers, this facility brings its own satisfaction; (2) the organization concerned may go out of business in today's era of information globalization; (3) the organization concerned may lose its competitive advantage over other similar companies; (4) SIM does not make an important contribution to the creation of an efficient and effective work process, but its existence is needed as a medium for supporting administrative activities; (5) without a good driving license, the company will experience difficulties in carrying out its business activities; (6) without a sufficiently sophisticated SIM, it is difficult in this global competition to be able to compete with big companies from abroad who are starting to make a lot of profit in the country [8]. Then, today's service industries such as finance, insurance, and real estate, as well as personal services such as travel, medicine, and education cannot operate without information systems. [9]. Meanwhile, all complex and complex problems in learning, management, and social interactions that affect organizations or educational units, especially during the COVID-19 period, can be resolved through a management information system [10] and the use of management information systems is very effectively implemented as part of the management of the educational unit [11] as well as many leaders who use management information systems to improve the efficiency of their agency's administrative work [12]. Therefore, SIM is a necessity that must be owned by an organization to be able to survive in today's technological era and continue to innovate in order to be able to improve the quality of organizational services.

Innovation is part of human nature which always wants to develop in a better direction, including in providing quality services. The process of educational innovation should start from the awareness of education unit actors, including education unit stakeholders in an effort to find solutions to problems related to the implementation of the educational process which is their responsibility.

2 Research Methods

Research design is the entire process needed in planning and implementing research [13]. Action research has a special research procedure. The procedure forms a spiral-like cycle consisting of planning, action, observation, and reflection [14]. This section will also describe the steps and processes in the form of details of the activities that will be carried out during the research. The design can be described as follows:
The data analysis used in this study is the one sample t-test and the normalized gain test.

$$t = \frac{x - \mu_0}{s/\sqrt{n}}, \quad [15].$$  

(1)

Information:
- $\bar{x}$ = Average $x_i$
- $\mu_0$ = Hypothesized value
- $s$ = Standard deviation
- $n$ = Number of sample members

$$\langle g \rangle \equiv \frac{\%\langle g \rangle}{\%\langle g \rangle_{\text{max}}} = \frac{\left(\%\langle S_f \rangle - \%\langle S_i \rangle\right)}{\left(100 - \%\langle S_i \rangle\right)} . \quad [16]$$  

(2)

Information:
- $\langle g \rangle$ = Average normalized gain
- $\langle G \rangle$ = Average gain
- $\langle S_f \rangle$ = Score final
- $\langle S_i \rangle$ = Score initial

**N-Gain** Criteria:
- $\langle g \rangle \geq 0.7$ = High
- $0.7 > \langle g \rangle \geq 0.3$ = Middle
- $\langle g \rangle < 0.3$ = Row

Then to calculate the percentage of service effectiveness, it can be measured as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Percentage (%)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>&lt; 40</td>
<td>Ineffective</td>
</tr>
<tr>
<td>2.</td>
<td>40 – 55</td>
<td>Less effective</td>
</tr>
<tr>
<td>3.</td>
<td>56 – 75</td>
<td>Effective enough</td>
</tr>
<tr>
<td>4.</td>
<td>&gt; 76</td>
<td>Effective</td>
</tr>
</tbody>
</table>
3 Research Results and Discussion

Pre-cycle activities provide an overview of the initial conditions of SMPIT Khairul Imam in SIM-based academic services. Based on the observations obtained, it shows that SMPIT Khairul Imam does not yet have academic services based on management information systems. This can be seen from the results of the assessment in the 2019 quality report card as shown in the table below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.4.</td>
<td>2.04</td>
<td>2.04</td>
<td>2.04</td>
</tr>
<tr>
<td>7.4.1.</td>
<td>2.04</td>
<td>2.04</td>
<td>2.04</td>
</tr>
</tbody>
</table>

Source: SMPIT Khairul Imam quality report card for 2019

Table 2 is a description of the condition of the Management Information System (SIM) of SMPIT Khairul Imam in 2019. With an acquisition value of 2.04, it shows that the SIM that should exist in every education unit, is in fact not yet available to provide academic services to students.

The development of information technology in the world of education has made everything can be done online, learning can be done with the Learning Management System (LMS), e-books, video conferencing, online new student admissions which are changes from outside the network. This information technology encourages the birth of other innovations, especially in services in educational units.

One of these services is applied in the academic field, as is the case at SMPIT Khairul Imam. Previously all academic services were carried out conventionally and offline because they did not have a driver's license in accordance with the findings of the researcher before starting the research. Then, research was conducted by applying SIM in an effort to improve academic services. The research was successfully carried out in 2 stages, namely cycle 1 and cycle 2.

The implementation of the first cycle begins with the planning of the school's collaboration with a private company, namely PT. Bumi Tekno Indonesia and Google. This collaboration aims to
improve academic services at SMPIT Khairul Imam. Collaboration is carried out by establishing cooperation with the two companies. This collaboration is in different fields in each company. For PT. Bumi Tekno Indonesia provides a SIM in the form of a school website, while Google provides an LMS for online learning activities at SMPIT Khairul Imam. In this first cycle, the successful collaboration was with PT. Earth Techno Indonesia. Then, to analyze this situation, the researcher observed the level of academic service provided by the school to students whether it was good or not.

The observations that have been made have obtained poor results from the implementation of 11 academic service indicators that were tested on 121 students. The average of each indicator is 2.60 or still in the less feasible category. The contributing factor is the large amount of academic service content provided by SMPIT Khairul Imam so it requires a lot of information and data to be published. Then the provision of LMS is constrained by the ability of researchers to use computer programming languages and foreign languages (English). In addition to this, another factor is also due to the lack of cooperation with LMS providers, namely collaborating with Google. Where this LMS is a medium that will be used for distance learning (PJJ). This collaboration has not been established because the school data information does not match the data at the ministry of education, as well as evidence of school accreditation there is a discrepancy in the name. For this reason, the researcher considers it necessary to do cycle 2 for improvements to the constraints that exist in cycle 1.

Furthermore, in cycle 2 the researchers began to complete incomplete information and data by inputting school profile data, teacher administration, academic calendar information, updating school news information, learning e-book data, syllabus data, new student admission information, data educators and education personnel, facility data, and student list data, as well as other academic related data and information. Then the researchers continued to collaborate with Google by registering SMPIT Khairul Imam on the website https://edu.google.com/, then getting a trial period of 14 days while waiting for the school data to be checked by Google. The refusal of this collaboration occurred twice, so that re-registration for SMPIT Khairul Imam was not allowed or the case was closed. However, the researchers continued to communicate with Google so that in the end they provided a solution to improve school data at the ministry of education and culture and asked to improve the name of the school in the national accreditation body. All this data is sent to Google in the form of a URL to the Google Team email, so they can verify it's correct.

Finally, SMPIT Khairul Imam obtained approval to cooperate with Google so that schools have private LMS. This LMS facilitates each school member with a personal account with unlimited capacity and provides a variety of online-based learning services. So that the results of observations in cycle 2 obtained an average of 4.20 for each service indicator. The results of observations from each indicator increased by an average of 1.61. Comparison of observations in cycle 1 and cycle 2 can be seen in the table below.
<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Cycle 1</th>
<th>Cycle 2</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1 New Student Admission</td>
<td>No.</td>
<td>Facilities/media for New Student Admission are available online.</td>
<td>2.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Easy-to-understand media usage guide</td>
<td>2.99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Coloring on media content is very good</td>
<td>2.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Visual images (graphics) on the media are very good</td>
<td>2.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Learning media can be run without damage</td>
<td>2.83</td>
</tr>
<tr>
<td>B</td>
<td>1 Online learning</td>
<td>No.</td>
<td>Facilities/media for distance learning are available.</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Material according to the topic of discussion</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Materials support the achievement of learning objectives</td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>The material is in accordance with the current development of science and technology</td>
<td>2.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Presentation of material arranged in order (hierarchical)</td>
<td>2.64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Giving examples or illustrations that are easy to understand</td>
<td>2.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>The duration of use is in accordance with the material presented</td>
<td>2.83</td>
</tr>
<tr>
<td>C</td>
<td>1 Graduation announcement</td>
<td>No.</td>
<td>Easy to login</td>
<td>2.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Value data and information provided is clear and correct</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>The results of the graduation announcement can be downloaded or printed</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Graduation announcement is published on time</td>
<td>3.12</td>
</tr>
<tr>
<td>D</td>
<td>1 Graduate data</td>
<td>No.</td>
<td>The personal data listed is easy to complete</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>The list of graduate names is easy to find</td>
<td>3.09</td>
</tr>
<tr>
<td>No.</td>
<td>Indicator</td>
<td>Cycle 1</td>
<td>Cycle 2</td>
<td>Delta</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------</td>
<td>---------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>with the searching menu</td>
<td>Score</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Teacher and Employee Data Collection</td>
<td>2.61</td>
<td>2.61</td>
<td>4.18</td>
</tr>
<tr>
<td></td>
<td>Teacher data is available and complete</td>
<td></td>
<td></td>
<td>4.03</td>
</tr>
<tr>
<td></td>
<td>Employee data is available and complete</td>
<td>2.61</td>
<td>3.88</td>
<td>1.42</td>
</tr>
<tr>
<td>F</td>
<td>School Identity</td>
<td>2.44</td>
<td>2.40</td>
<td>4.31</td>
</tr>
<tr>
<td></td>
<td>School profile is very complete</td>
<td></td>
<td></td>
<td>4.15</td>
</tr>
<tr>
<td></td>
<td>The information listed is in accordance with school conditions</td>
<td>2.36</td>
<td>3.99</td>
<td>1.75</td>
</tr>
<tr>
<td>G</td>
<td>Academic Calendar</td>
<td>2.92</td>
<td>4.24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The academic calendar can be accessed online through the school’s website</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information on national holidays available</td>
<td>2.28</td>
<td>2.50</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td>Exam implementation information is available and appropriate</td>
<td>2.30</td>
<td>4.17</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Subject Roster</td>
<td>2.05</td>
<td>4.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The subject roster can be accessed online through the school website</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Letters, numbers and symbols on the media are written clearly</td>
<td>2.46</td>
<td>4.24</td>
<td>1.78</td>
</tr>
<tr>
<td>I</td>
<td>Teaching Administration</td>
<td>2.85</td>
<td>4.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of learning and teaching equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administrative documents can be downloaded</td>
<td>2.86</td>
<td>4.24</td>
<td>1.38</td>
</tr>
<tr>
<td>J</td>
<td>School Information</td>
<td>2.66</td>
<td>4.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All information about the school can be accessed through the website</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>There are comments/input fields, and share links to social media</td>
<td>2.25</td>
<td>2.49</td>
<td>4.22</td>
</tr>
<tr>
<td></td>
<td>This media provides what students need</td>
<td>2.25</td>
<td>4.22</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>Easy to understand spelling and grammar</td>
<td>2.16</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>School Documentation</td>
<td>2.22</td>
<td>2.27</td>
<td>4.26</td>
</tr>
<tr>
<td></td>
<td>The information system is equipped with documentation</td>
<td></td>
<td></td>
<td>4.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.98</td>
</tr>
</tbody>
</table>
Table 4 shows the average of each academic service indicator of SMPIT Khairul Imam. In cycle 1, the average value of the 11 indicators is 2.60. This shows that there has been a change compared to the conventional academic system or the original SMPIT Khairul Imam did not have a SIM, but after the first cycle the school began to recognize and be able to have a SIM. Then continued improvement in cycle 2 and the average value of each indicator increased by 32% so that the average value in cycle 2 was 4.20. Then, from the analysis of the data it was also known that in cycle 2 managed to get 30.46% of students answered properly and 69.42 students answered very well so that the SIM SMPIT Khairul Imam was very feasible to use. This analysis can be seen from the diagram below.

**Figure 2.** Comparison of academic service indicators

The difference data from the 11 indicators in Figure 2 above, the researcher obtained a significance (sig.) of 0.473 which means that the data for the average difference of the indicators is normally distributed. Then, the calculated t value is 26.975 with 11 degrees of freedom and the sig (2-tailed) value is 0.000. From these results, it is known that t count is greater than t table (26.975 > 2.201) which means that there is a significant difference between the data in cycle 1 and cycle 2. Furthermore, the average gain score is 0.7 or high category with a percentage of 66.7% which is categorized as quite effective. From these results, it can be concluded that
academic services at SMPIT Khairul Imam can be improved effectively by using a management information system.

Improving SIM-based academic services at SMPIT Khairul Imam as well as achieving the expected goals, namely schools have SIMs as an assessment in quality report cards, management can be done online, services that have not been provided by the ministry can be fulfilled, learning activities can be carried out remotely, and the creation of new innovations in schools. In addition to this, the use of costs for the procurement of this SIM is very low even with the availability of this SIM being able to minimize school operational costs.

4 Conclusion

Based on the results of the research that has been done, it can be concluded that the acquisition value on the quality report card is 2.04 which indicates that the SIM is not yet available to provide academic services to Khairul Imam SMPIT students. Then, the results showed that in the first cycle the results of SIM-based academic services at SMPIT Khairul Imam were still categorized as less feasible with an average score of 2.60 so that improvements were needed in the second cycle. Furthermore, the results showed that in the second cycle the results of SIM-based academic services at SMPIT Khairul Imam were very feasible with an average score of 4.20 so that no improvement was needed for the next cycle. And finally, through these two stages of the cycle, Normalized Gain (N-Gain) was obtained of 0.7 or high category with a percentage of 66.7% with a fairly effective category, so it can be said that academic services at SMPIT Khairul Imam can be improved by implementing Information Systems Management and able to achieve the goals expected by the school. Thus, the improvement of SIM-based academic services at SMPIT Khairul Imam is quite effective.

References

Effectiveness and Efficiency in Realizing the Financing Plan for Extracurricular Activities during the Covid-19 Pandemic at WR Supratman High School Medan

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Abstract. Educational programs in schools will not run without cost, so each school must manage existing financial resources effectively and efficiently. This study aims to analyze the effectiveness and efficiency of realizing financing plans for extracurricular activities during the Covid-19 pandemic at Wr. Supratman High School Medan. This type of research is descriptive and qualitative. The research was conducted at Wr. Supratman High School Medan in April-May 2022. The research subjects are the principal, treasurer, head of administration, the teacher concerned, parents, and students. This research was analyzed by qualitative analysis. Research data was obtained through interview techniques, questionnaires, and archive recaps. Based on analyzing the research results, it can be concluded that the planning and management of Wr. Supratman High School financing to carry out extracurricular programs has been effective because there are two programs planned and all of them run during the pandemic. Financing planning is also very efficient because the budget has been properly implemented, and the results were very satisfying. Therefore, it is necessary to conduct a detailed study of the implementation of extracurricular activities so that extracurricular success can be measured by achievement. Extracurricular financing planning should be more detail about the budget.

Keywords: Effectiveness, Efficiency, Financing, Extracurricular, Pandemic Covid-19

1 Introduction

The cost of education has a significant decisive role. No education process is cost less. Every educational process in schools will not run without cost. This causes each education institution, namely schools, to manage existing financial resources effectively and efficiently to help to achieve educational goals. Education financing has been regulated in the 1945 Constitution of the Republic of Indonesia (Amendment IV) which states that every citizen has the right to educate, every citizen is obliged to attend a basic education and the government is obliged to finance it, the government seeks and organizes a national education system, which increases faith, piety, and noble character in the context of educating the nation's life which is regulated by state law [1].

For implementing the regulation, the state prioritizes the education budget at least twenty percent of the State Revenue and Expenditure Budget (APBN) and from the Regional Revenue
and Expenditure Budget (APBD) to meet the needs of national education administration. Education financing is certainly influenced by the situation and conditions in a region. And in the last two years, Indonesia has declared an emergency for the COVID-19 pandemic, starting from March 2020. Distance learning, which has become a necessity, which is carried out in almost all schools around the world, is a radical change that involves everyone.

This pandemic made the learning activities completely changed, and financing during the COVID-19 pandemic generally changed significantly. Learning from home programs were implemented throughout Indonesia with local policies for each region [2]. UNESCO stated that since March 25, 2020, school closures in many countries around the world during the spread of COVID-19 and forced almost all students out of the normal learning process. Alternative approaches have been taken, such as online learning from home so that students do not stop learning. This online learning involves students, parents/guardians, teachers [3].

Educational financing during the COVID-19 pandemic changed in terms of the allocation of funds issued. According to Sulhan, etc., the ineffective and inefficient distribution of these funds was due to the switching of funding from the RKAS which had been prepared at the beginning of the year, including the extracurricular activities due to changes in the learning system and changes to the BOS technical guidelines during the COVID-19 pandemic. Education financing is a complicated problem for education managers to figure out regarding the financing of educators, extracurricular costs, learning processes, and infrastructure [4].

In achieving quality education, education has a reference standard to achieve a quality of education which is expected to be able to face the work environment and give a contribution to social and economic development [5]. There are eight references that are used as standards in an educational institution so that the goals of quality education can be achieved. Among them are Content Standards, Process Standards, Graduate Competency Standards, Educators and Education Personnel Standards, Facilities and Infrastructure Standards, Management Standards, Financing Standards, and Educational Assessment Standards. The Covid-19 pandemic forced the government to issue an online learning policy. This will be certainly had a significant effect on the utilization and allocation of education costs that have been budgeted and outlined in the School Work Plan, both in the RKAS sourced from BOS funds and the Education Development Contribution funds sourced from students' parents.

The Ministry of Education, Culture, Research, and Technology has issued Permendikbudristek No. 2 of 2022 regarding technical guidelines for managing operational assistance funds for the implementation of early childhood education, School Operational Assistance (BOS), and operational assistance for the provision of equality education. The regulation states that regular BOS funds can be used by primary and secondary education units to assist the operational expenditure needs of all students. One of the components that can be financed using Regular BOS is the implementation of learning and extracurricular activities. Regular, namely the provision of educational tools and learning support materials, costs for developing learning media based on information and communication technology, Provision of applications or software for learning, and other relevant learning activities in order to support the learning process [6]. Although the government has fulfilled the constitutional mandate of Law No. 20 of 2003 concerning the allocation of the APBN and APBD of 20% for the education sector, private schools only receive a much smaller portion of the budget than public schools [7]. During the Covid-19 pandemic, some activities did not go well in every school, especially extracurricular
activities. According to Mila, it refers to the process standard which is an educational unit for implementing interactive, inspiring, fun, challenging, motivating students to participate actively and provide sufficient space for Initiatives, be creative and independent according to their talents, interests, and physical and psychological development of students. In order to increase the knowledge, skills, attitudes, and productivity of students. The author is interested in researching the Effectiveness and Efficiency in Realizing the Financing Plan for Extracurricular Activities During the Covid-19 Pandemic at WR Supratman High School Medan [8].

2 Method

The type of research is descriptive research with a qualitative approach. The qualitative approach was carried out to gain some insights into the general concept of education administration, especially education financing. This research was conducted in Wr. Supratman High School Medan from April to May 2022. The research subjects were adjusted to the education funding at Wr. Supratman High School Medan, namely all sources deemed to provide the necessary information data. Where the sources of data related to the characteristics of this research are the principal, treasurer, head of administration, the teacher concerned, parents and students. This study was analyzed by qualitative analysis. Qualitative data analysis techniques were carried out before the study, during the study, and after the study. The data was obtained through interview techniques, questionnaires and archive recaps.

3 Result and Discussion

3.1 Interview result

Effectiveness (Output). The current principal of Wr. Supratman High School Medan is Mr. Pinondang Situmorang, S.S., S.Pd., M.M. has served for 36 years since 1986 until now. Based on the results of interviews with school principals, during the COVID-19 pandemic, there were two types of extracurricular activities that were still being carried out. This program is carried out in a hybrid learning manner and its implementation remains in accordance with the health protocol. Extracurricular activities are programming and Paskibra activities. The achievement of the targets to be achieved from this extracurricular activity is the development of student talents and promotions for schools. Due to the Covid-19 pandemic, extracurricular activities at Wr. Supratman High School Medan was a bit constrained because all the students could not attend. However, according to the high school principal, Wr. Supratman's level of achievement of student independence with extracurricular activities above 80% is real, so it can be concluded that during the covid pandemic period, the independence of Wr Supratman High School students is well-formed and extracurricular activities can improve student talent achievement and are effective to carry out.

Effectiveness is related to achieving the goals that have been set. Garner, defines effectiveness even more deeply because according to him effectiveness does not stop until the goal is achieved but arrives at the qualitative results associated with achieving the vision. Financing management is stated to fulfill the effective principle if the activities carried out can regulate activity costs to achieve qualitative outcomes according to the established plan. So it can be concluded that cost-effectiveness is the ability of financing to achieve targets and targets as planned [9].
The following is based on the results of interviews with the Wr. Supratman Medan school treasurer, the planning for the financing of the extracurricular activity program at Wr. Supratman High School is adjusted to the needs of extracurricular activities and planning according to the educational calendar. Likewise with the target of reporting on financing for the management of extracurricular funds at Wr. Supratman High School Foundation, following the schedule or stages determined by the government. The results of the treasurer's task in the process of managing extracurricular funds are that it can assist school principals in planning, implementing, and reporting.

Based on the results of interviews with the Wr. Supratman Medan school treasurer, the financing planning carried out by the Wr Supratman High School for extracurricular activities, one of which is by taking trainers from outside the school for extracurricular marching band activities, is paid a salary of 5 million / month and has been implemented. It is carried out on Tuesdays and Thursdays from 15.00 WIB to 16.30 WIB. The results obtained by the students and schools are that the existence of extracurricular activities programs will improve the quality of children's education and school.

Funding for education can not be separated from the economic problems of education. Johns and Morphet argued that "education has a vital role in the economy and the modern state.” In general, education financing is a complexity, in which there will be interrelationships in each of its components, which have a micro (education unit) to macro (national) nature, includes education financing sources, systems, and mechanisms for their allocation, effectiveness, and efficiency in its use, accountability for the results as measured by changes that occur at all levels, especially schools, and problems that are still related to education financing, so a special study is needed to be more specific about this education financing. Financial management and education financing are an urgent position to be applied, because normatively and sociologically the school is not a profit institution, thus providing responsibility for the community and every parent of students, where every acceptance of educational institutions must be used to improve the quality and quantity of professional education services. [10].

Based on the results of interviews with the school teacher Wr. Supratman Medan, the teacher moved closer to discuss extracurricular activities. The teacher council discussed and said that the achievement of extracurricular activities was a joint achievement between students and the school so that all teachers expected to support extracurricular activities at school. And the influence of extracurricular activities on subjects at school is not very influential because extracurricular activities are carried out after students return home from school.

Based on the results of interviews with school teachers Wr. Supratman Medan that in school activities, students are able to take part in extracurricular activities and extracurricular activities always involve students and student council members in the management of their activities. The achievement of results from extracurricular activities has a very positive and effective impact on students such as students being able to actively socialize and carry themselves in student learning and psychological activities after participating in these extracurriculars is they have their own pride in the extracurricular activities they participate in.

Meanwhile, based on the results of interviews with the guardians of students or parents of Wr. Supratman High School Medan, the parents stated that it was true that extracurricular activities were held at the school and their children participated in these activities free of charge, they only paid for their own transportation and that does not burden parents/guardians of students. With the extracurricular activity program, in addition to students gaining knowledge and insight,
high school students also acquire values and skills so that they can play an effective role in society through ways of thinking, feeling and behaving according to social norms to participate as family members in the family and surrounding community groups. Children/students feel happier with the extracurricular activities at this school, it can be seen when children come home from school always with happy feelings.

Effeciency. Based on the interview with the principal of Wr. Supratman High School Medan, the budget of BOS funds for extracurricular activities at Wr. Supratman High School Medan was 10%. Several extracurricular activities got some achievements such as programming, marching band, basketball, scouting, dancing club, and paskibra. The principal also stated that participating in extracurricular activities can help by improving children's achievement based on their talents and interests. Extracurricular activities are activities outside the subject matter to facilitate students as a form of self-development that is followed by the potential, needs, talents, and interests of students through planned activities and specifically organized by educational staff/experts who have competence and authority in schools [11].

The definition of education costs is an effort to raise funds to finance the operations and development of the education sector. The cost of education is defined as the amount of money generated and spent for various purposes of providing education in schools/madrasahs. Among the scope of the costs are teacher salaries, increasing professional abilities of teachers, procurement of learning room facilities, repair of study rooms, procurement of furniture/moblers, procurement of learning tools, procurement of textbooks, office stationery (ATK), extracurricular activities, education management activities and educational supervision of education development as well as school/madrasah administration. Education financing is a concept that should exist and can't be understood without examining the underlying concepts.

Program efficiency is measured by cost-effectiveness with a certain budget. The different possibilities are compared, then the levels of effectiveness are determined, although in this case, it was not stated as money. The better effectiveness probability leads to more and better results. Concerning efficiency, Rahman [12] said that in a given school system, efficiency is the relationship between what is achieved (actual output) and what could be achieved with the economic resources available (potential output). It is following with what was stated by Nanang F., that efficiency can be assessed through the education system that produces the output with a minimum cost. It can be also stated that certain inputs can maximize the expected output. [11].

Based on the results of interviews with parents/guardians of Wr. Supratman High School Medan stated that the students could express their thoughts generally, feelings and desires through verbal communication or non-verbal communication to gain understanding from others and this extracurricular activity has little impact on students as a lack of time to study and do intracurricular tasks. Parents also spend funds for extracurricular activities in the form of student transportation costs and others. It does not burden the guardians/parents of students because all facilities and funds for extracurricular activities have been funded by the school. The value of efficiency is assessed from the point of view of the ability to use costs properly and appropriately. Financing will be efficient if the achievement of goals or targets could be obtained with minimum sacrifices or with minimum costs. Vebrianty Efficiency is related to the quantity of results of activity [13].

Efficiency is the best ratio between input and quadrant (output) or between power and result. The power that mentioned is energy, thought, time, and cost. The comparison can be seen in terms of using of time, effort, and cost. It means that educational financing activities can be
concluded to be efficient if the use of time, energy, and costs are as small as possible but can achieve the specified results. When viewed in terms of results, educational financing activities can be said to be efficient if the use of time, energy, and certain costs gives as many results as possible both in quantity and quality. The description above explains that the high level of efficiency and effectiveness will enable the implementation of educational services to the community satisfactorily with the available resources in an optimal and responsible manner. Meanwhile, the value of efficiency is assessed from the point of view of the ability to use costs properly and appropriately. Financing is said to be efficient when the achievement of goals or targets is obtained with minimum efforts or with minimum costs.

Table 1. Interview result and data observation

<table>
<thead>
<tr>
<th>No.</th>
<th>Extracurricular programs</th>
<th>Input Cost Realization (Rp) per month</th>
<th>Goals</th>
<th>Activities</th>
<th>Target</th>
<th>Target Realization</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Marching band</td>
<td>5.000.000</td>
<td>Improving students' abilities in non-academic fields</td>
<td>Drum band, Scout</td>
<td>Percentage of student attendance above 80%</td>
<td>Hybrid extracurricular training</td>
<td>Effective</td>
</tr>
<tr>
<td>2</td>
<td>Scout</td>
<td>4.000.000</td>
<td>Teacher training who foster scouts</td>
<td>Basic Advance course at KWARD ASU</td>
<td>Graduated and have a KMD certificate</td>
<td>KMD Training</td>
<td>Effective</td>
</tr>
</tbody>
</table>

The best comparison between inputs and outputs (results between profits and the resources used), as well as the optimal results achieved with the use of limited resources. In other words the relationship between what has been completed.

4 Conclusion and Suggestion

Based on the analysis of the research results, it can be concluded that the planning and management of Wr. Supratman High School Medan financing to carry out extracurricular programs has been effective because there are two programs planned and all of them run during the pandemic. Financing planning was highly efficient because the budget used has been properly implemented and the results are very satisfying. Therefore, it is necessary to conduct a detailed study of the implementation of extracurricular activities so that extracurricular success can be measured by achievement. Extracurricular financing planning should be more detailed about the budget.
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Development of Technology and Information Assistant Clinical Supervision Model in Private Madrasah Aliyah Yayasan Perguruan Islamiyah Batang Kuis Deli Serdang Regency

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Abstract. This study aims to produce a product in the field of education administration in the form of a clinical supervision model assisted by technology and information, which is expected to improve the quality of the implementation of clinical supervision during the COVID-19 pandemic. This research was carried out in the MAS YPI Batang Kuis Deli Serdang Regency. The research method used in this study is the Research and Development method with level 1, namely conducting research and producing an internally validated model. In three stages of research, three sets of analysis were used: stage 1 preliminary study, stage 2 development model, and phase three model validation. The research subjects are teachers and private madrasah. Data were obtained using three data collection techniques: observation, interviews, and documentation analysis. The data analysis technique used a qualitative approach: data reduction, data presentation, and conclusion drawing. The results of this study are called the clinical supervision model assisted by technology and information. This model is the result of the development of the model by redesigning components that are considered to have an effect on improving the quality of the implementation of clinical supervision implemented in madrasah during the covid-19 pandemic. The model was validated through a Focus Group Discussion with the principal as a practitioner and experts. This model contains four clinical supervision implementation stages: the initial planning stage, initial meeting, observation, and feedback findings, along with the application used. To make it easier to implement, this model is equipped with a guide so that the head of the madrasah will find it easier to learn and apply.

Keywords: clinical supervision, technology, and information

1 Introduction

Regulation of the Minister of National Education of the Republic of Indonesia No. 13 of 2007 concerning the Standards of Principals mandates that principals are the highest leaders in schools; they are required to have five dimensions of competence, namely personality, managerial, entrepreneurial, supervisory, and social competencies. Supervision is a
supervisory activity to help improve and improve education management in schools. Supervision must be carried out to improve the quality of education, especially in the teaching and learning process. There fore, one of the principal's duties is as a supervisor, namely supervising the work carried out by academic staff [1]. Clinical supervision is a vehicle for developing teachers to be professionally responsible for analyzing their performance and open to change and help from others, especially in self-direction [2].

The Covid-19 pandemic, which is continuing, has resulted in changes in all forms of educational programs, including academic supervision. This situation is a challenge for the principal as a supervisor because the principal is the driving force for educators to stay healthy, stay safe and keep working in any situation, especially during the Covid-19 pandemic. In the Covid-19 pandemic situation, where all school components are required to reduce the mobility of meetings to prevent the transmission of the Covid-19 virus, school principals must continue to carry out the task of guiding teachers toward improving their teaching. Because, after all, clinical supervision is an alternative to enhance learning even during the Covid-19 period. In this era of a pandemic like this, Indonesian education needs to follow a path that can help the world of education in an emergency, so it is necessary to force yourself to use online media. The facilities needed in this online media are electronic devices such as cell phones and laptops, thus causing all school components to master new abilities in technology and information.

Based on interviews with school principals conducted in January 2022 in the Private Madrasah Aliyah YPI, Batang Kuis Deli Serdang Regency, they found the following phenomena:

1. Teachers did not understand the meaning and benefits of supervision; they considered supervision an inspection, only looking for the teacher's fault.
2. Supervision occurs in schools as a routine managerial program not based on teacher needs.
3. Teachers are passive and assume supervision is a program of principals and supervisors only, so teachers wait whenever supervision is carried out.
4. Coaching or supervision carried out by principals or supervisors is rarely carried out, so teachers are passive in improving their teaching abilities.
5. Principals rarely carry out clinical supervision because no teachers are willing to ask for help in solving problems faced by teachers in learning.
6. In the era of the covid-19 pandemic, the implementation of clinical supervision experienced many obstacles because all school members were required to reduce the mobility of meetings. Hence, the performance of clinical care was not complete.

It is concluded that the implementation of clinical supervision is still not adequate. Therefore, the solution is that it is necessary to develop a clinical supervision model assisted by technology and information that can help the implementation of supervision during the Covid-19 period and increase continuous supervision.

Clinical supervision assisted by technology and information can be an alternative supervision model in the pandemic era by using online media (zoom). Because by using zoom, the principal can still provide guidance or coaching to the teacher in question, even though they have to be in their respective rooms without meeting face-to-face but can still meet face-to-face on the screen. Because conceptually, clinical supervision is a process of teacher professional development carried out directly (face to face). Even if, in fact, in the field, the
implementation of clinical supervision must meet face-to-face, it must still comply with existing health protocols.

Based on the existing phenomena and research on the development of previous clinical supervision models, it can be concluded that developing a technology-assisted clinical supervision model is the right one to apply in a pandemic like today. Because with the technology and information-based clinical supervision model as an alternative in implementing clinical supervision, coaching or guidance for teachers can still be carried out even with online media (zoom). Therefore, researchers are interested in conducting research on developing a clinical supervision model based on technology and information in MAS YPI Batang Kuis Deli Serdang Regency.

Clinical supervision is part of teaching supervision. It is said to be clinical supervision because the implementation procedure is more focused on finding the causes or weaknesses in the teaching and learning process and then directly trying to fix these weaknesses or deficiencies. Clinical supervision is professional assistance given to teachers who have problems in carrying out learning so that these teachers can overcome the difficulties they experience related to the learning process [3]. Then Purwanto explained clinical supervision as supervision focused on improving teaching by running a systematic cycle from the stage of intensive intellectual observation and analysis to the actual teaching performance [4]. The purpose of clinical supervision is to help modify learning patterns to achieve effectiveness. The targets of clinical supervision, namely, first, are to build teacher motivation and work commitment. Second, to provide staff development for teachers.

Sudjana said that there are four steps of the clinical supervision model, namely (1) initial meeting, (2) teaching observation, (3) feedback meeting, and (4) follow-up. Furthermore, Abidin states that clinical supervision consists of three processes, namely (1) the observation process, (2) the assistant process, and (3) the learning process. In comparison, Glickman states that there are five steps in the implementation of clinical supervision: (1) initial meeting with the teacher, (2) classroom observation, (3) analyzing and interpreting observations, and determining the approach to the meeting, (4) feedback/reflection with a teacher, and (5) a review of the previous four steps [3].

The Covid-19 Pandemic period made changes to the learning system that required school principals and teachers to be able to master technology and information to carry out the online learning process. Changes in the learning system also cause the supervision pattern carried out by supervisors to be adjusted to learning during the pandemic. In the pandemic era, all elements in the world of education, when carrying out educational activities, will, of course, be in direct contact with technology and information media.

Various kinds of digital applications can be chosen or used by principals in conducting coaching, such as see saw, Microsoft teams, cisco Webex, google meet and zoom cloud meetings. In the work guide for school supervisors during the pandemic published by the Ministry of Education and Culture (2020), several applications that can be used in the world of education: SMS, telephone, Whatsapp, google form, Microsoft teams, zoom, google meet, Webex, etc. (individual assistance). As for group assistance, applications that can be used include WhatsApp (8 people video call), Microsoft Teams, Google Forms, Zoom, Google Meet, WebEx, etc.
2 Methods

The type of research used to develop this clinical supervision model is the type of research and development level 1, which aims to produce a product in the form of a clinical supervision model assisted by technology and information.

Level 1 R&D research can be visualized in the following figure:

![Fig 1.R&D Research Steps Level 1 (Sugiyono, 2015)](image)

3 Results and Discussion

Broadly speaking, the trials in this study were carried out in two stages. The first phase of the trial was carried out by practitioners. This trial involved one principal and seven teachers at MAS YPI Batang Kuis, Deli Serdang Regency. The trial in this second stage aims to obtain internal validation by experts in the field of education management. The expert validators at this stage consist of three people with Doctoral degrees in Education Management who are postgraduate lecturers in the Universitas Negeri Medan.

The first phase of internal validation trials was carried out through Focus Group Discussion (FGD) activities with practitioners. This trial was conducted with the aim of validating each stage of clinical supervision along with the technology and information used in each stage internally and also to obtain input/suggestions from model users (practitioners). There are ten indicators that are discussed and assessed by practitioners. The first four indicators relate to the clinical supervision stage with the technology and information used, which consists of 1) initial planning stage, 2) initial meeting stage, 3) observation stage, and 4) feedback and follow-up meetings. Coupled with the ease of designing a clinical supervision model assisted by technology and information to understand, apply, and the effectiveness and efficiency of the model. The description of the internal validation of the technology-assisted clinical supervision model based on the results of the Focus Group Discussion (FGD) with practitioners at MAS YPI Batang Kuis Kabupaten Deli Serdang can be seen in the following diagram:
The results of internal validation through the first Focus Group Discussion (FGD I), as well as suggestions or input from practitioners, were reviewed and analyzed by researchers. Based on the validation and recommendations results, the researchers conducted the first revision (Revision I) of the previous clinical supervision model. Furthermore, to obtain a better degree of validity, it is necessary to carry out internal validation by Expert Judgment through FGD II on the results of the first revision. If FGD I practitioners assessed the dimensions and components of clinical supervision, then FGD II experts who acted as validators evaluated the design of the clinical supervision model assisted by technology and information, stages, and sequences of the clinical supervision model. However, the last four indicators in FGD I related to product convenience, practicality, effectiveness, and efficiency were still included. This is because the four indicators are the primary substance of any development model.

The description of the internal validation of the technology and information-assisted supervision model based on the results of the Focus Group Discussion (FGD) with Expert Judgment at the State University of Medan can be seen in the following diagram:

The development of a conceptual model is the development of a model based on a literature review, empirical study, and needs analysis. In the literature review on clinical supervision, clinical supervision as supervision focused on improving teaching by running a systematic cycle from the stage of intensive intellectual observation and analysis to actual teaching performance[5]. Acheson and Gall explained that the purpose of clinical supervision is to
improve the teacher-managed learning process in the classroom. These goals are broken down into more specific goals:

1. Provide objective feedback to the teacher regarding the teaching being carried out.
2. Diagnose and help solve teaching problems.
3. Helping teachers develop their skills using teaching strategies.
4. Evaluating teachers for promotion and other decisions.
5. Helping teachers develop a positive attitude towards continuous professional development.

There are four stages in the implementation of clinical supervision, while the stages are (1) initial meeting, (2) teaching observation, (3) feedback meeting, and (4) follow-up. In comparison, Glickman (2010: 289) states that there are five steps in the implementation of clinical supervision: (1) initial meeting with the teacher, (2) classroom observation, (3) analyzing and interpreting observations, and determining the approach to the meeting, (4) feedback/reflection with a teacher, and (5) a review of the previous four steps.

In addition to a study of the meaning, objectives, and steps for implementing clinical supervision in the literature review, it was also found that in the work guide for school supervisors during the pandemic published by the Ministry of Education and Culture (2020), several applications that can be used in the world of Education: SMS, telephone, Whatsapp, google forms, Microsoft teams, zoom, google meet, Webex, etc. Because in the pandemic era, all elements in the world of Education, when carrying out educational activities, will, of course, be in direct contact with technology and information media. Changes in the learning system also cause the supervision pattern carried out by supervisors to be adjusted to learning during the pandemic. Based on the literature review, empirical studies, and needs analysis, the researchers formulated an initial model of technology-assisted clinical supervision in the following figure:
1. At the initial planning stage, the teacher contacted the supervisor to ask for help with the problem through the clinical supervision process by sending a message (chat) or telephone via WhatsApp. The teacher conveys the skills to be improved. Then they meet...
on zoom to plan the initial planning stage, the initial meeting stage, the observation stage, and the feedback or follow-up meeting stage. Dividing tasks between teachers and supervisors, the teacher prepares himself with all his learning tools by practicing explaining skills. And supervisors also master in detail and detail the skills to explain as clearly as possible. Then they meet again with Zoom to re-confirm self-preparation between teachers and supervisors.

2. At the initial meeting stage, it continues in the zoom application. The supervisor creates a relaxed and friendly atmosphere so that the atmosphere is not too tense. The teacher displays the lesson plans the teacher wants to convey later in class. Supervisors and teachers review the lesson plans. The teacher reaffirms the skills to explain what you want to use. Then check the mechanism of media use and applications used in the observation stage.

3. At the observation stage, the teacher teaches in the class according to the contract. As usual, the teacher teaches one hour of lessons, then records using a cell phone (mobile phone). The teaching recording results are uploaded to Google Drive together with the lesson plans. After uploading, the teacher sends the link to the supervisor so that the supervisor can access the video and lesson plans anywhere and anytime at the same time while observing the teacher teaching and filling out the observation sheet.

4. At the meeting stage, feedback is still taking place in the zoom application. The supervisor creates a relaxed and friendly atmosphere. Ask how the teacher feels overall after teaching. The supervisor reviewed the lesson plans contract and asked the teacher to analyse the learning outcomes. Remind the teacher about the display contract (are these skills appropriate?) and dissect the explaining skills used. Supervisors show and provide feedback on targets and allow time to analyse input. Discuss the results of feedback analysis (teachers reveal strengths and weaknesses in teaching). The supervisor asked about the teacher's feelings again. Summarize the results of the conversation and motivate to perform better.

The advantages of the clinical supervision model assisted by technology and information are as follows: 1) In the observation stage, the teacher does not feel that his teaching skills are being assessed because the supervisor is not present in class. 2) This technology and information-assisted clinical supervision model is outstanding in terms of the limited time that the principal as a supervisor has given the number of teachers who must be fostered or mentored. 3) This model is constructive in providing professional guidance for teachers by prioritizing self-assessment so that it does not appear to show teacher shortages. Still, improvements are made based on the awareness or desire of the teachers themselves. 3) Clinical supervision assisted by technology and information facilitates teacher assessment in the observation stage because, with the help of technology and information, the results are more accurate and thorough through analysis of activities that can be carried out in real-time, without limited time, distance and place.

4 Conclusion

The research and development results of the technology and information-assisted clinical supervision model have carried out the steps according to the planned procedure. The model developed is expected to be a solution to optimizing the implementation of clinical supervision
During the COVID-19 pandemic to improve explaining skills by utilizing technology and information assistance such as WhatsApp, zoom, google drive, and handphone. Implementation does not require teachers and supervisors to meet in person but can meet face to face through the zoom application.

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Influence of Problem Based Learning (PBL) Model Towards Critical Thinking Ability Class VI SDN 14 Tanjung Medan

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Abstract. This study aims to determine: (1) The influence of students' critical thinking ability taught with the Problem Based Learning (PBL) model compared to the critical thinking ability taught with the Direct Instruction Class VI model of SD Negeri 14 Tanjung Medan for the 2021/2022 Academic Year; (2) The interaction of the Problem Based Learning (PBL) learning model and critical thinking in the face of students' critical thinking skills. The sample was carried out in two classes, class VI1 as many as 36 students as an experiential class with a Problem Based Learning (PBL) model and class VI2 as a control class as many as 32 students who were taught with the Direct Instruction model. Data collection instruments using critical thinking tests in the form of Multiple Choice as many as 15 items. This research method is quasi-experimental with data analysis techniques using a 2-line Anova test with a significant level of α = 0.05. The results of this study obtained that: (1) The ability to think critically based on the learning model was obtained that the Fhitung value = 7.558 and the probability value or significant value of the learning model was 0.010 < 0.05.; (2) There is an interaction between learning models and critical thinking; (0.008 < 0.05). For other researchers, it is recommended that before conducting the PBL model treatment, it should be socialized to class VI children and teachers in the school where the research is being studied.

Keywords: Problem Based Learning Models, and Critical Thinking.

1 Introduction

The industrial revolution 5.0 affected various fields, including the field of education. Education is faced with global and digital-based challenges. In facing these challenges, it requires not just conceptual science, but the ability to apply knowledge and various skills in thinking. In carrying out the response, the improvement of critical thinking skills in students must be driven by stimulus. This is in line with behavioristic learning theory. Experts in behaviorism argue that learning is a change in behavior as a result of experience. Learning is the result of the interaction between stimulus (S) and response (R). According to this theory, in learning, what is important is the existence of inputs in the form of stimulus and outputs in the form of responses (Suryono and Hariyanto, 2012: 59). Throughing is one of the cognitive strategies in solving more complex problems and demanding higher patterns. Critical thinking essentially develops elements of rational and empirical thinking based on scientific knowledge (Winarno, 2013:97-98)²
The critical thinking ability of Class VI students of SD Negeri 14 Tanjung Medan in the PPKn subject is still considered very low. This is evidenced based on the results of an interview with a Class VI teacher at SD Negeri 14 Tanjung Medan stating that questions related to interpretation, analysis, evaluation, and inference are still many students have not shown satisfactory results. According to Facione (in Fithriyah et al, 2016:582) there are six indicators of critical thinking ability involved in the critical thinking process. These indicators include interpretation, analysis, evaluation, inference, explanation, and self-regulation.3

Problem Based Learning according to Tan (in Rusman, 2011: 229) Problem-Based Learning is an innovation in learning because in PBL students' thinking ability is really optimized through a systematic group or teamwork process, so that students can empower, hone, test, and develop their thinking skills on an ongoing basis. The steps of this PBL model are: 1. Formulating the problem. 2. Analyze the problem. 3. Formulate hypotheses. 4. Collecting data. 5. Hypothesis testing. 6. Formulate problem-solving recommendations. Project-based Learning is a learning model that uses real-world problems as a context for students to stimulate higher-level thinking in real-world problem-oriented situations. The steps of this PjBL model are as follows: (1) student orientation to the problem; (2) organizing students to study; (3) guiding individual/group experiences; (4) develop and present works; and (5) analyze and evaluate the problem-solving process. (Rusman, 2012: 241).4

The formulation of the problem in this study is: Is the critical thinking ability of students taught with the Problem Based Learning model higher than the critical thinking ability taught with the Direct Instruction model in class VI at SDN 14 Tanjung Medan? Is there any interaction between the Problem Based Learning model and critical thinking and the critical thinking skills of Grade VI students of SDN 14 Tanjung Medan?

Based on observations in the field, it is still classified as the ability to think critically and think critically, students are also low, so it needs to be improved. To improve it is necessary to apply a wide variety of learning models. One of them is the learning model that is predicted to have a greater influence and have a greater relationship with critical thinking skills is the PBL model. To what extent this can affect the need for research with the title, "The Influence of Problem Based Learning (PBL) Models on Critical Thinking Ability grade 6 SDN 14 Tanjung Medan".

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2. Method

This research was conducted with a quasi-experimental type. Pseudo-experiential research is carried out to determine the influence of a treatment on the character of the subject under study. This research was carried out at SD Negeri 14 Tanjung Medan Jl. Beringin Tanjung Medan Village, Kampung Rakyat District, South Labuhanbatu Regency, Zip Code 21463 North Sumatra. The research time has been carried out on the implementation of the learning process or in the process of teaching and learning activities in the even semester of the 2021/2022 academic year, which is precisely in April to June 2022. The research samples are class VI-A and class VI-B. Class VI-A as an experimental class taught with a Problem Based Learning model with a total of 36 students. Meanwhile, the control class is taught with a direct learning model selected by class VI-A with a total of 32 students. Class determination is carried out by cluster random sampling and the selected class is class VI of SD Negeri 14 Tanjung Medan.

3 Result and Discussion

The results of the study Both classes of samples were given pretests to see if the two classes were normally distributed, homogeneous and had the same initial ability can be seen in Table 1 below.

<table>
<thead>
<tr>
<th>Score</th>
<th>F</th>
<th>Percentage</th>
<th>Score</th>
<th>f</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-31</td>
<td>2</td>
<td>6%</td>
<td>33-41</td>
<td>10</td>
<td>31%</td>
</tr>
<tr>
<td>32-43</td>
<td>6</td>
<td>17%</td>
<td>42-50</td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td>44-55</td>
<td>8</td>
<td>22%</td>
<td>51-59</td>
<td>8</td>
<td>25%</td>
</tr>
<tr>
<td>56-67</td>
<td>11</td>
<td>31%</td>
<td>60-68</td>
<td>7</td>
<td>22%</td>
</tr>
<tr>
<td>68-79</td>
<td>5</td>
<td>14%</td>
<td>69-77</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>80-91</td>
<td>4</td>
<td>11%</td>
<td>78-86</td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td></td>
<td>Total</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Average of pretest</td>
<td>58</td>
<td>100</td>
<td>Average of pretest</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1 shows that the average critical thinking pretest of students taught with the PBL learning model was 58 and those taught with the Direct Introduction learning model was 53. From the average, it can be said that the two classes have a difference in initial critical thinking ability of 5.

In order for the data from the study to be analyzed with parametric statistics, it is necessary to test assumptions or prerequisites. The first condition tested is normality. The purpose of the Normality Test is to see the distribution of student pretest data in both classes of normally distributed samples or not. The results of the data normality test can be seen in Table 2. Such results were obtained using the Kolmogrov-Smirnov test with the help of SPSS 26.
Table 2. Normality Test Results Data Pre Test Critical Thinking Pre Test Scores Students

<table>
<thead>
<tr>
<th>Class</th>
<th>Kolmogorov-Smirnov*</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic  DF</td>
<td>Significant  DF</td>
</tr>
<tr>
<td>Experiment</td>
<td>.140   36</td>
<td>.073       36</td>
</tr>
<tr>
<td>Control</td>
<td>.133   32</td>
<td>.158       32</td>
</tr>
</tbody>
</table>

The caption from Table 2 shows the Kolmogorov-Smirnov values of each of the above data of students’ critical thinking variables are normally distributed. The homogeneity test of the result data obtained an analysis of the significant value of pretests of students’ critical thinking learning outcomes can be seen in Table 3 below.

Table 3. Homogeneity Test of Students' Critical Thinking Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Score</th>
<th>Significant Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Critical Thinking</td>
<td>0.338</td>
<td>Homogen</td>
</tr>
</tbody>
</table>

From Table 3 it can be stated that the data on students' critical thinking scores were declared homogeneous with significant values of 0.338 > 0.05. Thus it can be concluded that the variance of students' critical thinking data is homogeneous.

The treatment carried out in both classes is the application of learning models. The learning model applied is different in each class. In class VI-1 (experimental class) a Problem Based Learning (PBL) learning model is applied. This model begins with the orientation of the problem. At this stage the teacher acts as a motivator, where the teacher motivates students to be actively involved and enthusiastic in solving a given problem. The next phase is that the teacher guides individual and group investigations and facilitates the needs of students in the investigation. Next, the teacher directs the students in planning and preparing the appropriate work in the problem solving report. The report is used as material to present the results of solving the problem. A summary of the data postes critical thinking of students in both classes can be seen in the table below.
Table 4 shows that the average critical thinking postes of students taught with the PBL learning model were 78 and those taught with the Direct Introduction learning model were 60. From this average, it can be said that students’ critical thinking skills using the PBL learning model are better when compared to the Direct Introduction model.

After the learning was completed, ppkn postes questions were given which consisted of students’ critical thinking questions to students both in PBL and Direct Introduction classes. The PPKn postes questions in the form of multiple choices totaled 15 questions. Postes are given during two hours of learning. The matter of postes is synonymous with pretests. This is done to see if there is an improvement or improvement after the student is taught with PBL or Direct Introduction. Meanwhile, the normality test for students’ critical thinking postes value data obtained results in the following Table 5:

Table 5. Normality Test Results Student Critical Thinking Postes Value Data

<table>
<thead>
<tr>
<th>Class</th>
<th>Kolmogorov-Smirnov*</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>DF</td>
</tr>
<tr>
<td>Experiment</td>
<td>.140</td>
<td>36</td>
</tr>
<tr>
<td>Control</td>
<td>.133</td>
<td>32</td>
</tr>
</tbody>
</table>

The caption from Table 5 above shows the Kolmogorov-Smirnov values of each of the above data of the students' critical thinking variables are normally distributed. The data requirement is called normal if the probability or p of > 0.05 on the Kolmogorov-Smirnov test. The table above shows that the p value > 0.05, then from each of the data the critical thinking variables of the students above are normally distributed.

Table 5 above explains that the scores of critical thinking postes of students taught with the PBL learning model are declared to be normally distributed with a significant value of 0.090 > 0.05. For the normality value of critical thinking data, direct introduction class students obtained a significant score of 0.288 > 0.05. Thus it is concluded that the entire data of students' critical thinking scores are normally distributed or meet the requirements of the normality test.

Data Homogeneity Test The homogeneity test of the result data obtained an analysis of the significant value of postes of PPKN learning outcomes and the value of critical thinking can
be seen in Table 6 below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data Nilai</th>
<th>Signifant Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Critical Thinking</td>
<td>0.585</td>
<td>Homogen</td>
</tr>
</tbody>
</table>

From Table 6 it can be explained that the data on students' critical thinking scores were declared homogeneous with significant values of 0.585 > 0.05. Thus it can be concluded that the variance of data on student learning outcomes and critical thinking is homogeneous.

The requirements for hypothesis testing with parametric testing have been met, that is, the group data are normally distributed and have a homogeneous variance. Hypothesis testing this study uses a two-lane ANOVA with a factorial of 2x2, hypothesis testing is calculated with the help of SPSS version 26. Hypothesis testing data can be seen in the following table:

**Table 7. Output SPSS Hasil Perhitungan ANAVATests of Between-Subjects Effects Dependent Variable: Critical Thinking**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>828.320</td>
<td>3</td>
<td>276.107</td>
<td>15.192</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>119095.380</td>
<td>1</td>
<td>119095.380</td>
<td>6553.050</td>
<td>.000</td>
</tr>
<tr>
<td>Model_Pembelajaran</td>
<td>137.365</td>
<td>1</td>
<td>137.365</td>
<td>7.558</td>
<td>.010</td>
</tr>
<tr>
<td>Motivasi_Belajar</td>
<td>146.111</td>
<td>1</td>
<td>146.111</td>
<td>8.040</td>
<td>.008</td>
</tr>
<tr>
<td>Model_Pembelajaran * Motivasi_Belajar</td>
<td>342.861</td>
<td>1</td>
<td>342.861</td>
<td>18.865</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>581.569</td>
<td>32</td>
<td>18.174</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>149122.000</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>1409.889</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .588 (Adjusted R Squared = .549)

Based on the SPSS output of anova calculation results in Table 7 on the ability to think critically based on the learning model, it was obtained that the \(F_{\text{hitung}}\) value = 7.558 and the probability value or significant value of the learning model was 0.010 < 0.05. Thus it can be stated that there is a significant difference between the average critical thinking ability of students taught with the Problem Based Learning learning model compared to the Direct Introduction learning model.

Based on the SPSS output of anova calculation results in Table 7 it is obtained that \(F_{\text{count}}\) = 18.865 and a significant value of 0.000 with a = 0.05. Then it can be seen that the value of the sig. 0.00 < 0.05 so hypothesis testing rejects \(H_0\) and accepts \(H_a\). Thus, it can be concluded that there is an interaction between learning models and critical thinking in influencing students' critical thinking ability.

**4 Conclusion**

Students' critical thinking ability taught with the Problem Based Learning (PBL) model is higher than the critical thinking ability of students taught with the Direct Introduction model.
in Class VI of SD Negeri 14 Tanjung Medan for the 2021/2022 Academic Year. There is an interaction between the learning model and the critical thinking ability of students of SD Negeri 14 Tanjung Medan for the 2021/2022 Academic Year. The interaction can be seen from the significant difference between the average critical thinking ability of students taught with the Problem Based Learning learning model and the Direct Introduction learning model.

Acknowledgments. A thank you to all research supporters, especially to the supervisors and lecturers of thePPs basic education study program, Medan State University.

References

Development of "Tcode" Learning Model (Qr-Code Based TGT) and the Role of Digital Literature to Improve Learning Results Economic Students of Class X IPS SMA N 1 Tukka Kab. Central Tapanuli TP. 2021/2022

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Abstract. This research is motivated by the low economic learning outcomes of students of class X IPS SMA N 1 Tukka Kab. Central Tapanuli. The purpose of this study is to develop an innovative learning model using the ADDIE method to produce a TCODE learning model with the role of digital literacy to improve student economic learning outcomes. Based on the validation of the learning model experts gave an assessment of 92.5%, media experts 87.5%, and material experts 90%. So that the developed model is feasible to use. From the t-test, it is known that the sig value is 0.004 <0.05. So it can be concluded that the TCODE learning model is effectively used. Furthermore, through the 2-way Anova test obtained a sig value of 0.00 <0.05, the conclusion is that there is an interaction between learning models and digital literacy to improve economic learning outcomes.

Keywords: TCODE, Digital Literacy, Economic Learning Outcomes.

1 Introduction

In the Republic of Indonesia Law No. 14 of 2005 concerning Teachers and Lecturers Article 1 paragraph (1) "Teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in early childhood education through formal education, basic education, and middle education. The teacher's accuracy in the preparation of learning activities is a determinant of the quality and results. So, in making the learning effective, the teacher must use the right learning model so that the students have good learning motivation. Likewise with economics learning, effective learning activities are certainly needed. Economics Learning Activity is a series of learning that involves students being active in the process. In the following research, the researcher discusses economic material related to supply and demand.

The selection of learning models and their media brings hope that they can increase their learning activities. From the results of preliminary interviews with Economics teachers at SMA N. 1 Tukka, in carrying out their learning they use several methods, namely lectures, questions
and answers, and giving assignments and teachers still rarely use models that can make students interactive and collaborative. Here, the researcher assumes that students are only recipients of the material. This situation makes students passive, boring and difficult to understand the material. In addition, based on the list of student scores, some of the student's test scores, especially on the subject matter of demand and supply, are still below the predetermined KKM, namely "75", in 34 students it is known that only 30% are declared passed while 70% are declared unsuccessful.

In solving this problem, it is necessary to apply a learning model with interactive and collaborative nature between students so that students can be interested in learning so that it brings out students' creativity in learning which of course is expected to be able to improve students' economic learning outcomes. According to Fathurrahman (2015) the TGT learning model is part of a cooperative model which can be easily used by involving all students regardless of their status. Media is also useful for making learning interactive and interesting so that it can motivate students when learning and eliminate boredom in the process (Suryani, 2018). The use of QR-Code is very effective in many purposes, including in education. Applications in education as a new thing, QR-Code is used in redesigning subject matter (Durak, et al 2016), increasing student knowledge regarding plant species from websites, texts, website videos, texts, videos (Patil, 2020), active learning for students which can bring student involvement and curiosity (Someral, 2020). All research results related to QR-Code got good results until QR-Code brought hope as a digital technology literacy media used by economics teachers for their students.

Digital literacy gives us an idea of how to use social networks well. Literacy is a person's language skills, namely listening, reading, writing, and communicating based on goals (Pujiono, 2017). Digital literacy is the ability to use digital technology to be effective and efficient for many things (Gilster 1997). Digital literacy can be inserted in language lessons, science, social studies, and others. For example, in economics, when combined with digital literacy, students must master several skills such as reading, listening, describing social events in society, using digital media such as computers, the internet, or cell phones. According to Rahmadhani's research (2020), where in his research he concluded that there was a significant positive relationship between emotional intelligence and digital literacy together on student social studies learning outcomes. Furthermore, Yusuf (2019) in his research shows that the role of digital literacy of students at Madrasah Aliyah Negeri Palopo arouses student interest and increases student creativity in learning to improve student learning outcomes. From the problems that exist in the field that the researchers have explained in the background above, the researchers are interested in developing research "Development of the TCODE (Teams Game Tournament Based on Qr - Code) Learning Model and the role of Digital Literacy to Improve Student Learning Outcomes in Economics Subjects in Class X Social Sciences SMA N 1 Tukka Kab. Central Tapanuli". The development of the Teams Game Tournament (TGT) model is relevant to previous research, namely the research of Kristiyani (2021), in the results of her research it was found that the TGT model increased student activity and learning outcomes in mathematics. Likewise, Hudi's research (2020), explains the android-based TGT-type cooperative learning model that was developed to meet valid, practical, and effective aspects. However, there is a difference with the research of Amni, et al (2021), it is concluded that there is no effect of the TGT learning model assisted by destination media on learning outcomes. This is because there are implementation constraints, namely students are not present, so the material is not perfect so that the learning outcomes are below the KKM, time management is not good where the game is only carried out during the last 1 hour of the lesson. And also Reseyca's
research (2017) explains that the TGT learning model is not effective on learning outcomes of uniformly changing straight motion for class X SMA Santo Fransiskus Asisi Pontianak. The reason is that the use of TGT-style learning has research limitations, namely: (1) students do not follow the rules during tournaments; (2) identifying group members using pre-test data is not appropriate in group formation because not all students take the pre-test seriously, so that the group capacity is not balanced; (3) the limited ability of students to give topics to other groups; (4) does not apply feedback on the work of LKS due to time constraints. With the results of the varied Teams Game Tournament (TGT) model research above, it shows the inconsistency of the influence of these variables so that there is a research gap. This adds to the interest of researchers to conduct a research on the development of the Teams Game Tournament (TGT) model with different modifications from previous studies.

The development research that the researchers applied in the research on the development of the QR-Code-based Teams Game Tournament learning model was using the ADDIE model with the following steps: Analize, Design, Develop, Implementation, and Evaluation.

2 Research Methodology

In the research "Development of the TCODE learning model (Teams Games Tournament based on QR-Code) and the role of digital literacy to improve students’ economic learning outcomes in class X IPS SMA N 1 Tukka" using the ADDIE model. According to Mulyatiningsih (2011), the ADDIE model is a structured model. The reason the researcher uses the ADDIE model is because this model is suitable for various kinds of development, one of which is the learning model and can solve research and development problems in the learning model. The ADDIE model is structured systematically in order to solve learning problems related to learning needs. The ADDIE model has 5 stages, namely 1) Analyze, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation.

The following is a procedural chart in this research:

![Fig. 1. EDDIE model procedural chart](image-url)
This research was conducted at SMA N 1 Tukka which is located on Jl. Education No. 2 district. Tukka, Kab. Central Tapanuli, North Sumatra. The research was carried out in the even semester of 2021/2022. The research population in this study were students of class X SMA N 1 Tukka Kab. Tapanuli Middle of the Academic Year 2021/2022.

<table>
<thead>
<tr>
<th>No</th>
<th>Class</th>
<th>Total students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>X A</td>
<td>34</td>
</tr>
<tr>
<td>2.</td>
<td>X B</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>X C</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>104 Person</td>
</tr>
</tbody>
</table>

(Source: Researcher Data)

Samples were taken using purposive sampling. The sampling technique in this study was to take two classes, namely class X IPS-A as many as 34 students as the experimental class, and class B as the control class as many as 34 students.

3 Result and Discussion

Prior to testing the QR-Code learning media, a feasibility test was first carried out by a team of experts. The media feasibility test was carried out by 1 expert media validator lecturer from UNIMED. This validation aims to obtain information, criticism, and suggestions so that the QR-Code learning media in the TCODE model developed becomes a quality product, in terms of material, appearance and attractiveness so that this media is suitable for use in the learning process. The overall results of the aspects obtained are based on the validator experts as much as 87.5% with very decent criteria. The inputs obtained include; it is necessary to make a curve for each sales result from each group, on the advice of media experts so that the researcher makes a student sales result curve. Furthermore, expert validation of the model provides an assessment of the TCODE learning model as much as 92.5% with very feasible criteria. By providing input so that the lesson plans are revised according to K-13, and on the advice of the validator so that researchers have made improvements to the lesson plans in accordance with the provisions in K-13. Next, material expert validation gives an assessment of 90% with very feasible criteria. As for the input submitted by expert validation, it is necessary to add calculation test questions related to demand and supply materials. So, on the advice of material experts, the researcher has made calculation test questions related to supply and demand material.
From the results of the calculation of the 2-way ANOVA test in the table, it is known that the significance value of the learning model is 0.023 < 0.05, which means that there are differences in student economic learning outcomes taught using the TCODE learning model and conventional methods. Where in the experimental class with the application of the TCODE model, the average student learning outcomes are 81.7 with a total of 34 students and from the average this value has shown the achievement of KKM (Minimum Completeness Criteria) from those determined by the school as many as 75 in class. X. While student learning outcomes in the control class using conventional learning models obtained the average value of learning outcomes from 34 students had not reached the predetermined KKM (Minimum Completeness Criteria) score of 75 while the average student learning outcome was 73.82.

From the results of the calculation of the 2-way ANOVA test calculated using SPSS, it is also explained that the significance value of the learning model and the role of digital literacy is 0.00 < 0.05, then H0 is rejected and H1 is accepted. Thus, it is concluded that there is an interaction between the learning model and the role of digital literacy to improve student economic learning outcomes.
The TCODE learning model is a learning model developed from the Teams Game Tournament model, where this model has the advantage of accelerating students' mastery of teaching materials because through the games contained in this model students have higher learning motivation. As stated by Slavin (2010), the advantages of the TGT model are: 1) With a little time, you can master the material in depth. 2) Higher learning motivation. 3) The teaching and learning process takes place with the activeness of the students. 4) Further increase the time devoted to tasks. 5) Educate students to practice socializing with other people. 6) Prioritizing acceptance of individual differences 7) Increasing kindness, sensitivity and tolerance.

Through the ADDIE model development stage, a model that develops a product based on 5 stages, namely Analyze, Design, Development, Implementation, Evaluation, the TGT learning model is developed into a TCODE (Teams Game Tournament based on QR-Code) model. With the ADDIE development model, products are developed and tested to see the level of feasibility, namely by distributing questionnaires to learning model experts, learning media experts, and subject matter experts. The TCODE model questionnaire was also distributed to teachers and students to see the responses of teachers and students to the developed model.

From the results of the distributed questionnaire, it was obtained that the feasibility test assessment from the learning model expert was 92.5% with a very feasible category, because the TCODE model was an expert in assessing according to the material being taught, namely demand and supply. Furthermore, the assessment from media experts gave an assessment of 87.5% with a very decent category, because with the use of this media the experts assessed that students could be enthusiastic in understanding the subject matter because this media was considered closer to the habits of students who use gadgets. Next, the meter expert gave an assessment of 90% with a very decent category, where the test questions were in accordance with the material presented, namely demand and supply and the content of the material was also complete. In this case the researchers also looked at the responses of teachers and students to the application of the TCODE model. Where the teacher gave a very positive response to the TCODE model because during the teaching and learning process through this model the teacher saw that students were very enthusiastic and actively involved in participating in class learning. So the teacher gave an assessment of 90 responses with very good criteria. Likewise, students who gave a positive response with an average rating of 84.4 with good criteria.

To see the effectiveness of the TCODE learning model, the researchers calculated the 2-way ANOVA test and compared the student learning outcomes in the experimental class and the control class. Where from the calculation of the 2-way ANOVA test, it is known that the significance value of the learning model is 0.023 <0.05, which means that there are differences in student economic learning outcomes who are taught using the TCODE learning model and conventional methods. By distributing 20 multiple-choice test questions to each class, each class has 34 students. Where from the results of the study, it was obtained that the economic learning outcomes of students who were taught with the TCODE model were 10% higher than the economics learning outcomes of students who were taught using conventional learning methods. This is evidenced by the average economic learning outcomes of students who are taught using the TCODE learning model getting a score of 81.7 and having reached the predetermined KKM value of 75. While the economic learning outcomes of students who are taught using conventional learning models get an average value of 73.82 has not reached the KKM value. So it can be concluded that the TCODE model is effectively used to improve student economic learning outcomes.
After testing the feasibility and effectiveness of the model, then the interaction test of the TCODE model with students' digital literacy was carried out. The TCODE model is a model that trains students to be competitive in learning, by dividing students into small groups to conduct buying and selling game tournaments with payment aids using Qr-Code. To apply this learning model, a high level of digital literacy is required, because this model uses digital media in its learning activities. Digital literacy is the ability to use technology and information from digital devices effectively and efficiently in various contexts such as academics, careers and everyday life (Gilster 1997). From the appropriate assessment given by the model validation team, media, and subject matter, as well as obtaining a positive response from teachers and students towards the TCODE model, the researchers concluded that the TCODE model developed was feasible to improve students' economic learning outcomes on the subject matter of demand and supply.

To see the interaction of the TCODE model and the role of digital literacy in improving students' economic learning outcomes, the researchers conducted a 2-way ANOVA test using SPSS 21. Where the results of this study showed significant results with a sig value of 0.00 < 0.05. So it can be concluded that H0 is rejected and H1 is accepted, which means that the TCODE model and the role of digital literacy have interactions to improve students' economic learning outcomes in class X IPS A SMA N 1 Tukka, Kab. Central Tapanuli, TP. 2021/2022. The results of this study are supported by the results of relevant previous studies such as research conducted by Rahmadhani (2020), where in his research he concluded that there is a positive and significant relationship between emotional intelligence and digital literacy together with student social studies learning outcomes. Furthermore, Yusuf (2019), in his research, shows that the digital role of students in Madrasah Aliyah in Palopo State creates student interest and builds student creativity in the learning process so as to improve student learning outcomes.

4 Conclusion

Based on the results of data analysis from research results on the development of the Qr-Code-based Teams Game Tournament learning model and the role of digital literacy to improve student economic learning outcomes in class X IPS-A SMA N 1 Tukka, it can be concluded that The TCODE (Teams Game Tournament based on QR-Code) model developed is suitable for use in Class X IPS-A SMA N 1 Tukka Kab. Central Tapanuli TP. 2021/2022. This can be seen from the 3 results of expert validation, namely expert validation of the learning model providing an assessment of the TCODE model as much as 92.5% with a very feasible category. Furthermore, by the validation of media experts who gave an assessment of the Qr-Code media as much as 87.5%. The validation of subject matter experts provides an assessment of the questions and material that the researcher examines, as much as 90% with very feasible criteria. Then the TCODE (Teams Game Tournament based on QR-Code) model that was developed is effectively used in Class X IPS-A SMA N 1 Tukka, Kab. Central Tapanuli TP. 2021/2022. This can be seen from the calculation of the 2-way ANOVA test using SPSS and comparing the results of students' economic studies. It is known that the significance value of the learning model is 0.023 <0.05, which means that there are differences in students' economic learning outcomes who are taught using the TCODE learning model and conventional methods. Where by using the TCODE learning model, student learning outcomes are 10% higher with an average value of 81.7 while the conventional model obtains an average value of 73.8. Furthermore, there is an interaction of the TCODE (Teams Game Tournament based on QR-Code) model with digital literacy in improving economic learning outcomes of students in class X IPS-A SMA N
This can be seen from the results of the 2-way ANOVA test analysis with a sig value of 0.00 < 0.05. So it was concluded that Ho was rejected and Ha accepted, which means the TCODE model and the role of digital literacy have interactions to improve students' economic learning outcomes in class X IPS A SMA N 1 Tukka. The implications that can be drawn from the results of this study are if the teacher develops the subject first, a feasibility test of the model must be carried out before it is implemented so that it can be applied properly. Then if the teacher wants to apply the TCODE learning model, first ensure that students have a high level of digital literacy skills so that the model can be applied effectively. Because the TCODE model is only suitable for students who have a high level of digital literacy. If students have a low level of digital literacy, it is better to use other learning models that do not require a high level of digital literacy such as Jigsaw, Inquiry, etc. Furthermore, if the teacher wants the subject matter to be conveyed and easily understood by students, the teacher should apply appropriate learning models and media to be combined. So as to create an interaction between the model and learning media in improving student learning outcomes.

References


Development of CTL Model on Blended Civic Education Learning in Grade IV Theme 7 Sub Theme 1 Private Elementary School SDS GKPS Medan Tenggara

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Abstract Type study this is study development with using the ADDIE. As for results of the Feasibility instrument used that is with results questionnaire validation CTL based learning model expert Blended Learning by 84%, validation learning media expert by 90%, validation RPP experts by 88%, validation LKPD experts by 95% and the Learning Outcome Test carried out with results validation N=35 students score r table show number 0.361 result reliability question of 0.790 and results teacher ‘s response is 91.6% and the result response student by 96%. With results it's a CTL -based model Blended Learning learning PPKn in grade IV SDS GKPS Medan Tenggara is said to be "Very" Worth “use” in learning Then results from Instrument with results gain score 0.74 then could is said to be a based CTL learning model Blended Learning learning PPKn in class IV SDS GKPS Medan Tenggara is “ Effective “.

Keywords: CTL Model, Blended Learning Model, PPKn

1 Introduction

Society is one element of the formation of a state in which the state has a responsibility to its citizens and vice versa. Being a good and reliable citizen is one of the contributions in the development of a country. The readiness of citizens is very necessary in the current 21st century development period, known as the "industrial revolution 4.0" signifies a condition the development of increasingly sophisticated technology, the industrial revolution 4.0 is a digital concept that affects the needs of industry and the economy. This revolution will bring many changes significant efficiency have an impact on jobs that are more dominated by the use of technology.

As a means to optimize benefits from use technology it can be seen the role of education is to strengthen learning based on technology information for support implementation system learning in Century industrial revolution 4.0. Moreover, during the COVID-19 pandemic, there was an
attack by the corona virus or severe acute respiratory syndrome (SARS-Cov-2), an infectious disease that can attack the respiratory system. So for now, learning restricted with distribution time done cause time study stare advance at school less than optimal and reduce quality learning.

In the context of education in the era of the industrial revolution 4.0, education has a fairly high level of challenge, the more sophisticated the technology, the freer public space that can be accessed by children. With this, educators must be able to change the teaching and learning process.

The implementation of learning is often full of science alone, for that learning is carried out also includes skills and moral competencies that function to fortify global flows. As according to the regulation of the minister of education and culture number 70 of 2013 concerning the basic framework and structure of the curriculum as curriculum improvement, there are external challenges, including those related to the flow of globalization and various environmental issues, advances in technology and information, the rise of creative industries, culture and educational developments, international level.\(^1\)

As an external challenge, the implementation of learning using technology is developed through creativity and new ideas as an effort to attract children's attention in the learning process. As for the use of internet applications in learning, students can explore the ability of learning activities and make it easier to get a variety of information from various learning sources provided on the internet. The use of the internet in every learning activity does not escape the supervision of teachers and parents so that children do not abuse the internet function.

Thematic learning of the 2013 curriculum is learning that uses themes in linking several lesson content with which students can understand a concept based on one theme for several applied lessons. In elementary education, Civics Education is one of the thematic lesson content, while the purpose of Civics in elementary schools is one of the right means to implement values in character education for students to form and create democratic and character students in accordance with the values values contained in Pancasila.

Mentioned as a “discipline”, Civics learning has a “subject matter” , namely the study of political, legal, social and educational fields that are scientifically and systematically structured in citizenship knowledge (civic knowledge), citizenship skills (civic skills), and citizenship character (civic disposition).

In realizing a democratic society, Civics learning in elementary schools contains tolerance material by recognizing, understanding the concept of tolerance and implementing tolerance in the environment of students with various religious, ethnic, social and cultural differences aimed at shaping the democratic attitude of children from elementary school age.

From the above, Civics learning strategies in high-grade elementary schools must be able to trigger the ability of students who are oriented to the activeness of students in learning activities.

\(^1\)Permendikbud Republik Indonesia Nomor 70 (2013). Tentang Standar Kompetensi Lulusan (SKL)
to observe, ask questions, reason, try and communicate. With an effective learning strategy that can develop children's thinking skills, a blended learning model was developed that adapts to the 4.0 revolution in the 21st century and is also adapted to the conditions of the COVID-19 pandemic where learning is carried out through online learning. It is also in accordance with the constructivist theory where the CTL model is able to construct students' knowledge through knowledge of what they want to know as initial knowledge.

Knowledge is the result of a cognitive construction of reality through activities with the formation of schemas, concepts that are constructed through the experiences they experience.

The CTL learning model was developed in accordance with the current technological era through blended learning learning techniques as a learning medium by combining online and face-to-face learning. This is also related to the COVID-19 pandemic by implementing distance learning or through online learning using blended learning-based CTL learning models as a forum for Civics learning in grade IV SD.

As for the application of the CTL model based on blended learning, it is hoped that updating the learning system by implementing communication through applications that can be used with it does not reduce the quality of Civics learning, therefore it is necessary to conduct research with the title "Model Development-Based Contextual Teaching and Learning (CTL) Blended Learning Civics Learning in Class IV SD S GKPS Southeast Medan".

1.1 Model Development Contextual Teaching Learning based on Blended Learning in Civics learning for grade IV SD

Citizenship education is a vehicle for developing and preserving noble and moral values rooted in the culture of the Indonesian nation which is expected to be realized in realizing good and reliable citizens. As for the material for learning Civics in class IV on theme 7, Sub-theme 1 is about diversity. Implementing a blended learning-based CTL model can help children's learning creativity. The application of the contextual teaching learning model is a learning concept that helps teachers relate the material being taught to students' real world situations and encourages students to make connections between their knowledge and the application of everyday life.

Contextual teaching learning seeks and facilitates students to connect real-life learning. Therefore, a teacher who teaches with contextual teaching learning must be able to present learning in which the teacher acts as a facilitator and leads children to real problem solving through the newly acquired knowledge that requires all class components to be active in learning.

The development of the Contextual Teaching Learning model based on blended learning in Civics learning in elementary schools at SD S Medan Tenggara aims to further develop the

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2 Dwiyogo, D. Wasis, Pembelajaran Berbasis Blended Learning (Depok, Grafindo, 2018)
3 Muchith, Saekhan, Pembelajaran Kontekstua, (Semarang, Reisa Media Group, 2008)
blended learning model that has been applied in the school. The development of the model is carried out by making a product guidebook for implementing the Contextual Teaching and Learning model based on blended learning in Civics learning in grade IV SD S GKPS Medan Tenggara by providing learning tools through the Learning Implementation Plan by developing more creative indicators and learning steps based on and making PPKn LKPD that is practical and attracts children's attention in learning. LKPD is given to students to increase understanding of the learning material.

2 Types of research

The type of research used in this research is development research (R&D). The product to be developed is a blended learning -based CTL learning model along with learning support tools, namely the Learning Implementation Plan (RPP), Student Worksheets (LKPD) and Learning Outcomes Test (THB) for students in grade IV Elementary School with Theme 7 (It's beautiful Diversity in my country) subtheme 1 by using the existing steps in development research. The development research model used is the ADDIE model which was pioneered by Dicky and Carrey. Borg and Gall (1983) say that the research and development approach, namely research-oriented for develop, and validate the products used in research4.

2.1 Data collection

To measure the validity, effectiveness and feasibility of developing a CTL model based on blended learning in Civics learning, research instruments and data collection techniques were developed. The instruments used in this study were: validation sheets (experts) materials and experts instructional design, technologist), and tests in the form of question posttest there is in LKPD and response questionnaire students.

3 Result and Discussion

Based CTL learning model Blended Learning on learning PPKn Theme 7 sub-theme 1 grade IV SDS GKPS Medan Tenggara is one of the learning models that can be used made as guide in learning in the classroom applied by the teacher in developing a payload model eye lesson PPKn.

CTL -based model development Blended Learning conducted for adequate learning Creative PPKn so that could shape learning PPKn is fun and interesting desire child in study PPKn. A good learning model is could fulfill criteria appropriateness for knowing feasibility of -based CTL learning model Blended Learning with conducting a validity test by the lecturer learning model expert, learning media expert, expert plan implementation, learning media experts and experts in LKPD learning test design PPKn in grade IV SD.

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4 Sugiyono, Metode Penelitian & Pengembangan (Bandung, Alfabeta, 2017)
Revision model validation obtain 93% value with "worthy" criteria used and without revision ". Then from results revision next RPP validation get 88% value with " worthy " criteria used and without revision ", revision Next Media validation get value 80% with " worthy " criteria used and without revision ". Validation next is LKPD obtain value 80% with " worthy " criteria used ".

Based on data analysis , obtained question with category hard total of 5 questions invalid (14.3%) and 3 questions (15%), questions with category currently totaling 10 questions (50%) and questions with category easy totaling 7 questions (35%). Analysis power question item differentiation aim for differentiate Among students who have ability height and ability currently nor ability low 2 points question (10%), question with category medium 9 grains questions (45%) and questions with category 9 points high questions (45%).

Then results teacher response Gainscore test results or enhancement student's average score class IV SDS GKPS Medan Tenggara in the post- test activity that has been carried out held after application of the CTL model based on Blended Learning on the material Theme 7 Sub theme 3 already " high " criteria , namely with average score of 91 compared to score acquisition activity pretest before using the CTL model based on Blended Learning with acquisition score 63 with " medium " criteria . This thing could show that existence enhancement knowledge on learning PPKn with Theory theme 7 sub theme 3 with score gainscore that is of 0.74 with " effectiveness " criteria height " so that could concluded that the CTL model is based on Blended Learning in learning PPKn could said to be " effective " used in learning in grade IV SD on learning PPKn ". and students regarding the CTL - based model Blended Learning with instrument results in the form of the questionnaire that has been provided show that results teacher 's response to the - based CTL learning model Blended Learning said worthy with percentage 91.6%. This thing show that the developed model could Fulfill demands needs learning so that make it easy in study . Then on the instrument in the form of questionnaire about response students who have provided show that results response student to the - based CTL learning model Blended Learning on learning PPKn Theme 7 Sub - theme 3 in grade IV SDS GKPS Medan Tenggara reached 96.9% with criteria very worth . With thereby could used in classroom learning .

4. Conclusion

Result of study this is a number of product learning namely 1) Syntax of - based CTL Learning Model Blended Learning , 2) RPP, 3) Learning Media , 4) LKPD, 5) Learning Outcomes Test. With results evaluation validation research model product by 84%, learning media products by 80%, RPP products by 88%, LKPD products by 95% and Learning Outcomes Tests carried out with results validation $N = 30$, value $r$ table show number 0.361 result reliability reliability question of 0.844 and results teacher 's response is 91.6% and the result response student by 96%. From result the could said worthy used in learning PPKn in grade IV SDS GKPS Menteng .

Pretest results question PPKn implemented _ in learning with an average of 62 and the result posttest question PPKn implemented _ in learning with an average of 91 with results gain score
is 0.74 which can be is said to be a -based CTL model *Blended Learning* learning PPKn in class IV SDS Medan Tenggara stated effective.

**References**

The Effect of Using Quizizz Learning Media and Critical Thinking Ability on Cultural Arts Learning Outcomes in Class X MAN 2 Medan Model

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Abstract. The aims of this study were to: (1) find out whether the learning outcomes of the group of students taught with the Quizizz learning media were higher than the group of students taught with the Power Point learning media, (2) to determine whether the cultural arts group of students with high critical thinking skills has better learning outcomes than the group with low critical thinking skills, and (3) find out whether there is an interaction between Quizizz learning media and Power Point learning media with critical thinking skills in influencing cultural arts learning outcomes. The research population was all students of class X IPS MAN 2 Model Medan consisting of 5 classes. The samples chosen to be the Quizizz media learning class were class X IPS-4 and class X IPS-3 as the Power Point media learning class. Cluster random sampling is the method of sampling. The Scheffe test is used after the two-way ANOVA with a significance level of \( \alpha = 0.05 \). The outcomes revealed: (1) Students’ arts and culture learning outcomes were higher when they were taught with the Quizizz learning media than when they were taught with the Power Point learning media. Students who were instructed using Quizizz learning materials had an overall higher average learning outcome (\( \bar{X} = 28.41 \)) than students who were instructed using Power Point learning materials (\( \bar{X} = 26.79 \)); (2) In the cultural arts, students with strong critical thinking skills perform better than students with weak critical thinking skills; (3) There is a connection between critical thinking abilities and learning media: Power Point learning materials are superior to Quizizz learning materials for students with low critical thinking abilities, whereas Quizizz learning materials are superior for students with high critical thinking abilities. In this case, the average learning outcomes of students with high critical thinking abilities who are taught with Quizizz learning media and Power Point learning media are higher than the average learning outcomes of students.

Keywords: Learning Media, Critical Thinking Ability, Learning Outcomes

1. Introduction

Education is one of the ways a person takes to make big changes in life. Basically, education can be obtained anywhere, anytime and by anyone. Everyone has the right to a proper education. In Indonesia, there are many institutions and agencies that provide both formal and non-formal education. In formal institutions, education can be found in schools, both public schools and private schools. And non-formal education can be obtained by someone through non-formal educational institutions such as play groups, studios, training centers, Islamic
boarding schools. "Education and teaching is a conscious effort of purpose that is systematically directed at changing behavior towards the maturity of learners".¹

Formal educational institutions in Indonesia starting from the elementary, junior high, and high school levels teach dozens of subjects, both practical and theoretical. A person's effort to change a new behavior as a whole as a result of his own experience interacting with his environment is called learning. The changes are relatively constant and second-hand.² One of the dozens of subjects taught is the subject of Cultural Arts. Cultural Arts subjects are further divided into several subjects, one of which is fine arts. Fine art is one of the subjects that dominates practicum activities without compromising theory as the basic foundation for students before practicing. Fine arts is a subject that requires students to be more active, skilled, creative, innovative, characterized, disciplined, critical and responsible. In the 2013 curriculum of SMA class X in arts and culture subjects, especially fine arts, students are required to be able to understand the concepts, procedures, and functions of criticism in works of art. The definition of criticism of a work of art is not interpreted as a criticism that corners the work or its creator. Similar to appreciation, art criticism is basically an activity to respond to works of art. The difference is only in the focus of art criticism which is more aimed at showing the strengths and weaknesses of a work of art.³

The Covid-19 pandemic, which struck Indonesia and other countries at the beginning of March 2020, posed challenges to all business endeavors. The Covid-19 pandemic has also caused a lot of problems and changes in the education sector. During the Covid-19 pandemic, all teaching and learning activities are conducted online, despite the fact that face-to-face instruction is recommended. On Monday, February 7, 2022, class X MAN 2 Model Medan was observed repeatedly. One cultural arts teacher asserts that the outcomes of learning arts and culture, particularly fine arts, have decreased since the beginning of the Covid-19 pandemic, as the teaching and learning process has been conducted online. The learning outcomes, which are the outcomes of the interaction of learning actions, are typically indicated by the teacher's test scores.⁴

The use of Quizizz media had a significant impact on the biology learning outcomes of students in class X MIPA SMAN 3 Maros, as shown in his study, "The Effect of Quizizz Media in Online Learning on Students' Biology Learning Outcomes." According to the findings of his research, students who were taught biology using Quizizz media had better learning outcomes than students who were taught biology using traditional media.⁵

Quizizz is an internet-based learning platform that can be accessed by everyone using laptops and smartphones that are connected to the internet.⁶ Quizizz is a digital game that is also a fun multiplayer classroom activity.⁷ Quizizz is a quiz-based platform that is combined in the form of games and can be used as a medium for learning. In order to improve student learning outcomes, the use of Quizizz as an online learning medium in the field of cultural arts studies, particularly fine arts in art criticism content, is regarded as very appropriate. By using Quizizz as a learning medium, a teacher can directly control the class during online and offline learning simultaneously. Even teachers can design presentations and quizzes at the same time. Teachers can directly control student learning activities both at home and at school. By using Quizizz learning media, teachers can also give assignments with automatic deadlines so that students are more disciplined and on time in doing assignments.
Based on the above background, the researcher is interested in conducting a study entitled "The Effect of Using Quizizz Learning Media and Critical Thinking Ability on Learning Outcomes of Class X MAN 2 Medan Model Arts and Culture".

2. Method

This study uses an experimental method (quasi-experimental) by conducting experiments on samples or research subjects who are in an experimental class that has been formed previously without changing the class situation and learning schedule. We will compare the effects of Quizizz and Power Point learning media on student learning outcomes using this design. The two experimental groups, each made up of students with varying degrees of critical thinking ability, will use these two learning tools. The research design used is a 2 x 2 factorial design as shown in the following table:

<table>
<thead>
<tr>
<th>Critical Thinking Ability</th>
<th>Learning Media</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quizizz (A₁)</td>
</tr>
<tr>
<td>High (B₁)</td>
<td>A₁B₁</td>
</tr>
<tr>
<td>Low (B₂)</td>
<td>A₁B₂</td>
</tr>
</tbody>
</table>

Table 2. Description of the Research Design

A₁ : Groups of students who are taught with Quizizz learning media.
A₂ : Groups of students who are taught with Power Point learning media
B₁ : Group of students who have high critical thinking skills.
B₂ : Group of students who have low critical thinking skills.
A₁B₁ : Groups of students who are taught with Quizizz learning media and have high critical thinking skills
A₁B₂ : Groups of students who are taught with Quizizz learning media and have low critical thinking skills
A₂B₁ : Groups of students who are taught using Power Point learning media and have high critical thinking skills
A₂B₂ : Groups of students who are taught using Power Point learning media and have low critical thinking skills

The entire class X of IPS MAN 2 Model Medan's five classes served as the study population. Class X IPS-4 and class X IPS-3 were the Power Point media learning classes chosen as the samples for the Quizizz media learning class. Group irregular inspection is the method of testing. With a significance level of α = 0.05, the two-way ANOVA was followed by the Scheffe test.
3. Results and Discussion

The scores of MAN 2 Medan Model students who were instructed using the Quizizz learning platform and MAN 2 Medan Model students who were instructed using the Power Point learning platform for their Cultural Arts learning outcomes, which were grouped into critical thinking skills, make up the description of the data that is presented in the study, high and low capacity for critical thinking.

3.1 Learning Outcomes of Cultural Arts Taught with Quizizz Learning Media and High Critical Thinking Ability

The description of the displayed learning outcome data includes the mean, mode, median, variance, standard deviation, maximum and minimum scores, as well as a frequency distribution table.

The mean of data on the learning outcomes of Cultural Arts students in MAN 2 Medan Model who were instructed with Quizizz learning materials and had high critical thinking skills was 32.36; mode = 32.16; average is 32.30; variation of 4.59; 2.14 standard deviation; 36 is the maximum score; and 28 is the minimum score.

Table 3 shows the distribution of scores on the learning outcomes for Cultural Arts students in MAN 2 Medan Model who use Quizizz learning media and have high critical thinking skills, as follows:

<table>
<thead>
<tr>
<th>Interval Class</th>
<th>f absolute</th>
<th>f relatively</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 – 29</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>30 – 31</td>
<td>4</td>
<td>28.57</td>
</tr>
<tr>
<td>32 – 33</td>
<td>5</td>
<td>35.71</td>
</tr>
<tr>
<td>34 – 35</td>
<td>3</td>
<td>21.44</td>
</tr>
<tr>
<td>36 – 37</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

3.2 Learning Outcomes of Cultural Arts Taught with Power Point Learning Media and High Critical Thinking Ability

The mean of the data on the learning outcomes of Cultural Arts students in MAN 2 Medan Model who were taught with Power Point learning media and had high critical thinking skills is 28.09; mode = 29.00; average is 28.255; variation of 7.88; 2.80 standard deviation; 34 is the maximum score; and a 23 minimum score.

Table 4 shows the distribution of scores for the Cultural Arts learning outcomes for MAN 2 Medan Model students who are taught with Power Point learning media and have high critical thinking skills, as follows:
Table 4. Data Description of Student Learning Outcomes Taught with Power Point Learning Media and High Critical Thinking Ability

<table>
<thead>
<tr>
<th>Interval Class</th>
<th>f absolute</th>
<th>f relatively</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 – 24</td>
<td>2</td>
<td>11.76</td>
</tr>
<tr>
<td>25 – 26</td>
<td>3</td>
<td>17.65</td>
</tr>
<tr>
<td>27 – 28</td>
<td>4</td>
<td>23.53</td>
</tr>
<tr>
<td>29 – 30</td>
<td>5</td>
<td>29.42</td>
</tr>
<tr>
<td>31 – 32</td>
<td>2</td>
<td>11.76</td>
</tr>
<tr>
<td>33 – 34</td>
<td>1</td>
<td>5.88</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>100</td>
</tr>
</tbody>
</table>

3.3 Testing Requirements Analysis

Testing the requirements for data analysis of research results in this case is the data on learning outcomes of Cultural Arts students of MAN 2 Model Medan carried out through normality testing and homogeneity tests.

Normality Test. The Liliefors test was used for the normality test. In this case, Table 5 shows a summary of how the Liliefors formula was used to calculate the normality test of the learning outcomes of the Cultural Arts students at MAN 2 Medan Model.

Table 5. Summary of Normality Test Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Group</th>
<th>L_observation</th>
<th>L_table</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students Taught with Quizizz Learning Media</td>
<td>0.0930</td>
<td>0.1519</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>Learning Outcomes of Cultural Arts Students of MAN 2 Medan Model Taught with Power Point Learning Media</td>
<td>0.0818</td>
<td>0.1437</td>
<td>Normal</td>
</tr>
<tr>
<td>3</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students with High Critical Thinking Ability</td>
<td>0.0930</td>
<td>0.1591</td>
<td>Normal</td>
</tr>
<tr>
<td>4</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students with Low Critical Thinking Ability</td>
<td>0.1178</td>
<td>0.1383</td>
<td>Normal</td>
</tr>
<tr>
<td>5</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students Taught with Quizizz Learning Media and High Critical Thinking Ability</td>
<td>0.1552</td>
<td>0.227</td>
<td>Normal</td>
</tr>
<tr>
<td>6</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students Taught with Quizizz Learning Media and Low Critical Thinking Ability</td>
<td>0.0764</td>
<td>0.190</td>
<td>Normal</td>
</tr>
<tr>
<td>7</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students Taught with Power Point Learning Media and High Critical Thinking Ability</td>
<td>0.0927</td>
<td>0.206</td>
<td>Normal</td>
</tr>
<tr>
<td>8</td>
<td>Cultural Arts Learning Outcomes of MAN 2 Medan Model Students Taught with Power Point Learning Media and Low Critical Thinking Ability</td>
<td>0.1146</td>
<td>0.186</td>
<td>Normal</td>
</tr>
</tbody>
</table>
**Homogeneity Test.** The homogeneity test was performed by comparing the variance of the data on the Art and Culture students' learning outcomes in MAN 2 Model Medan's treatment with Power Point learning media and critical thinking skills.

Table 6 displays a summary of the homogeneity test results for the Art and Culture students in MAN 2 Medan Model, comparing the group taught with Quizizz learning materials to the group taught with Power Point learning materials:

**Table 6. Summary of Homogeneity Test Analysis of Student Groups Taught With Quizizz Learning Media and Power Point Learning Media**

<table>
<thead>
<tr>
<th>Sample Group</th>
<th>$F_{\text{Value}}$</th>
<th>$F_{\text{Table}}$</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Critical Thinking Ability and Low Critical Thinking Ability</td>
<td>1,01</td>
<td>1,73</td>
<td>Homogeneity</td>
</tr>
</tbody>
</table>

Table 7 displays a summary of the homogeneity test results for the Art and Culture students in MAN 2 Medan Model who had high critical thinking skills and students who had low critical thinking skills:

**Table 7. Summary of Homogeneity Test Analysis of Groups of Students with High Critical Thinking Ability and Low Critical Thinking Ability**

<table>
<thead>
<tr>
<th>Sample Group</th>
<th>$F_{\text{Value}}$</th>
<th>$F_{\text{Table}}$</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Critical Thinking Ability and Low Critical Thinking Ability</td>
<td>1,32</td>
<td>1,74</td>
<td>Homogeneity</td>
</tr>
</tbody>
</table>

Table 8 provides a summary of the homogeneity test calculations for the Cultural Arts students in MAN 2 Medan Model as an interaction between learning media and critical thinking skills:

**Table 8. Summary of Homogeneity Test Analysis of Learning Media and Critical Thinking Skills**

<table>
<thead>
<tr>
<th>Sample Group</th>
<th>$\chi^2_{\text{Value}}$</th>
<th>$\chi^2_{\text{Table}}$</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction of Learning Media and Critical Thinking Ability</td>
<td>4,60</td>
<td>7,81</td>
<td>Homogeneity</td>
</tr>
</tbody>
</table>

**Hypothesis Test.** 2 x 2 factorial analysis of variance was used to test the first, second, and third research hypotheses. The learning method variables, Quizizz learning media and Power Point learning media, were distinguished by two factors, so the 2 x 2 factorial variance
analysis was chosen. In addition, there are two components to critical thinking ability: high critical thinking ability and low critical thinking ability.

The complete calculation of the research hypothesis testing uses 2 x 2 factorial analysis of variance as seen in Table 9 as follows:

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>dk</th>
<th>Jk</th>
<th>Rjk</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Media</td>
<td>1</td>
<td>293.21</td>
<td>293.21</td>
<td>33.58</td>
</tr>
<tr>
<td>Critical Thinking Ability</td>
<td>1</td>
<td>62.32</td>
<td>62.32</td>
<td>7.13</td>
</tr>
<tr>
<td>Interaction</td>
<td>1</td>
<td>90.36</td>
<td>90.36</td>
<td>10.35</td>
</tr>
<tr>
<td>Error</td>
<td>68</td>
<td>594.11</td>
<td>8.73</td>
<td>3.984</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>1040</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

After testing the hypothesis and the third hypothesis, it is determined that learning media and critical thinking skills interact, necessitating additional testing. Using the Scheffe formula, additional tests were carried out in this instance. The summary of the calculation of the Scheffe test can be seen in Table 10 as follows:

<table>
<thead>
<tr>
<th>Statistical Hypothesis</th>
<th>F value</th>
<th>F_table (3,76) (α = 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0 : µ11 = µ12</td>
<td>3.78</td>
<td>2.726</td>
</tr>
<tr>
<td>Ha : µ11 &gt; µ12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H0 : µ11 = µ21</td>
<td>6.63</td>
<td>2.726</td>
</tr>
<tr>
<td>Ha : µ11 &gt; µ21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H0 : µ11 = µ22</td>
<td>6.18</td>
<td>2.726</td>
</tr>
<tr>
<td>Ha : µ11 &gt; µ22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H0 : µ12 = µ21</td>
<td>2.80</td>
<td>2.726</td>
</tr>
<tr>
<td>Ha : µ12 &gt; µ21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H0 : µ12 = µ22</td>
<td>1.91</td>
<td>2.726</td>
</tr>
<tr>
<td>Ha : µ12 &gt; µ22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H0 : µ21 = µ22</td>
<td>1.32</td>
<td>2.726</td>
</tr>
<tr>
<td>Ha : µ21 &gt; µ22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.4 Discussion

The Influence of Learning Media on Cultural Arts Learning Outcomes. In light of the preceding explanation, it has been established that the standard of learning outcomes MAN 2 Medan Model Arts and Culture students who are instructed using the Quizizz learning media (= 28.41) are superior to the average learning outcomes of MAN 2 Medan Model students who are instructed using the Power Point learning media (= 26.79).

This demonstrates that the Quizizz learning media have been shown to improve students' learning outcomes for arts and culture in general, specifically their cognitive abilities, particularly when it comes to material criticism of fine art works for the
MAN 2 Medan Model as a whole. This is true for groups of students who have strong critical thinking skills as well as groups of students who have thinking skills low on criticism.

**The Influence of Critical Thinking Ability on Cultural Arts Learning Outcomes.** Additionally, this study demonstrates that students in MAN 2 Model Medan Arts and Culture who possessed strong critical thinking skills had superior learning outcomes (= 29.81) when they were taught with Quizizz and Power Point learning materials, respectively. MAN 2 Medan Model students with low critical thinking skills (=26.10) are learning about the arts and culture. This demonstrates that students' ability to think critically without paying attention to the learning media used affects their Arts and Culture learning outcomes, specifically cognitive abilities.

**Interaction of Learning Media and Critical Thinking Ability to Cultural Arts Learning Outcomes.** The average student learning outcomes of MAN 2 Medan Model students with high critical thinking skills in the Quizizz learning media (=32.36) are higher than those of MAN 2 Medan Model students with low critical thinking skills (=25.40). In the Cultural Arts, students with high critical thinking abilities performed better than students with low critical thinking abilities in the Cultural Arts in the Power Point learning media (=26.43).

This demonstrates that students' cultural arts learning outcomes are significantly influenced by their ability to think critically. In both Quizizz and Power Point lessons, students with high critical thinking skills perform better than students with low critical thinking skills.

**4. Conclusion**

The following conclusions can be drawn from the hypothesis testing results: When teaching students' arts and culture with the Quizizz learning tool, students had better learning outcomes than when teaching them cultural arts with the Power Point tool. The way that Fvalue 33.58 is more noteworthy than Ftable 3.984 shows that the utilization of Quizizz learning media impacts Social Expressions learning results. The difference in average learning outcomes (=28.41) between students who used Power Point learning media and those who used Quizizz learning media (= 26.79) was larger overall. As a result, students' learning outcomes are enhanced when the Quizizz learning media are utilized for Cultural Arts instruction.

When it comes to learning about the arts and culture, students who have strong critical thinking skills perform better than students who have weaker critical thinking skills. Cultural arts learning outcomes are influenced by critical thinking skills, as evidenced by the fact that Fvalue 7.13 is greater than Ftable 3.984. Additionally, when taught with Quizizz and Power Point, students with high critical thinking skills had significantly better average learning outcomes (=26.10) than students with low critical thinking skills. This difference was the same as 29.81.

Quizizz learning materials are superior to Power Point learning materials for students with high critical thinking skills, whereas Power Point learning materials are superior for students with low critical thinking skills. Media learning and critical thinking skills interact in this way. This is demonstrated by the fact that Fvalue 10.35 is greater than Ftable 3.984.
References

Development of Science Student Worksheets Based on Contextual Teaching and Learning (CTL) to Improve Students' Critical Thinking Skills on Heat Transfer Materials

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Universitas Negeri Medan¹, Universitas Negeri Medan², Universitas Negeri Medan³

Abstract. The purpose of this study was to determine the feasibility and effectiveness of the development of IPA based on Contextual Learning to improve critical thinking skills. The data analysis technique in this study is the N-Gain test. The results of the expert validation test were carried out on 6 experts, namely 2 Indonesian language experts, 2 material experts and 2 learning media experts. the average score obtained by Indonesian language experts is 42.5 with a percentage of 88.54% (very valid), then the average score by material experts is obtained by 56.5 with a percentage of 88.28% (very valid), then obtained the average score by learning media experts with a score of 88 with a percentage of 95.65% (very valid). The results of field trials were carried out on a small, medium, and large scale in this study, namely the total score obtained from 3 students, the average value obtained was 47.18 with a percentage of 83.37% (Very Valid). For the effectiveness test, the interpretation of the effectiveness of 71.58% is in the range of 56 - 75 so it can be concluded that the Science Student Worksheet Based on Contextual Learning is “quite effective” in increasing students’ ability to think critically on heat transfer materials.

Keywords: IPA, Critical Thinking Skills.

1 Introduction

Education is very important for humans, because with education humans can gain knowledge and skills and can develop their abilities, attitudes and behavior. Some of the challenges in the 21st century are climate change (climatechange), global poverty (global poverty), population growth (population growth), wars in the 21st century (all out war), species extinction (losing species), creativity, transhumanism, and the divide between skills and wisdom (skills and wisdom gap) (Martin, 2007). To face these challenges, the quality of science education in Indonesia not only needs to be improved on the cognitive dimension, but also on the skills dimension in science learning. One of the skills needed in the 21st century identified by the Assessment and Teaching of 21st Century Skills (ATC21S), is the way of thinking (Griffin,
Ways of thinking include creativity, innovation, critical thinking, problem solving, and decision making.

According to Wagner (2010) and the Change Leadership Group from Harvard University, the competencies and skills needed by students in dealing with life, the world of work, and citizenship in the 21st century are emphasized on the following seven skills: (1) critical thinking and problem solving skills, (2) collaboration and leadership, (3) dexterity and adaptability, (4) initiative and entrepreneurial spirit, (5) able to communicate effectively both orally and in writing, (6) able to access and analyze information, and (7) have a passion for know and imagination. Critical thinking skills have long been an ability that is developed explicitly in learning. Zubaidah (2016) suggests that students must be able to find various solutions from different perspectives in solving complex problems. Critical Thinking Skills can also be improved through the CTL (Contextual Teaching and Learning) approach. This is in line with the research of Sudarmiani (2020), Silvia druru, et al (2018), and Hasruddin, et al (2015) which concluded that critical skills can be developed through the CTL (Contextual Teaching and Learning) approach.

This opinion is in line with the research results of I Wayan Sadia (2008: 219) that according to the teacher, the learning model that is seen to make a significant contribution in developing students' critical thinking skills is contextual learning. CTL helps participants develop their intellectual potential by teaching directly the steps that can be used in critical and creative thinking and providing opportunities to use higher-level ways of thinking in the real world (Johnson, 2009: 182).

Another alternative is to improve critical thinking skills by using the learning model conducted by Duran and Dökme (2016), Fuad, Zubaidah, Mahanal, and Suarsini (2017), Ikayanti, Suratno, & Wahyuni (2017), Mahanal, Zubaidah, Bahri, and Syahadatud (2016), and Wannapiroon (2014). The results of these studies can improve critical thinking skills, but really like the interaction of students with teachers during learning.

The CTL approach is an approach that can help students relate the material studied to the real life of everyday students, both in the family, school, and community environment. Thus learning will be more meaningful. CTL can turn regular programs, programs that are not attractive to students, into programs that enable them to perform to high standards (Sepriyanti, et al (2017, 233)). The seven components in CTL learning are constructivism, finding (inquiry), asking (questioning), learning community (learning community), modeling (modeling), reflection (Reflection), and Authentic assessment (Sanjaya: 264-268). Contextual learning is learning that allows the learning process to occur in which students use their understanding and academic abilities in various contexts inside and outside school to solve problems that are simulative or real, either individually or together. Contextual learning provide a stimulus to the brain for processing materials meaningfully (Hasruddin, 2015: 11).

In addition to using various methods and strategies to achieve the expected learning objectives in the classroom learning process, teachers also use various teaching aids such as textbooks, learning media, and Student Worksheets (LKPD). Usually LKPD is used for each subject as a tool for teachers in providing concise material along with questions that students can do.

Interviews conducted with several 5th grade science teachers in August 2020, showed that...
learning with the 2013 Curriculum had been carried out smoothly but there were still obstacles related to the existence of LKPD based on the 2013 Curriculum.

LKPD is one of the teaching materials used as a tool to support learning objectives. Trianto (2009:222) defines that LKPD is a student guide used to carry out investigations and problem solving activities. LKPD can also be defined as printed teaching materials in the form of twin sheets of paper containing material, summaries, and instructions for carrying out tasks that must be done by students, which refers to the KD achieved (Prastowo, 2014: 204).

Each LKPD contains, among others: a brief description of the material, the purpose of the activity, tools or materials needed in the activity, work steps, questions to be discussed, conclusions from the results of the discussion, and rehearsals. So, LKPD can be interpreted as sheets that are used by students as a guide in the learning process, and contain tasks carried out by students in the form of questions and activities that will be carried out by students. This is in accordance with the definition of LKPD according to Andi Prastowo (2013: 204) where student worksheets are defined as printed teaching materials in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students. With reference to basic competencies (KD) that must be achieved.

From some of the definitions above, the author concludes that the LKPD is in the form of instructions or guidelines as well as steps to complete a task as well as a guide for developing cognitive aspects as well as a guide for developing all aspects of learning in the form of printed teaching materials/books containing summary material, questions Questions (questions) and are also a learning tool that can be used by teachers in increasing the involvement or activity of students in the teaching and learning process which contains student activities that allow students to carry out real activities with the objects and problems studied.

The existence of innovative and creative LKPD will make the learning process more enjoyable. Therefore, it is imperative that every educator or prospective educator be able to prepare and create innovative teaching materials. In preparing it, the teacher must be careful and have adequate knowledge and skills, because an LKPD must meet at least the criteria related to achieving or not achieving a basic competency mastered by students. Given the importance of creating a good LKPD, before creating your own LKPD, several steps should be taken. According to Alan (2012:23) the steps for making LKPD are: (1) The material must refer to the curriculum; (2) Paying attention to individual differences, because the 2013 Curriculum emphasizes competence, the LKPD must be able to measure the ability of students; (3) Activities to support concept understanding, activities in LKPD help understand the concepts being studied; (4) Activities are related to real activities and technology; (5) Have clear learning objectives; (6) Making main points and details; (7) Using sentences that are simple, clear and easy to understand; (8) Have a sequence that is in accordance with the abilities of students; (9) Encouraging students to study and work scientifically; (10) There is a match between the material and the time available; (11) Used to carry out activities or problem solving and drawing conclusions.

2 Research Method

This research is a development research (Development Research). According to Sugiyono (2008:407), research and development (research and development) is a research method used
in order to produce certain products and test their effectiveness. In this study, what was developed was teaching materials in the form of student worksheets based on the CTL approach. This research will be carried out at the Binjai Methodist Private Elementary School. The subjects in this study were Binjai Methodist Private Elementary School students consisting of 6 (students) class V for a trial with the ability to learn science evenly as many as 28 people.

3 Results And Discussion

Research result

a. The results of the Feasibility Test of the Science Student Worksheet Based on Contextual Teaching and Learning (CTL)

From the results of expert validation tests conducted on 3 experts, namely Indonesian language experts, material experts and learning media experts. the score obtained by the Indonesian language expert, Mrs. Dr. Elly Prihastuti Wuriyanti, M.Pd of 35 with a percentage of 72.92% (quite valid), then obtained a score by material expert Dr. Ridwan Abdul Sani, M.Pd where the score obtained is 55 with a percentage of 85.94% (Valid). Then the score obtained by learning media experts is 64 with a percentage of 69.75% (quite valid). Here's the table:

<table>
<thead>
<tr>
<th>No</th>
<th>Name of Expert</th>
<th>Kind of Expert</th>
<th>Score</th>
<th>Max. Score</th>
<th>P (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Elly Prihastuti Wuriyanti, M.Pd</td>
<td>Indonesian language</td>
<td>42</td>
<td>48</td>
<td>87.61</td>
<td>Very Valid</td>
</tr>
<tr>
<td>2</td>
<td>Ita Khairani, S.Pd, M.Hum.</td>
<td>Indonesian language</td>
<td>43</td>
<td>48</td>
<td>89.70</td>
<td>Very Valid</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Ridwan Abdul Sani, M.Pd</td>
<td>material experts</td>
<td>58</td>
<td>64</td>
<td>83.75</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>Sabani, S.Pd, M.Si</td>
<td>material experts</td>
<td>55</td>
<td>64</td>
<td>91.25</td>
<td>Very Valid</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Samsidar Tanjung, M.Pd</td>
<td>learning media</td>
<td>89</td>
<td>92</td>
<td>90.75</td>
<td>Very Valid</td>
</tr>
<tr>
<td>6</td>
<td>Dr. R. Mursyid, ST, M.Pd</td>
<td>learning media</td>
<td>87</td>
<td>92</td>
<td>89.84</td>
<td>Very Valid</td>
</tr>
</tbody>
</table>

The following is a comparison chart of experts in providing an assessment:
From the results of expert validation tests conducted on 6 experts, namely 2 Indonesian language experts, 2 material experts and 2 learning media experts. The first Indonesian language expert scored 42 with a percentage of 87.5% (very valid), the second Indonesian expert scored 43 with a percentage of 89.58% (very valid). Then the score was obtained by the first material expert where the score was obtained 58 with a percentage of 90.63% (Very Valid), obtained a score by the second material expert where the score was obtained by 55 with a percentage of 85.94% (Very Valid). Then obtained a score by the first learning media expert with a score of 89 with a percentage of 96.74% (very valid), obtained a score by the second learning media expert with a score of 87 with a percentage of 94.57% (very valid).

a. Developmental Testing

At this stage, the researcher conducted a field trial using the LKPD Draft II. Field trials were carried out in two stages, namely limited field trials (readability tests) and operational field trials. The legibility test aims to determine the readability level of the LKPD Draft II before being used in operational field trials. The purpose of the operational field trial is to determine the improvement of students’ critical thinking skills after using the developed LKPD. Based on the data from the trial, the researchers conducted an evaluation to improve the LKPD Draft II so that the final product (LKPD Draft III) was produced. The following are the results of the field test consisting of small, medium and large field trials. The results of the moderate group trial obtained as Table 2 below:
Table 2. Small Group Trial

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>38</td>
<td>67.86</td>
</tr>
<tr>
<td>R2</td>
<td>46</td>
<td>82.14</td>
</tr>
<tr>
<td>R3</td>
<td>44</td>
<td>78.57</td>
</tr>
<tr>
<td><strong>SUM</strong></td>
<td><strong>128</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>42.67</strong></td>
<td><strong>73.56%</strong></td>
</tr>
</tbody>
</table>

The results of field trials on a small scale in this study were the total scores obtained from 3 students with a total of 128 and the average value obtained was 42.67 with a percentage of 73.56% (quite valid). After being tested on a small scale, then continued with a medium scale trial. The following are the results of the moderate group trial obtained as Table 3 below:

Table 3. medium group trial

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>46</td>
<td>82.14</td>
</tr>
<tr>
<td>R2</td>
<td>48</td>
<td>85.71</td>
</tr>
<tr>
<td>R3</td>
<td>49</td>
<td>87.50</td>
</tr>
<tr>
<td>R4</td>
<td>50</td>
<td>89.29</td>
</tr>
<tr>
<td>R5</td>
<td>52</td>
<td>92.86</td>
</tr>
<tr>
<td>R6</td>
<td>50</td>
<td>89.29</td>
</tr>
<tr>
<td>R7</td>
<td>48</td>
<td>85.71</td>
</tr>
<tr>
<td>R8</td>
<td>49</td>
<td>87.50</td>
</tr>
<tr>
<td>R9</td>
<td>44</td>
<td>78.57</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>436.00</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>48.44</strong></td>
<td><strong>86.51%</strong></td>
</tr>
</tbody>
</table>

The results of field trials on a medium scale in this study were obtained by the total score obtained from 9 students with a total of 436 and the average value obtained was 48.44 with a percentage of 86.51% (Very Valid). After being tested on a medium scale, a large scale trial was continued, obtained as Table 4 below:

Table 4. large group trial

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>43</td>
<td>76.79</td>
</tr>
<tr>
<td>R2</td>
<td>48</td>
<td>85.71</td>
</tr>
<tr>
<td>R3</td>
<td>49</td>
<td>87.50</td>
</tr>
<tr>
<td>R4</td>
<td>50</td>
<td>89.29</td>
</tr>
<tr>
<td>R5</td>
<td>52</td>
<td>92.86</td>
</tr>
<tr>
<td>R6</td>
<td>48</td>
<td>85.71</td>
</tr>
</tbody>
</table>
The results of a large-scale field trial in this study were the total scores obtained from 21 students with a total score of 1059 and the average value obtained was 50.43 with a percentage of 90.05% (Very Valid). The results of the small, medium, and large group trials can be seen from Figure 2 below:

![Figure 2. The results of the small, medium, and large group trials](image-url)
The final product above after going through several development processes ranging from product manufacture, field trials, operational trials to see the effectiveness to revisions from experts.

b. Results of the Effectiveness of the Science Student Worksheet (LKPD) Based on Contextual Teaching and Learning (CTL)

The second problem formulation regarding the effectiveness test was carried out on 27 students, the following is the effectiveness test data in learning through LKPD:

<table>
<thead>
<tr>
<th>Name</th>
<th>Pre Test (X1)</th>
<th>Post Test (X2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>53</td>
<td>85</td>
</tr>
<tr>
<td>R2</td>
<td>55</td>
<td>85</td>
</tr>
<tr>
<td>R3</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>R4</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>R5</td>
<td>62</td>
<td>82</td>
</tr>
<tr>
<td>R6</td>
<td>40</td>
<td>78</td>
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<td>R13</td>
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<td>R14</td>
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<tr>
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<td>R18</td>
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<td>R22</td>
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<td>R23</td>
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<td>R24</td>
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<td>82</td>
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<td>R25</td>
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<td>90</td>
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<tr>
<td>R26</td>
<td>40</td>
<td>74</td>
</tr>
<tr>
<td>R27</td>
<td>55</td>
<td>82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sum</th>
<th>1409</th>
<th>2321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td><strong>52.18</strong></td>
<td><strong>85.96</strong></td>
</tr>
</tbody>
</table>

Based on the table above, the learning outcomes obtained before using the student worksheets based on contextual learning obtained an average score of 52.18. While the learning outcomes obtained after using the student worksheets based on contextual learning obtained an average score of 85.96. Test the effectiveness of student worksheets based on contextual learning can be calculated using the gain score contained in Table 6 below:
Table 6. Test the effectiveness of student worksheets based on contextual learning

<table>
<thead>
<tr>
<th>Name</th>
<th>Pretes</th>
<th>Postes</th>
<th>Postes - pretes</th>
<th>Skor ideal- pretes</th>
<th>N-Gain</th>
<th>N-Gain %</th>
</tr>
</thead>
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<tr>
<td>R1</td>
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<td>85</td>
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<td>47</td>
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<td>90</td>
<td>40</td>
<td>50</td>
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<td>80</td>
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<td>85</td>
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<td>40</td>
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<td>75</td>
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<td>64,51</td>
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<tr>
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<td>82</td>
<td>40</td>
<td>58</td>
<td>0,689</td>
<td>68,96</td>
</tr>
<tr>
<td>R12</td>
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<td>90</td>
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<td>40</td>
<td>0,75</td>
<td>75</td>
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<tr>
<td>R13</td>
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<td>92</td>
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<td>40</td>
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<td>80</td>
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<td>R14</td>
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<td>50</td>
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<td>R17</td>
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<td>85</td>
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<td>50</td>
<td>0,70</td>
<td>70</td>
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<td>R18</td>
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<td>0,90</td>
<td>90</td>
</tr>
<tr>
<td>R21</td>
<td>65</td>
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<td>35</td>
<td>0,942</td>
<td>94,28</td>
</tr>
<tr>
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<td>38</td>
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<td>78,94</td>
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<tr>
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<td>98</td>
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<td>0,942</td>
<td>94,28</td>
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<td>R24</td>
<td>40</td>
<td>82</td>
<td>42</td>
<td>60</td>
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<td>70</td>
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<td>R25</td>
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<td>38</td>
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</tr>
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<td>R27</td>
<td>55</td>
<td>82</td>
<td>27</td>
<td>45</td>
<td>0,60</td>
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</tr>
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<td>140</td>
<td>232</td>
<td>982</td>
<td></td>
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</tr>
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</table>
Based on the results of the effectiveness test, it can be concluded that the use of the IPA Student Worksheet (LKPD) based on contextual learning is "quite effective" because the average percentage gain score for the interpretation of effectiveness is 71.58% in the range 56 - 75. The value The N-gain score obtained is 0.71 at g 0.7 which can be concluded in the "High" category. Thus the hypothesis states that the Science Student Worksheet (LKPD) Based on Contextual Learning is quite effective in increasing students' ability to think critically on heat transfer material in class V.

From the results of the calculation of the data above, it is obtained that \( t_{count} = 8.34 \). From the list of \( t \)-distribution by using probability \( 1 - \alpha = 0.95 \) with \( df = n - 1 = 27 - 1 = 26 \), the value of \( t_{table} = 4.25 \) is obtained. So that \( t_{count} > t_{table} \) is obtained, thus the hypothesis states "There is an effectiveness of the Science Student Worksheet (LKPD) Based on Contextual Teaching and Learning (CTL) on the material "Heat Transfer" in Class V SD Binjai Private Elementary School".

### 4 Discussion

a. The results of the Feasibility Test of the Science Student Worksheet (LKPD) Based on Contextual Teaching and Learning (CTL)

At this stage, the researcher developed an instrument used to assess the feasibility and effectiveness of the developed LKPD (validation instrument), and developed an instrument to assess students' critical thinking skills (test instrument). Instruments are listed in the appendix.

The choice of format is adjusted to the content of the material and the basis used in the development of LKPD, which is adapted to the Contextual Teaching and Learning (CTL) approach. The purpose of selecting this format is so that the LKPD developed is in accordance with good and correct criteria so that it is suitable for use in science learning.

The results of field trials on a small scale in this study were the total scores obtained from 3 students, the average value obtained was 42.67 with a percentage of 73.56% (quite valid). The results of field trials on a medium scale in this study were obtained by the total score obtained from 9 students, the average value obtained was 48.44 with a percentage of 86.51% (Very Valid). The results of a large-scale field trial in this study were the total scores obtained from 21 students, the average value obtained was 50.43 with a percentage of 90.05% (Very Valid). From the results of expert validation tests conducted on 3 experts, namely 2 Indonesian language experts, 2 material experts and 2 learning media experts. the average score by the first Indonesian language expert was 3.5 with a percentage of 87.61% (very valid), the average score by the second Indonesian expert was 3.6 with a percentage of 89.7% (very valid). Then the score was obtained by the first material expert where the average score was 3.35 with a
percentage of 83.75% (Valid), the score was obtained by the second material expert where the average score was 55 with a percentage of 91.25% (Very Valid). Then the score obtained by the first learning media expert with an average score of 3.6 with a percentage of 90.75% (very valid), obtained an average score by the second learning media expert with an average score of 3.59 with a percentage of 89.84% (very valid).

Based on previous research journals on the development of LKPD, namely Nurul Hidayati's research (2014) So far, the process of teaching science in elementary schools has not provided optimal opportunities for students to improve science process skills. The science kit has not been used optimally because the teacher has not developed a science kit-based LKPD. This research is an R&D research with the results of LKPD based on the Science Kit. The development steps carried out were: (1) product analysis, (2) initial product development, (3) validation and revision, (4) small-scale field trials and revisions. The results of the quality feasibility study by material experts were in the "very good" category, by media experts it was in the "good" category, and the linguists were in the "good" category. The results of the small-scale trial showed an increase in basic science process skills in every aspect. This is in line with Rahayu (2021) who explains that the development of LKPd is very necessary.

b. Results of the Effectiveness of the Science Student Worksheet (LKPD) Based on Contextual Teaching and Learning (CTL)

Based on the results of the effectiveness test, it can be concluded that the use of the IPA Student Worksheet (LKPD) based on contextual learning is "quite effective" because the average percentage gain score for the interpretation of effectiveness is 71.58% in the range 56-75. The value The N-gain score obtained is 0.71 at g 0.7 which can be concluded in the "High" category. Thus the hypothesis states that the Science Student Worksheet (LKPD) Based on Contextual Learning is quite effective in increasing students' ability to think critically on heat transfer material in class V.

For related research that tests the effectiveness is research by Winda Pradika (2022). This study aims to (1) describe the design and development of interactive E-LKPd, (2) determine the feasibility of interactive E-LKPd, and (3) determine the effectiveness of interactive E-LKPd. The development model used is ADDIE. The data collection methods used were interviews, observations, questionnaires and tests. Analysis of the data used, namely, quantitative descriptive analysis, qualitative, descriptive statistics and inferential statistics. This interactive E-LKPd is feasible to use, this is evidenced by the results of the test of learning content experts 98.7%, learning media experts 98.6%, learning design experts 100%, individual tests by teachers 97.5%, students 93.3%, small group test 96.1%, 95% field test which qualified very well. The results of the effectiveness test show that the interactive E-LKPd based on local wisdom is effective in increasing the competence of Balinese language knowledge, as evidenced by the t-test results obtained tcount = 6.1665, ttable = 2.086. This means that tcount> ttable so that H0 is rejected and H1 is accepted. Thus, the interactive E-LKPd based on local wisdom in Balinese script material is effectively applied to the fifth grade students of SD Negeri 8 Banjar Anyar.

Wahyu Purwaningrum (2022) This development research has the aim of testing the feasibility of a product in the form of a digital-based student worksheet as an online learning innovation with Natural Science subjects. The results of the feasibility test from colleagues got a good response with an average of 90.4%, then in the one-on-one test (individual) with an average result of 90%, in small group testing an average of 87%, and in group testing big get 88%.
Based on the validation from the experts and the trials that have been carried out, the digital-based student worksheet as an online learning innovation is feasible to use in the learning process. From the results of this effectiveness test, it can be concluded that LKPD has a significant influence on students' critical thinking skills.

5 Conclusion

1. For the feasibility test in this development research, namely the results of expert validation tests conducted on 6 experts, namely 2 Indonesian language experts, 2 material experts and 2 learning media experts. The score obtained by the first Indonesian language expert is 42 with a percentage of 87.5% (Valid), the second Indonesian language expert scores 43 with a percentage of 89.58% (very valid), then the score is obtained by the first material expert where the score is 55 with a percentage of 85.94% (Valid), obtained a score by the second material expert where the score was obtained by 55 with a percentage of 85.94% (Very Valid). Then the score obtained by the first learning media expert was 92 with a percentage of 94.56% (Valid). Then the score was obtained by the first learning media expert with a score of 89 with a percentage of 96.74% (very valid). The results of field trials in this study were obtained by the total score obtained from 28 students, the average value obtained was 49.07 with a percentage of 87.63% (Valid). The results of field trials on a small scale in this study were the total scores obtained from 3 students, the average value obtained was 42.67 with a percentage of 73.56% (quite valid). The results of field trials on a medium scale in this study were obtained by the total score obtained from 9 students, the average value obtained was 48.44 with a percentage of 86.51% (Very Valid). The results of a large-scale field trial in this study were the total scores obtained from 21 students, the average value obtained was 50.43 with a percentage of 90.05% (Very Valid).

2. For the effectiveness test, based on the results of the effectiveness test, it can be concluded that the use of the IPA Student Worksheet (LKPD) based on contextual learning is "quite effective" because the average value of the percentage gain score for the effectiveness interpretation is 71.58% included in the range 56 – 75. The N-gain score obtained is 0.71 at g 0.7 which can be concluded in the “High” category. Thus the hypothesis states that the Science Student Worksheet (LKPD) Based on Contextual Learning is quite effective in increasing students' ability to think critically on heat transfer material in class V.

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The Use of the Quipper School Application in Grade XI Drama Materials

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Universitas Negeri Medan¹,²,³

Abstract. Drama and audio-visual learning is the right combination. Drama performances that cannot be witnessed directly due to the COVID-19 pandemic can be seen through video recordings of drama performances. Distance learning is quite difficult for the process of learning drama with audio-visuals. Quipper School provides audio-visual features needed in the drama learning process. Quipper School is also able to connect students and teachers in one application which makes learning more effective and efficient. This research method uses qualitative research with direct observation research methods. The technique of analyzing research data is through direct observation, namely by looking directly at the drama learning process using the Quipper School application. The results of this study indicate that the use of the Quipper School application in drama learning in grade XI is the right medium and can increase students' interest in learning.

Keywords: drama, Quipper School, audiovisual, learning media.

1 Introduction

Drama learning is learning that emphasizes three aspects, namely cognitive, affective, and psychomotor aspects. In drama learning, students are not only required to be able to understand the material, but also must be able to examine the mandate and messages contained in the drama and be able to stage a drama performance. In Basic Competencies 3.18 and 3.19 and Skills Competencies 4.18 and 4.19 also emphasize these three aspects, namely 3.18 identifying the story line, chapter by act, and conflict in the drama that is read or watched, 3.19 analyzing the content and language of the drama that is read or watched, 4.18 showing one of the characters in the drama that is read or watched orally, and 4.19 demonstrates a drama script by paying attention to the content and language.

In order to realize drama learning that can fulfill these three aspects, several supporting components of learning are needed, one of which is appropriate and innovative learning media. Appropriate and innovative learning media for drama learning must be able to emphasize the audiovisual field. Because in drama, visualization and sound are inseparable components. With good visualization and sound, the drama performance can be enjoyed well by the audience. Meanwhile, [1] Baugh explained that approximately 90% of a person's learning outcomes are obtained through the sense of sight, and only about 5% is obtained through the sense of hearing and 5% by other senses. Based on the explanation, it can be
concluded that the learning media that emphasizes the audiovisual field is the right media in the learning process, including drama learning.

Drama learning that emphasizes the audiovisual field requires students and teachers to carry out the learning process directly. However, during the Covid-19 pandemic, the government promoted distance learning for all students in Indonesia to prevent the transmission of the Covid-19 virus. Of course, this program is a new challenge for all educators in Indonesia. Schools and teachers are required to be able to carry out the learning process well, although not directly. This is not an easy thing, but also not impossible to do considering that IT programs have evolved quite far.

Seeing this situation, several parties involved in education took part in creating the best solution for Indonesian education, including tutoring. Some tutoring make changes to follow the current government program, one of which is Quipper. Quipper is an online tutoring service that has been around since 2010 which means that Quipper existed long before the Covid-19 pandemic hit the world. However, Quipper continues to make changes so that it launches several platforms that can benefit teachers and students in the learning process, both directly and indirectly.

One platform that can facilitate distance learning is Quipper School. Quipper School is an online learning platform that facilitates students in the learning process, and supports teachers in managing the classroom. Quipper School also assists teachers in creating digital teaching materials that can facilitate students and teachers in the learning process. Quipper School can also load learning videos to make it easier for students to learn. That way, drama learning that emphasizes cognitive, affective, and psychomotor aspects can still be carried out even though it is far away.

2 Theoretical Basis

Audiovisual

[2] Wingkel explained that audio-visual media is a combination of audio and visual media that is created by itself, such as slides combined with audio cassettes. Meanwhile, Wina Sanjaya explained that audio-visual media is media that has elements of sound and elements of images that can be seen, for example video recordings, slides, sound, and so on.

[2] Atoel stated that audio-visual media has several advantages or uses, including: 1) clarifying the presentation of messages so that they are not too verbalistic (in the form of words, written or spoken); 2) overcome the limitations of space, time and senses, such as: objects that are too large are replaced with reality, pictures, frame films, films or models; and 3) audio-visual media can play a role in tutorial learning.

Drama

[3] Gafari explained that drama is a distinctive form of literary work, because the ultimate goal of a drama is not only to be enjoyed as writing, but also to be enjoyed as a performance on stage. Waluyo divides drama learning in schools into two types, namely: 1) drama text learning which includes literature, and 2) drama performances which includes the theater field.
Setiyaningsih explained several elements in the drama, namely 1) the theme is the main idea that underlies the drama play. In writing a drama script, one must first determine the theme to be developed; 2) the plot is a story or framework from the beginning to the end. The plot contains a tangle of conflict between two opposite characters; 3) character and disposition. Disposition or character is the overall characteristics of the soul of a character in a drama play; 4) dialogue. The storyline of the drama is realized through dialogue (in motion) performed by the players. The dialogues carried out must support the characters played and can show the plot of the drama; 5) setting is the place, time, and atmosphere of the occurrence of a scene. Setting is also often called the setting of the story. Drama setting usually includes three dimensions, namely place, space, and time; 6) the mandate is a moral message that will be conveyed by the author to the readers of the script or drama. The message is not conveyed directly, but through the play of a drama script that has been written; 7) technical instructions in drama scripts are also called side texts. Side text serves to provide clues when the actor should be silent, private conversations, length of quiet time between the two players, small or long pauses, and so on; 8) drama as an interpretation in life has inner glory. The life imitated by the playwright contains the side of life that the writer highlights; and 9) the relationship between script, author, staging, and audience. The advantage of the drama script is that in the conflict that is built, the conflict determines the climbs towards the climax. The answer to the conflict will give birth to suspense or surprise.

Sumardjo describes several structures in the drama, namely 1) the act; 2) scene; 3) dialogue; 4) prologue; and 5) epilogue.

Santoso explained the components contained in playing the drama, namely: 1) appreciation is the depth of meaning of the contents of the dialogue, the character of the characters, and the character of the situation/situation (difficult, happy, etc.); 2) gestures are major movements performed, namely hand, foot, head, and body movements in general performed by players; 3) articulation is the pronunciation of words through the mouth so that they are heard properly and correctly and clearly, so that the ears of the listener/audience can understand the words spoken; 4) sound volume; 5) mimic is facial expression that shows the character or character of the character being played; 6) intonation is related to dialogue on words that are considered important and tone distinctions for dialogue forms of questions, exclamations, orders, requests, and so on; 7) expression related to the skills of the actor to express human feelings and emotions, both their own emotions and the emotions of others; 8) improvisation includes three meanings, namely: a) creating, assembling, playing, presenting something without preparation, b) showing something suddenly, c) doing something spontaneously and as is; and 9) characterization is an attempt to display the character or character of the character being played.

Sukadi explained several elements that support the staging of drama, namely: 1) a drama script is an essay that contains a story or play; 2) the actors/actors of the story are the characters of the story in the drama script; 3) the director is the leader in staging the drama; 4) make-up is the part in charge of dressing or making up the players; 5) fashion is the part that regulates the players' clothes, such as materials, models, and how to wear them; 6) the stage setting is the stage condition needed in playing the performance; 7) the lighting system is the part in charge of setting the light on the stage; 8) the sound system that we usually know is the part that regulates the loudspeaker (sound system) and music accompaniment; and 9) the audience is an important element in staging a drama, because the success of a drama can be measured from the response of the audience who witnessed it.
Quipper School

Quipper provides 4 (four) services for all schools in Indonesia, namely Quipper School, Quipper Video, Quipper Video Master Class, and Quipper Campus. Quipper School is a learning management system intended for teachers and students at the junior and senior high school levels. Quipper Video is a video-based self-learning e-learning intended for students at the junior high and high school levels (grades 9 – 12). Quipper Video Master Class is a premium service from Quipper Video with two interactive features, namely a tutor question feature and online guidance which is also intended for students at the junior high and high school levels (grades 9 – 12). Quipper Campus is a portal that provides complete information about quality universities throughout Indonesia. This service is specifically for high school students and the equivalent. Quipper School has several features aimed at teachers and students, namely QLink, QCreate, Essay, and QLearn.

a. QLink

QLink is a place where teachers monitor student learning progress. This portal is designed to help teachers work more effectively by saving time in assigning assignments and correcting student work, so that they can analyze students' weaknesses and strengths in a practical way.

1. Create Account
   a) Go to the School.Quipper.com site on the search page
   b) Select “For Teachers” then select “Quipper School”
   c) Click “Create Account”
   d) Then fill in the data requested by the system
   e) Fill in the name and address of the school
   f) Recheck the data that has been entered
   g) Click continue and create an account
   h) After creating an account, please contact Quipper to verify the teacher account that has been created.

2. Create a Class
   a) Go to the site link,Quipper.com on the search page
   b) Then fill in the email and password for the Quipper School account that was created on the previous QLink platform
   c) Click “Sign In”
   d) Then click "Class List”
   e) Then fill in the class data
   f) Then click "Save"

3. Submitting Assignments
   a) Click “Curriculum & Assignments” on the QLink app
   b) Choose the curriculum that applies to the school
   c) Choose a subject
   d) Then check the material that will be given the task
   e) Then click “Create task with selected topic”
   f) Then fill in the data in the Task Settings
   g) After filling in the data in the Task Settings, click "Send Assignment"
4. Managing Values
   a) Click “Home”
   b) Then the tasks that have been sent by the teacher will appear along with the process of working on the tasks carried out by students.
   c) Click on the assignment that students want to see the progress of

b. QCreate

QCreate is a place where teachers add materials and questions that they want to use, so they can be accessed on QLink and QLearn with students. The Quipper School system has also provided teaching materials and questions related to the material in accordance with the existing curriculum. However, the teacher can choose whether to use the teaching materials and questions that have been provided or make their own.

In the process of preparing teaching materials, there are several stages that must be carried out, namely as follows:

1. Select QCreate at the top right
2. Click “Create Field of Study”
3. Fill in the requested data in making the field of study
4. Then click “Create”
5. Next, click “Create Chapter” on the previously created field of study
6. Then fill in the requested data in the chapter making
7. Then click “Create”
8. Click “Create Sub-chapter”
9. Then fill in the requested data in making sub-chapters
10. Then click “Create”
11. After creating sub-chapters, teachers can upload previously created materials into the QCreate portal. Materials uploaded to the QCreate portal must be in pdf or power point format.
12. Teachers can also create materials directly in the QCreate portal. There are two forms of material that teachers can make, namely in the form of text and video. In the video material, the teacher can only attach a link
13. After uploading or creating material, the teacher can see how the material will look by clicking “Preview this topic”
14. After uploading or creating material, the teacher is required to make questions in each sub-chapter
15. Click “Problem”. Then fill in the data requested in making questions. Please tick “Allow answer choices to be auto-shuffled” and “Allow teachers to randomize questions for assignments” so that the questions accessed by each student are different, both questions and answer choices.
16. In the process of creating questions, teachers can import questions from the Quipper School system or create their own. If the teacher wants to import questions from the system, then click "Import Questions"
17. Then select “Field of Study”
18. Then select the curriculum that applies to the "Set Field of Study"
19. Then click on the subject for which questions will be made
20. Then select the material
21. After selecting the material, the teacher can first check whether the questions in the system are related to the previously uploaded and created material.
22. Then check the questions that match the material that has been uploaded or created previously.
23. Click “Import Questions”
24. Then click “Import”
25. If the teacher wants to make his own questions, then click "Create Questions"
26. After that, type the question in the column provided
27. Then select the type of answer you want
28. Then click “Add Answer” to load the answer choices for the multiple choice questions that have been written in the previous column. Each “Add Answer” contains only one answer choice. If there are 4 (four) answer choices, then the teacher must add 4 (four) "Add Answers”
29. Then click “Create”
30. The next question will appear, if the student has answered the previous question
31. After you finish uploading or creating materials and making questions, please click “Publish” in the field of study that has been created so that the material is published on QLink.
32. Teachers can check “Select All Content” if they want to publish all previously uploaded and created materials and questions.
33. Then click “Publish”

![Fig. 1. Drama Learning Videos in Quipper School App](image)

c. Essay

Essay is one of the features of Quipper School that can be used by teachers and schools to give assignments in essay format. In addition, the teacher can also provide an assessment with the criteria and scores entered in the rubric provided. Then, students can easily work on the essays that have been assigned.

The steps for making questions in the Essay feature are as follows:

- a. Teacher logs in via Qlink
- b. Then click profile and select “Essay”
- c. Click “Create a new essay assignment”
- d. Fill in the data requested in the essay question
- e. Then click send
Then click OK.

On the student's QLearn account, the essay assignment that the teacher has created will go into the inbox.

QLearn

QLearn is a place where students learn in a fun and exciting new way. Now the materials and assignments given by the teacher can be accessed by students anytime, anywhere through this portal. Each student account is monitored by the teacher so that it can assist them in learning online.

In the process of using the QLearn feature on Quipper School by students, the main step that must be taken is creating an account. In the account creation process, Quipper will provide accounts to students at school so they can use them in the learning process. This is done by Quipper in order to minimize errors and fraud committed by students in creating accounts.

The steps for using QLearn are as follows:

a. Go to the website learn.quipper.com
b. Log in with the account provided by Quipper
c. Click profile
d. Then select the class list
e. Then enter the class code that has been given by the subject teacher
f. Then click "Gather" or "Join Class"
3 Research and Methods

This study uses qualitative research methods with direct observation research methods. The technique of analyzing research data is through direct observation, namely by looking directly at the drama learning process using the Quipper School application in class XI of SMA Negeri 1 Tanjungbalai.

4 Discussion

In the drama learning process, the researcher gave directions to students to perform a drama performance at their respective homes in groups. Students form groups independently with the results of obtaining 5 groups consisting of 6 to 7 people per group. Students act out a drama script entitled Pengamen Kecil by Sebrina Ayunani.

Students need 2 weeks to prepare for the play, starting from determining roles to preparing supporting properties. In this case, students are welcome to explore all the abilities they have. The drama preparation process was monitored by researchers through online class group conversations. The extent to which the drama staging process they do, how much practice they do, and how the video editing process will be sent through the Quipper School application later. Students are also allowed to do the editing process on their drama performance videos to make it look better.

After performing the drama staging process, students download their videos into the Quipper School application. There are several obstacles such as students not getting a good network, difficulties in finding the task portal that has been provided due to being accepted by the assignments given by teachers in other fields of study, and also there are students who forget their account passwords. However, this obstacle can be overcome by good communication between researchers and students. The researcher directs students who forget their account passwords to contact Quipper so they can change their passwords. Meanwhile, students who cannot find the assignment portal are assisted by other students by sending a link to the assignment that has been given previously.
During the process of staging the drama, the students seemed enthusiastic in conducting a question and answer session to the researchers. Students ask things related to staging, such as supporting properties that can be used in the staging process to asking about video editing processes that can and can be used in drama performances. During the process of staging the drama, it was also seen that students who were less active were able to explore themselves and show their ability to socialize and cooperate with their group mates.

5 Conclusion

Drama learning using the Quipper School application can provoke students' creativity to the maximum. Students can demonstrate their ability in the IT field and can also show a compact and solid cooperation. With the process of staging dramas recorded through video, it can not only explore students' abilities in acting, but also can make students show their abilities in video editing. The process of staging drama in groups can also increase good cooperation so that shy and quiet students can start socializing with their group friends.

References

Development of Persuasive Speech Text Materials Assisted by Podcast Media for Class IX Students of Nurcahaya Medan Private Junior High School

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Abstract. This study aims to produce a persuasive speech text material product with the help of podcast media for class IX students of SMP Swasta Nurcahaya Medan, to determine the feasibility of persuasive speech text material assisted by podcast media for grade IX students of SMP Private Nurcahaya Medan. In research and development methods there are several types of models. The model used in this research is the Research and Development (R&D) Borg & Gall. The results of the study show that: (1) validation from material experts includes, content eligibility 96.87% in the very good category, the feasibility of presenting 91.6% in the very good category and the feasibility of language 90.62% in the very good category. (2) The results of the validation of the media design experts were stated to be very good with the percentage of skill feasibility assessment aspects on average 93.18%. The aspect of assessing the feasibility of the program with a presentation of 92.5 with a very good category, and (3) the effectiveness of learning materials through student learning outcomes in the pretest and posttest. The average score at the pretest is 58.90 and at the posttest 88.90. The difference obtained is 30. It can be concluded that learning using persuasive speech text materials assisted by podcast media can improve student learning outcomes.

Keywords: Teaching materials, persuasive speech text, podcast

1 Introduction

Persuasive speech skills are part of speaking skills. Persuasive speech is an aspect that must be mastered by students in the era of globalization, because the ability to speak persuasively promises students to be able to be competitive in all aspects, namely accuracy of speech, pronunciation, fluency of intonation, attitude / expression and mastery of language. The fact that occurs in the teaching and learning process of students in the ability to make speeches needs to
be improved.

Students who have persuasive speech skills will easily convey their ideas and will successfully put forward the idea so that it can be accepted by others. On the other hand, if students lack the skills of persuasive speech, they will certainly have difficulty conveying their ideas to others, and it is suspected that they will experience failure because of their usual speech. Persuasive speech is considered one of the difficult skills for students to master. Because this skill involves many aspects in mastery such as accuracy of speech and pronunciation, fluency and intonation, diction, attitude and facial expression, and language mastery. The main things found in students when measuring the ability to make persuasive speeches are errors in processing speech, organizational errors, errors in appearance and attitude, errors in speaking and errors in relationships with listeners.

Starting from the above, interviews were conducted to prove the low ability of persuasive speeches in Indonesian subjects. Interviews were conducted by students who were selected as a whole from one existing group. Based on the initial interviews conducted on speech learning, it was found that the students' low ability to speak was because learning was not interesting because the focus of learning was only on textbooks and teachers. The textbooks used are books published by the government.

Based on direct observation, it was found that students' understanding of persuasive speech was quite low, with the elaboration of the aspect of understanding persuasive speech found 8 people who were able to answer correctly from 18 respondents, it can be concluded that the level of students' understanding of the operational definition of speech was sufficient. In the aspect of the structure of persuasive speech texts, it was found that 5 people were able to answer correctly from 18 respondents, so it can be concluded that the level of students' ability to identify the structure of speech is sufficient. In the aspect of determining speech ideas, 5 people were found who were able to answer correctly, it can be concluded that the students' ability to identify persuasive speech ideas was sufficient.

After conducting a direct assessment of teaching and learning activities in the online classroom and observing the learning media used by the teacher, the researcher found that the learning media used by the teacher was very simple, namely only through text in the learning book and the learning model used by the teacher was a learning model using a model. lectures, This is one of the factors that cause students to feel less interested in studying this topic.

Starting from these conditions, the researchers have the idea that learning media in the world of education, especially in speech learning needs to be adapted to the development of science and technology. Persuasive speech learning in schools using conventional media is considered less attractive to students and will affect learning outcomes. Persuasive speech with product media is one of the interesting learning media innovations. Because the media is not only a tool, it also has an important role to create an effective and efficient teaching and learning process. One way to improve students' persuasive speech skills is to use Podcast Media. Podcast is one of the learning media that can overcome weaknesses in teaching persuasive speech, because this media is mobile and can be used by students anywhere, be it at school or at home. This podcast is a very practical online media because students can easily download it via a shortcut phone device with an internet
Based on the explanation above, this problem is very interesting to be studied and researched further. Therefore, the researchers chose and set the title "Development of Persuasive Speech Text Materials Assisted by Podcast Media for Class IX Students of Private Junior High School Nurcahaya Medan"

2 Research Methods

This type of research is research and development (R&D). The location of the research was carried out on grade IX students of Nurcahaya Private Junior High School Medan. The data collection instrument in this study was in the form of questionnaires given to material experts and media design experts as validators for the development of persuasive speech text materials assisted by podcast media and to students as objects in this study. The instruments given to learning materials experts and media design experts are intended to validate the resulting development products. This is meant as the fulfillment of learning requirements developed with podcast media.

3 Results And Discussion

3.1 The Process of Developing Persuasive Speech Text Materials Aided by Podcast Media

The process of developing persuasive speech text materials assisted by podcast media is carried out in three stages, namely needs analysis and literature survey, planning, initial product development. At the stage of needs analysis and literature survey, an analysis of the needs of teachers and students was carried out. Then set learning objectives, namely basic competencies, indicators of competency achievement, learning objectives, and the scope of the material in the developed learning media. At the planning stage, the outline of the material in the learning media is designed. The initial product development stage is the stage of developing an outline of the material that has been made in the previous stage into a more complete display of learning media. Furthermore, the last stage is the assessment stage of the learning media that has been developed. The validation assessment was carried out by 2 material experts and 2 design experts, 2 Indonesian language teachers and testing on students.
### Table 1. Feasibility of the Process of Developing Persuasive Speech Text Materials Aided by Podcast Media

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Expert Validation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Eligibility</td>
<td>96.87%</td>
</tr>
<tr>
<td>Serving Eligibility</td>
<td>91.65%</td>
</tr>
<tr>
<td>Language Eligibility</td>
<td>90.62%</td>
</tr>
<tr>
<td>Average</td>
<td>93.04%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Media Expert Validation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects of skill feasibility assessment</td>
<td>93.18%</td>
</tr>
<tr>
<td>Aspects of programming feasibility assessment</td>
<td>92.52%</td>
</tr>
<tr>
<td>Average</td>
<td>92.85%</td>
</tr>
</tbody>
</table>

#### 3.2 The Effectiveness of Developing Persuasive Speech Text Materials Aided by Podcast Media

After conducting a wider trial, further testing the effectiveness of the product on student learning outcomes is carried out. The results of these students’ learning can be known after the pre-test and post-test were held on 32 students of class IX of SMP Swasta Nurcahaya. The pretest is given before using the developed product and the posttest is given after using the developed product (material). The average value (mean) of student learning outcomes through the pretest was 58.90% and posttest 88.90%. Based on these results, it can be seen that the average value of student learning outcomes after using the media increased by a difference of 30. The table above also shows that student learning outcomes in folk story text material through the pretest have the lowest 55 and the highest score 75, while student learning outcomes the folklore text material through the posttest has the lowest score of 70 and the highest score of 95.

The calculation obtained from the product effectiveness test shows that the results of developing persuasive speech text materials with the help of podcasts are more effective than learning speech texts that do not use media. This is evidenced by the learning outcomes of students using podcasts with an effectiveness of 88.90%, while the effectiveness of learning that does not use developed products (materials) is 58.90%. Based on this explanation, it can be concluded that persuasive speech text materials assisted by podcasts are effectively used and can improve student learning outcomes, especially in persuasive speech text materials.
4 Conclusion

Based on the formulation, objectives, results and discussion of the research on the development of persuasive speech text materials with the aid of podcast media for class IX students of SMP Swasta Nurcahaya Medan, it can be concluded as follows. 1) The material for persuasive speeches developed with the help of podcast media is divided into three stages, namely stage I analysis, which is a preliminary study in order to generate ideas or ideas so that they become the initial basis for learning media knowledge, stage II is developing learning media products in Indonesian language learning by persuasive speech text material, stage III of development, is the core stage of the product development process. At this stage the activities carried out are to realize the product specifications that have been determined at the design stage into an initial product form (media). The initial product developed is then assessed for product quality by material experts and design experts. Product quality assessment by experts is carried out to assess the level of product feasibility when implemented in persuasive speech text learning.

The results of validation research from material experts, learning media design experts, individual test responses, small group trials, and limited group trials on persuasive speech text learning that were developed show that all aspects of podcast media assessment using the anchor platform as a whole include in the "Very Good" category with a percentage of 90.9% so that it is suitable for use in the learning process.

The effectiveness of the media shows better results when compared to the effectiveness of not using the media. The students' persuasive speech texts through the posttest were 88.90%, while the effectiveness of the students' persuasive speeches without using the media through the pretest was 58.90%. The difference in these results indicates that the average value of student learning outcomes increased with a difference of 30% increase. The value obtained by students also shows that student learning outcomes of persuasive speech texts through the pretest have the lowest score of 50 and the highest score of 70, while student learning outcomes on persuasive speech texts through posttest have the lowest score of 80 and the highest score of 95.

References

Application of Contextual Learning-based Interactive Learning Media for Class V Students in Civics Subjects at SDN 250/VI Sinar Gading II

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Abstract. Media is an important means of learning in constructing students' understanding by relating students' real lives. Interactive learning media can be used offline and online so that they can be accessed anywhere. This study examines the application of contextual-based interactive learning media in Civics Class V subjects. The research method uses a mixed-method by describing the data qualitatively and analyzing the data quantitatively. The results of the application of the media by looking at the results of the pretest and post-test obtained a total pretest score of 1435 with an average value of 57.40 and a total post-test score of 2035 with an average value of 81.40 and by testing the N-Gain score obtained 56.3 or 56% with quite an effective category. So it is proven that the interactive learning media that is applied is effective in learning Civics for the fifth-grade students of SDN 250/VI Sinar Gading II.

Keywords: Application, interactive learning media, contextual, Civics.

1 Introduction

Education is determined by the learning process delivered to students. Education is a real and planned effort to realize a learning and learning activity so that students are can increase their self-potential to have religious-spiritual strength, self-control, personality, intelligence, noble character, and skills to be developed in students and society. [1]. Education is carried out in the family, at school, and in the community [2]. a learning process is a process of one's activities to learn. Learning is a person's effort to acquire knowledge through a communication activity between students and teachers, with learning resources, in a learning environment to achieve learning objectives. [3]. The purpose of learning is to create quality and character human beings to have intelligence in achieving goals as an adjustment to the environment appropriately and quickly so that a person can himself to have competence in all fields and aspects of life. [4]. Learning will be more effective and efficient if it is supported by learning media so that students easily understand the concept [5].
Constructivism in learning is an understanding that students' knowledge is developed gradually in a systematic way and that learning is a student experience not the result of rote memorization. [6]. Contextual learning is a learning process carried out by linking the material discussed with the problems experienced by students in everyday life.1

Learning media is a means to facilitate teachers and students in delivering information or materials. The material will be more interesting and easy to understand if it is related to the real daily context of students. The media is seen as capable of providing interesting learning motivation; so that learning is effective and the achievement of learning objectives is more optimal [7]. Learning media continues to develop according to the problems the teacher encounters in the classroom [8]. Learning media continues to develop, one of which is interactive media which is developed with an articulate storyline. The articulate storyline is an application as well as the development of full-featured presentation media so that the media is more attractive and students are more motivated and improve student learning outcomes.2

Interactive learning media can be accessed anywhere with internet access in web format [9]. so that the media used can construct understanding by providing real visualization according to the students' experiences [10].

Civics subjects have a fairly broad scope, it needs a media that can construct student knowledge gradually. Civics learning objectives (citizenship) are subjects that focus on the formation of a diverse self in terms of religion, socio-culture, language, age, and ethnicity to become intelligent, skilled, and characterized Indonesian citizens mandated by Pancasila and the 1945 Constitution. [11]. Knowledge cannot be formed or obtained instantly so it needs a context related to concrete things or problems that students encounter in everyday life. [12]. So in this study, the application of contextual learning-based learning media in Civics subjects for fifth-grade elementary school students at SDN 250/VI Sinar Gading II will be studied.

2 Research Method

The method used is the Mixed method [13]. With two qualitative approaches at the same time to define the data, while quantitative as a data analysis step, the data that has been obtained is then analyzed mathematically. The main purpose of this study was to determine the application of interactive media based on contextual learning in Civics Subjects for class V students. Location At SDN 250/VI Sinar Gading II Tabir Selatan District, Merangin Regency, Jambi Province. Subjects amounted to 25 students. The research period was from May to June 2022. The data obtained were described in a narrative and systematic manner and analyzed based on field data.

1 Nurdyansyah, dan Eni Fariyarul Fahyuni, M.Pd.i, *Appropriate Learning Model Innovation K13*, (Sidoarjo: Nizamia Learning Centre, 2016) h 35-51
3 Finding and Discussion

The interactive learning media applied to learning has gone through the stages of development using the Akker development model [14]. The learning media has been tested for expert validity, namely: by material experts and media experts, and practicality tests by practitioners, namely teachers [5]. The media contains examples of the implementation of children's rights, obligations, and responsibilities at home, at school, and in the community. Each material is given a quiz as material enrichment. In the media, development information is given so that there is no use of other people's work. This Interactive Learning Media has a scheme of using media which can be seen in Figure 1 below:

![Fig. 1. Interactive Learning Media Scheme.](image1.png)

The application of this interactive learning media can be used offline and online: Interactive learning media can be run offline on a computer (PC), laptop, Chromebook, or MacBook. Offline use by downloading files on [https://bit.ly/MediaPKnCDoffline](https://bit.ly/MediaPKnCDoffline). After the download is complete, double click on the "Launch_Story" file as shown in Figure 2 below:

![Fig. 2. media installation offline (ex).](image2.png)

Media can be used directly online by using the link [https://bit.ly/PKnSD](https://bit.ly/PKnSD). This interactive learning media can also be shared with students via social media or by inputting links in
browsers such as Google Chrome, Mozilla Firefox, Opera Mini, and so on. This will open the media page. On the media page, there is a button to enter the login page to input student names and school origins. After that go to the instructions page, and there is a button to enter the main menu page as follows:

![Image](image.png)

**Fig. 3.** The main menu of interactive learning media.

Interactive learning media based on Contextual learning in Civics subjects, the main menu contains information on KI, KD, Indicators, and Learning Objectives, materials, interactive quizzes, and development information. The main materials in this media are: 1) children's rights at home, at school, and in the community; 2) children's obligations at home, at school, and in the community, 3) children's responsibilities at home, at school, and. In the media, the material is found in the material menu after pressing the red button on the main menu.

The application of interactive learning media based on contextual learning is applied in class V SDN 250/V1 Sinar Gading II on the subject of 25 students. Before the application of interactive learning media in the learning process. The teacher conducts a pretest to find out whether after, the implementation of this media, can affect student learning. After the pretest, learning is carried out using contextual learning steps with 7 principles, namely: constructivism, inquiry, questioning, learning community, modeling, reflection, and authentic assessment.

With the application of this contextual learning-based learning media, the media has several functions and roles. The first is to construct knowledge based on examples of application, the second is as a learning model, and the third is an authentic assessment.

Interactive learning media based on contextual learning on rights, obligations, and responsibilities are applied by teachers in learning in class V. Application of media using laptop devices offline in the first meeting learning. And at the second meeting, the interactive learning media was used with each student's cellphone, so that students could understand the entire content of the material. Students can re-open the material repeatedly at home via the media link provided. Thus students can know the achievement of the material that they have and have not understood independently. In addition, students can also assess the level of understanding they have achieved with enrichment quizzes in each material. After learning Civics by implementing interactive learning media, the teacher conducts an assessment by giving posttest to students. Then the results of the pretest and posttest are obtained which can be seen in Table 1 below:
Table 1. Pretest and posttest scores of students.

<table>
<thead>
<tr>
<th>No</th>
<th>Student's name</th>
<th>Score</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aam Maulana Yusup</td>
<td>55</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Alifah Najwa</td>
<td>65</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Asela Lestifa</td>
<td>60</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dawam Ainur Ridlo</td>
<td>45</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Devin Rahmat Muafa</td>
<td>50</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dhiyas Kholaifal Nawaf</td>
<td>50</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dimas Andrianto</td>
<td>50</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ewanti Ardiarsyah Pratama</td>
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<td>85</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Evidatul Magfiro</td>
<td>60</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Fadil Setiawan</td>
<td>45</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Hajis Nur K.</td>
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<td></td>
</tr>
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<td>12</td>
<td>Ica Tri Agustina</td>
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<td>90</td>
<td></td>
</tr>
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<td>13</td>
<td>Khoirul Umam</td>
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<td></td>
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<td></td>
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<td>15</td>
<td>Mahmad Ilham</td>
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<td>16</td>
<td>Mahmad Agung Prasetyo</td>
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<td>80</td>
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</tr>
<tr>
<td>17</td>
<td>Muhammad Faiz Fiqron</td>
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<td>18</td>
<td>Muhammad Rafiy</td>
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<td>90</td>
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<td>19</td>
<td>Mahmad Yasin Aldivo</td>
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<td>20</td>
<td>Nazialatul Mufidah</td>
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<td>22</td>
<td>Rara Aulya</td>
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<td>23</td>
<td>Silvia Novi Andriani</td>
<td>75</td>
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<td>Syafira Nabila P.</td>
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<td>85</td>
<td></td>
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<td>25</td>
<td>Zulfa Nur Atikah</td>
<td>65</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

| Amount | 1435 | 2035 |
| Mean    | 57.40 | 81.40 |
| Maximum Value | 75 | 95 |
| Minimum Value   | 45 | 60 |
| Number of Completed Students | 7 | 23 |
| Number of Students Not Complete | 18 | 2 |

Based on the results summarized in Table 1, the pretest scores of class V students obtained a total score of 1435 with an average value of 57.40. It can be seen that at the beginning of the study, the students' pretest was quite low. If you look at the post-test after the learning process with interactive learning media, the total achievement value is 2035 with an average value of 81.40. Then it can be seen that the learning improvement of class V students is seen from the results of the pretest and posttest. This proves that the application of learning media based on contextual learning in Civics Class V subjects at SDN 250/VI Sinar Gading II is effective in improving student learning outcomes.

The effectiveness of the media was tested with the N-gain score, which concluded the results of the students' pretest and post-test, so it can be seen the effectiveness of the media in Table 2 below:
4 Conclusion

From the discussion of this research, it can be concluded: that interactive learning media is needed in learning as a means to facilitate teachers and students in learning; media is generated with the articulate storyline application; contextual-based interactive learning media can be applied offline and online; the application of media proved to be effective in improving the learning outcomes of fifth-grade students with pretest and posttest results. In the N-Gain Score, the interactive learning media used is considered quite effective in improving the learning outcomes of fifth-grade students at SDN 250/VI Sinar Gading II.

Acknowledgments. Thank you to all research supporters, especially to the supervisors and lecturers of the basic education study program at Medan State University.

References


The Effectiveness of Animated Video Media to Improve Self-Efficacy and Self-Regulated Learning

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Physics Education, Postgraduate School, Universitas Negeri Medan, Medan, 20221 Indonesia¹,²,³

Abstract. The importance of media in learning is to clarify so that the message conveyed is not too verbal, transcends the boundaries of space, time, energy and the five senses. Self-regulated learning is still a core problem in the world of education which is quite alarming. One of the factors that influence self-regulated learning is self-efficacy. High self-efficacy is needed in the learning process to achieve the expected self-regulated learning. This study aims to determine the effectiveness of animated video media to increase self-efficacy and self-regulated learning. This research method uses descriptive qualitative research through the provision of questionnaires and interviews to students in two classes. The results obtained showed that through the t test and MANOVA showed a significant value with a value of 0.000 (p ≤ 0.05), then animated video media was effective for increasing self-efficacy and self-regulated learning.

Keywords: Animated Video, Self-Efficacy, Self-Regulated Learning

1 Introduction

The present students are brought up in the computerized age. They get a great deal of help from Google products in their daily lives and are exceptionally confident connected with their mobile phones. The technology platform enables students to can access and learns from various places and times utilizing personal computers, laptops, tablets, and mobile phones. Subsequently, utilizing this technology permits students to participate actively in their learning [1].

Learning is a system made up of different components. There are objective components, tools, and materials components, strategy components, media components, and assessment components. Media seems to be an integral part of the learning process. The role of the media is to provide clarity so that the message conveyed is not overly verbal, transcending the boundaries of space, time, energy, and the five senses.

Video media is one of the most popular ICT media that can arrive at the general population. Sablic mentions that one of the fundamental elements of video is the simultaneous use of both auditory and visual signs [2]. The visual aspect is the primary wellspring of information, and
the audio is utilized to make sense of the information exhaustively. Through these two elements, students can receive, understand, and remember learning information [3].

Animated video is a learning media that acts as a bridge to help students understand the material. Animation is the modification of visual media, such as images or static patterns, to move and convey more realistic information [4]. The presence of animation may limit the learning experience for students. The material in the book can be visualized and audio touches can also be provided. The utilization of animated video learning media in the learning process can increment student motivation, interest, and learning results [5].

Self-regulated learning is still the core of the problems in the world of education which is quite concerning [6]. Self-Regulated learning describes a skill and activity carried out to increase knowledge, as well as expertise to expand/deepen a material that is carried out responsibly, creatively, designing learning activities on their own, independent or not dependent on others, and having self-confidence [7].

One of the variables influencing self-regulated learning is self-efficacy, which is a skill and activity aimed at increasing knowledge and increasing professional knowledge, which is self-efficacy [8]. Student self-efficacy refers to an individual's beliefs about their expected performance in certain subjects or tasks [9]. Students with lower self-efficacy in science subjects prefer easier assignments, work less, struggle to adjust to school classes, and have lower academic performance [10].

This is very necessary to improve self-efficacy and self-regulated learning of students. If students already have self-efficacy to study physics subjects, these students will be happy and enthusiastic when involved in learning physics and have the potential to grow independence in learning physics [11].

2 Methods

This research was carried out using a quasi-experimental design with a non-equivalent control group design. This research was carried out in an experimental class (using animated video) and a control class (using textbooks).

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment Class</td>
<td>$O_1$</td>
<td>$X_T$</td>
<td>$O_2$</td>
</tr>
<tr>
<td>Control Class</td>
<td>$O_1$</td>
<td>$X_C$</td>
<td>$O_2$</td>
</tr>
</tbody>
</table>

Description:
$O_1$ = Early class abilities/characters
$O_2$ = End of class abilities/characters
$X_T$ = Learning using animated video
$X_C$ = Learning using textbooks
3 Result and Discussion

3.1 T-test

a. Independent Sample t-Test

<table>
<thead>
<tr>
<th>Data</th>
<th>Class</th>
<th>df</th>
<th>Score Significance</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>Control &amp; Experiment</td>
<td>78</td>
<td>0.981</td>
<td>Ho accepted</td>
</tr>
<tr>
<td>Post-test</td>
<td>Control &amp; Experiment</td>
<td>78</td>
<td>0.000</td>
<td>Ho rejected</td>
</tr>
</tbody>
</table>

The pre-test data showed that Ho was accepted according to the findings of the independent t-test, indicating that there was no significant difference between the experimental and control classes. The post-test data shows that Ho is rejected because each had a significance value of <0.05, which equals 0.000. Therefore, in the post-test, Ho was rejected and Ha was accepted, so indicating that there is a difference in self-efficacy between students who take learning with animated video media and students who do not take lessons with animated video media.

b. Paired Sample t-Test

<table>
<thead>
<tr>
<th>Data</th>
<th>df</th>
<th>Score Significance</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 before-after</td>
<td>39</td>
<td>0.000</td>
<td>Ho rejected</td>
</tr>
</tbody>
</table>

The significance value for each was 0.05 according to the findings of the paired t-test. As a result, Ho is rejected and Ha is accepted. Based on the data, the conclusion is that there are
differences in students' self-efficacy before and after participating in learning with animated video media.

**Table 5. Paired t-test results Data Self-Regulated Learning**

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>Score Significance</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 before-after</td>
<td>39</td>
<td>0.000</td>
<td>Ho rejected</td>
</tr>
</tbody>
</table>

The significance value of each was 0.05 based from the results of the paired t-test. Hence, Ho is rejected while Ha is accepted. Based on this result, the conclusion is that there are differences in students' self-regulated learning before and after participating in learning with animated video media. Each significance level (p) 0.05 is equal to 0.000.

### 3.2. MANOVA test

**Table 6. MANOVA Test Results**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>df error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Pillai's Trace</td>
<td>.994</td>
<td>6.258E3</td>
<td>2.000</td>
<td>77.000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks' Lambda</td>
<td>.006</td>
<td>6.258E3</td>
<td>2.000</td>
<td>77.000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling's Trace</td>
<td>162.543</td>
<td>6.258E3</td>
<td>2.000</td>
<td>77.000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy's Largest Root</td>
<td>162.543</td>
<td>6.258E3</td>
<td>2.000</td>
<td>77.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

According to Table 6, Pillai-Spur, Wilks-Lambda, Hotelling-Spur, and Roy's Greatroot test has a significance value of 0.000 < 0.05, implying that Ho is rejected and Ha is accepted. One might say that there are significant differences in self-efficacy and self-regulated learning among students who participate in learning using animated video media. It very well may be reasoned that the utilization of animated video media can improve the self-efficacy and self-directed learning of class X high school students.

According to the results, animated video media was effective in increasing students' self-efficacy and self-regulated learning. Previous research has found that the use of animated videos will improve the quality of learning, where the material presented will be clearer and more interesting, and the learning process will be more interactive through clear audio, image and text communication [12]. Using animation can also enhance the learning experience for students. Animation can be conceptualized according to the will of the designer. Things that are
difficult to be packaged directly in front of students can be replaced by translating them using animation [13]. Animated videos were chosen because animated videos can help students not to get bored, which can create an interesting, comfortable and humorous learning atmosphere, while still paying attention to the main aspects of the learning material elements [14].

4 Conclusion

The obtained results show that the animation video media is effective in improving self-efficacy and self-regulation learning through t-test and MANOVA test, showing a significant value of 0.000 ($p \leq 0.05$). The animated video media in this study effectively improved the self-efficacy and self-regulated learning ability of class X high school students.

References

The Development of Student Worksheets Procedure Text Using Virtual Games in Class VII Students of SMP Negeri 1 Tanah Jawa Tp 2021/2022

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Abstract. Efforts to realize independent, creative and innovative learning are the main things behind this research. This study aims to determine the feasibility of LKPD with the use of Virtual Games through the results of expert validation and to determine the response of educators and students to the attractiveness of LKPD with the use of Virtual Games. This research is a type of instructional design development research (Instructional Design) using the ADDIE model. The research results obtained are the feasibility of LKPD with the use of Virtual Games. Based on expert judgment, it is categorized as very feasible, with a very good percentage, with a material validation percentage of 96.25% and a percentage of media experts 94%. Educators and students gave a positive response to the attractiveness of LKPD by using virtual games as learning media, with the percentage of educators responding 98.8%, small group testing 89.09%, and field testing 93.14%. The development of LKPD with the use of virtual games was declared very feasible and received a positive response to be used as a learning medium.

Keywords: Student Worksheets Using Virtual Games, Procedure Text

1 Introduction

Improving human resources (HR) we can start by improving the quality of education. Education must be improved by initiating creative and innovative learning. The 2013 curriculum summarizes the competencies of attitudes, knowledge, and skills in an integrated manner (Kemendikbud, 2013: 72). The 2013 curriculum not only teaches right or wrong, but demands character education that instills good habits so that students are able to understand good and wrong knowledge (cognitive domain), have good skills in the community or in the school environment (cognitive domain), affective), and can do it in everyday life (psychomotor domain).

The process of achieving the cognitive, affective, and psychomotor domains is inseparable from the use of student worksheets (LKPD). Synchronous with what Majid said, (2013: 176) student worksheets (LKPD) are a collection of learning activities and must be completed by students. The
worksheet contains guidelines for learning, activities to complete learning problems written on the worksheet according to the competencies to be achieved. Student worksheets (LKPD) are used to assist students in learning so as to facilitate teachers in teaching and learning activities (KBM) in schools. In line with the above opinion, Prastowo (2015: 204) argues that the student worksheet (LKPD) is learning material in written form in the form of a row of material written on paper, an overview, and directions on learning that must be prepared by students, according to the instructions in the text. Basic competencies (KD) to be achieved.

Procedure text is a text whose purpose is to show teaching about the steps to do something that has been determined. Procedure text means text that signifies a series of actions or steps that are regular and must be carried out to make something desired (Deni Herman Permadi 2014: 70). Procedure text contains an experience of observation and experimentation, procedure text has a thinking structure: title, objectives, list of materials, sequence of stages of implementation, observations, and conclusions. Thus, procedure text means text that contains the purpose of conveying directions and steps in doing or forming something that is presented in a coherent or structured manner.

Game (game) in this study is an educational game in the form of virtual reality (VR). Based on Sahulata, Wahyudi, Wuwungan, and Nayoan (2016), VR is usually presented in a visual experience and can be felt by the user, the form of VR is displayed on a computer. VR can be created as if the person playing it can feel the situation in the game. With this VR-type educational game, students are expected to be able to experience the learning situations contained in the game firsthand, resulting in students gaining new experiences and knowledge. Virtual reality educational games that are designed are limited to two-dimensional forms but are still designed based on real-world learning situations.

Based on the results of observations at SMP Negeri 1 Tanah Jawa Kab. Simalungun, it is known that there are several obstacles regarding learning Indonesian, especially in procedural text material. Constraints faced by teachers include the limitations of teachers in developing LKPD with creative and innovative learning media based on Android. In addition, there are also many students who have difficulty understanding the procedural text material, the teacher is still the center of learning and students are less active.

The obstacles experienced by teachers at SMP Negeri 1 Tanah Jawa in developing LKPD can be seen when researchers see that the LKPD used by teachers has not been developed effectively. It can be seen in the picture below that the worksheets used in schools still use essay questions only and have never used virtual game media.

Given the importance of digital learning in the current era of technological development 4.0, research is needed on "Development of Procedure Text Student Worksheets (LKPD) by Utilizing Virtual Games for Class VII Students of SMP Negeri 1 Tanah Jawa TP. 2021/2022". This research was conducted because the development of procedural text material already exists but has never been accessed through virtual game media at SMP Negeri 1 Tanah Jawa. This research activity is an effort made by researchers to create innovative learning by introducing virtual games so that they can be easily accessed by students through their androids anytime and anywhere.
2 Method

Based on the opinion of Sugiyono (2009: 297), research development or research and development (R&D) is a basic research activity to obtain user needs issues (needs assessment), then continued with development activities to produce products and examine the effectiveness of these products. Development research consists of 2 words, namely research (research) and development (development). The first activity means conducting research and literature studies to form a specific product design, and the second activity is development, namely testing the effectiveness, validation of designs that have been designed, as a result of this research are products that are tested and can be used by the wider community. According to Mulyatiningsih (2012: 161), making a new product is the goal of research and development.

The results of this development research are (1) A Student Worksheet (LKPD) by utilizing Virtual Game for class VII SMP, (2) Assessment of material content and LKPD design by material and design experts as well as questionnaire instrument experts, (3) Teacher response Indonesian language subjects and students on the LKPD that has been made, (4) The learning outcomes of students on the use of LKPD procedural text materials by utilizing Virtual Game class VII SMP.

In this study, LKPD was packaged in an attractive manner and provided a variety of colors and images, used language that was easy to understand so as to make students enthusiastic in reading and studying it, systematically by presenting material in accordance with the students' conceptual understanding abilities. At this stage the researchers developed a product of teaching materials in the form of Student Worksheets (LKPD) by utilizing Virtual Games for class VII SMP.

In developing the procedure text student worksheets by utilizing virtual games for class VII students of SMP Negeri 1 Tanah Jawa, the data needed include (1) a questionnaire on the needs of teachers and students on teaching materials for procedure texts by using virtual games for class VII SMP, (2) a questionnaire validation test of teaching materials and procedural text learning design using virtual games for seventh grade junior high school students, and (3) teacher and student responses questionnaire to procedure text student worksheets using virtual games VII junior high school.

In accordance with some of the opinions above, we can conclude that research and development (R&D) is a research model with the aim of making a product with the process starting with observing needs and then continuing with making a product that is tested. The products of this research include: media, learning materials, and learning systems. Product development in this research is product development in the form of student worksheets (LKPD) by utilizing virtual game media. The research development model in this study is the ADDIE model.

The data analysis technique in this study used descriptive qualitative analysis, namely through data exposure and data conclusions. This technique is used to obtain and analyze three data, namely (1) data on the needs of students and teachers for procedure text worksheets using virtual games, (2) analysis of expert lecturer validation test data to improve product design and procedural text worksheets using virtual games. for seventh grade students of SMP Negeri 1 Tanah Jawa, and (3) student learning outcomes tests (pre-test and post-test).
Each phase in the ADDIE model is interrelated and interacts with each other, the analysis phase is the most important phase, then refined by evaluation. To answer the formulation of the problem, the researcher will use the five stages of the research.

1. Analysis

The first stage in this development research is the analysis stage, at this stage the researcher analyzes the need for developing procedure text worksheets using virtual games and also analyzes the feasibility and requirements for developing the product.

2. Design

The second stage is the initial product design (design), which is a product design activity as needed.

3. Development

The third stage is the product development stage, at this stage the researcher realizes the product design, LKPD procedure text with the use of virtual games, then carries out product testing through validation tests by experts and responses from the teachers concerned.

<table>
<thead>
<tr>
<th>Validation Assessment Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentase</td>
</tr>
<tr>
<td>81%-100%</td>
</tr>
<tr>
<td>61%-80%</td>
</tr>
<tr>
<td>41%-60%</td>
</tr>
<tr>
<td>21%-40%</td>
</tr>
<tr>
<td>0%-20%</td>
</tr>
</tbody>
</table>

4. Implementation

The fourth stage is the product implementation stage (implementation), after the procedure text LKPD with the use of virtual games through a validation test by experts, the procedure text LKPD with the use of virtual games is tested on students to be able to find out the students' responses about the procedure text LKPD with the use of virtual games which has been developed.

5. Evaluation

Then the final stage is the product evaluation stage (evaluation), at this stage the product is evaluated as a form of revision of the results of student trials. If in the field trial there are still deficiencies, it is necessary to carry out an evaluation stage, where the researcher makes improvements to the procedure text LKPD by using the developed virtual game. The final product of this development research is the development of a procedure text student worksheet (LKPD) using virtual games to train students' conceptual understanding.
3 Results and Discussion

The material expert validator provides an assessment based on the questionnaire that has been provided. Several aspects that become an assessment of the LKPD with the use of virtual games are (1) the aspect of the feasibility of the content/material. The aspect of the feasibility of the content/materials in the LKPD obtained an average score of 97% with the criteria of "very good". (2) the aspect of presentation feasibility. The presentation feasibility aspect of the developed LKPD obtained an average score of 97% with the criteria of "very good". (3) aspects of language feasibility. The aspect of language feasibility in the LKPD obtained an average score of 97% with the criteria of "very good" and (4) the suitability aspect of teaching materials with the theme of procedure text by utilizing virtual games obtained an average score of 94% with the criteria of "very good". Based on the discussion on the validation of the material as a whole, it is explained that the LKPD procedure text with the use of virtual games is declared feasible to be used or applied in learning even with minor revisions/rules.

Design validators provide input and comments on the developed teaching materials. As for some inputs and comments from design expert validators, namely (1) the color of the LKPD cover was changed, (2) the introduction page should not be too empty, (3) the LKPD title circle was changed, (4) the concept map was colored to make it attractive. The assessment carried out by design experts on the graphic aspect obtained an average score of 96% with the criteria of "very good". Furthermore, the design assessment was based on the aspect of the suitability of the procedure text with the use of virtual games with an average score of 92% with the criteria of "very good". Based on the discussion on design validation as a whole, it is explained that the LKPD with the use of virtual games for class VII students of SMP Negeri 1 Tanah Jawa is declared feasible to be used in the learning process with revisions.

Based on the results of the data on the responses of the Indonesian language teacher to Mrs. Klara Parhusip, S. Pd and Mrs. Henisa Nainggolan, S.Pd at SMP Negeri 1 Tanah Jawa, the score based on the fable text material indicators obtained an average of 98.8% with the "very good" criteria, the assessment based on the attractiveness indicator obtained an average score of 98% with the "very good" criteria and the assessment based on the language indicator obtained an average score of 99% with the "very good" criteria. Based on the data from the responses of the subject teachers, the LKPD with the use of virtual games is declared suitable for use in the learning process with an average score of 98.1 % with the criteria of "very good".

The test results of all indicators show that (1) in the individual trial as many as 3 students obtained the total average percentage was 88.10% with the category "very good". (2) a small group trial of 9 students obtained a total average percentage of 89.09% in the "very good" category. (3) a limited field trial of 32 students obtained a total average percentage of 93.14% in the "very good" category. The test results on students as a whole explained that the LKPD with the use of virtual games for class VII students of SMP Negeri 1 Tanah Jawa was declared eligible to be used as additional teaching materials or supporting teaching materials in learning Indonesian subjects.

At the pretest (before using the LKPD with the use of virtual games) students obtained an average score of 69.91, while at the posttest (after using the LKPD with the use of virtual games) the average
score was 84.38. This means that there is an increase in student learning outcomes before and after using the canva-shaped fable text module by 14.47. The increase in test results is evidence that the developed LKPD can have a positive impact on student learning outcomes, especially in procedural text material.

Based on the results of the gain test conducted on 32 students of class VII SMP Negeri 1 Tanah Java, it can be seen that as many as 5 students (15.63%) showed high effectiveness criteria, as many as 27 students (84.37%) showed effectiveness currently. While the average gain index gain is 0.48 with moderate effectiveness criteria. So, it can be concluded that the LKPD using virtual games is used by students in class VII SMP Negeri 1 Tanah Java.

4 Conclusion

The conclusions that can be drawn from this development research are as follows: The feasibility of the procedure text worksheet with the use of virtual games based on the assessment of material experts reached an average percentage of 94% with very decent interpretation criteria and media experts gave an average percentage of 92% with very feasible criteria. The level of attractiveness of the procedure text worksheet with the use of virtual games based on the teacher's response is 98.8% with very interesting criteria. The level of attractiveness based on the responses of SMP/MTs students in both small group trials and field tests got very interesting interpretations with percentages of 88.10% and 89.09%. This shows that the LKPD developed is very attractive to educators and students, so it can be used as one of the supporting media in learning.

Suggestions

Suggestions for use. The researcher hopes that the results of the study in the form of procedure text worksheets with the use of virtual games can be used in the learning process in schools so that the quality of the worksheets as a whole becomes more useful.

Implementation suggestions. The researcher hopes that the procedural text LKPD product with the use of virtual games can be implemented to train students' conceptual understanding, because this LKPD contains evaluation questions that are adjusted to indicators of concept understanding.

Suggestion for further product development. It is hoped that the procedure text worksheets with the use of virtual games that were developed this time will be redeveloped not only on procedural text materials, but can be developed on other materials.

References


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Abstract. The current state of education in Indonesia is still a gap between the skills and the competencies required by the market. STEM-based learning is expected to be a reform of education that can improve the excellence individual in the era of technology and information. The aim of investigation is to obtain authentic and appropriate STEM-PjBL-based chemistry practicum guidebook for class XI according to the BSNP standard, to find out the improvement of student learning results and impact of learners science process competence using the developed practicum guide. This investigation utilizes the R&D method with the ADDIE development model. The data were analyzed utilizing the normality check, homogeneity check, hypothesis check with the independent sample T-check, and N-gain check. The output indicated that the developed STEM-PjBL-based chemistry practicum guidebook was categorized as valid and suitable to support the chemistry learning in schools.

Keywords: Chemistry practicum guide, STEM, Project Based Learning (PjBL), Science Process Skills (KPS), learning outcomes, ADDIE.

1 Introduction

Practical activities affect chemistry learning where students will demonstrate and be challenged in understanding or proving a chemical concept. Currently, chemistry learning has been accompanied by practical activities in 2013 curriculum. However, the improvement in student learning outcomes is still limited to knowledge competence, has not been able to help students to learn actively and creatively so that the competence of students' attitudes and skills is still low [1].

According to Puspita [2], science process skills can help students to have direct experience of a surrounding phenomenon and change perceptions about important things into something meaningful, involving cognitive or intellectual skills, manuals, and social skills. Practicum standard guidelines according to BSNP are very much needed by students to get an overview of the objectives, benefits and processes of practicum activities to be carried out [3]. A good
practicum guide must be arranged systematically, attractively, clearly, and can be used by students independently at any time according to their needs [1].

Based on the results of observations on the implementation of practicum in schools where chemistry learning is accompanied by practicum, but only on certain materials that are adapted to the tools and materials available in the laboratory, there is no chemistry practicum guide, and there are no laboratory personnel with special expertise in their fields. So far, the value of students' cognitive learning outcomes in practicum-based learning has increased, but affective and psychomotor assessments are still low, it is necessary to develop an innovative chemistry practicum guide that meets the standards of the National Education Standards Agency (BSNP) [4,5]. It can direct students to perform the correct procedure and increase students' critical thinking power [6].

The application of science process competence in chemistry literature is very necessary because students have different potentials and the teacher's task is to provide convenience to students by creating a conducive environment so that all participants can develop their potential optimally [7]. The aim of investigation is to obtain a valid and appropriate STEM-PjBL-based chemistry practicum guidebook for class XI according to the BSNP standard, to find out the advancement of graduate training result and impact of graduate science process competence untilizing the developed practical guide.

2 Methods

The investigation utilize a Research and Development (R&D) advance with the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). These steps include (1) Analysis (inspect the properness of existing practicum guide books), (2) Design (compassionate and assortment the basic amount or amount design of STEM-based chemistry practical guide books), (3) development (developing a product design for a STEM-based chemistry practical guide book), (4) Implementation (using a STEM-based chemistry practicum guide developed in classroom learning), (5) Evaluation (measuring the feasibility and effectiveness of the product in developing graduate training result).

The population in the investigation were all learners of class XI IPA MAN Insan Cendekia Aceh Timur. The sample in the investigation were 2 students of class XI which were divided into a control class and an experimental class using purposive sampling. The validators in this study are chemistry lecturers and teachers who have a minimum qualification of a bachelor's degree (S1) and are actively involved in the laboratory. The device was utilized to accumulate data with the ratify sheet and a properness survey be based the BSNP criteria and an objective check of training results. Then the data were analyzed descriptively based on the average score of training results. Then, the presumed statistical check was enforced with a t-check, starting with the prerequisite test, namely the normality check and homogeneity check.

3 Results and discussion

STEM is an combination between four concepts, namely science, technology, engineering, and mathematics in an integrative advance and is enforced based on absolute-world contexts
and problem-based learning [8]. STEM learning includes demanding intelligent, analysis, and concert processes in which students integrate processes and concepts in real-world contexts from science, technology, engineering, and mathematics [10]. The Characteristics of STEM Learning are Increase students' ability to design designs, Guide students in solving problems, Increase students' sensitivity to real-world issues, Involving students in inquiry learning, Give students the opportunity to express their opinions, Guide students to apply STEM understanding, and Engaging students in productive group work.

3.1 Feasibility analysis of the practical guide

The investigation begins with reasoning of the practicum guides used in schools today to regulate the properness of the practicum guides circulating in schools and the STEM-PjBL-based chemistry practical guides that have been developed. The questionnaire utilized to regulate the properness of the advanced practicum guide is the BSNP (National Education Standards Agency) survey with 4 eligibility criteria, namely content properness, language properness, presentation properness, and graphic properness [11]. The average value of each aspect will indicate the level of validity of the advanced practicum guide. Properness analysis of practicum guidelines currently used in schools. The data obtained from the analysis of the guidebooks used in schools to support the current practicum can be book A (properness of content = 1.78, properness of language = 3, properness of presentation 2.33, and feasibility of graphics = 2.5), while book B (properness of content = 1.91, language properness = 3.33, presentation properness =2.22, and graphic properness = 2.4). So that the average feasibility of the guidelines used in schools is obtained a score of 2.397 which is included in the less valid category and needs to be revised. The eligibility criteria are based on a feasibility analysis instrument according to the BSNP standard [13].

3.2 Design of a STEM-PjBL-based chemistry practicum guide

Analysis of the suitability of learning competencies (KI & KD) with the syllabus and analysis of the titles of practical substance and learning models that can be utilize for developing practical guides in further research. The following are the results of the analysis of learning competencies as well as the adjustment of models and materials that will be developed in the design of the STEM-PjBL-based chemistry practicum guide in table 1.

Table 1. Analysis of learning competencies and developed design of practicum guidelines

<table>
<thead>
<tr>
<th>KD</th>
<th>Subject Matter</th>
<th>Indicators of Competence Achievement</th>
<th>Developed design of practicum</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.10</td>
<td>Acid-Base Solution</td>
<td>Make acid-base indicators from natural materials</td>
<td>Make the natural indicator materials</td>
</tr>
<tr>
<td>4.11</td>
<td>Ionic Equilibrium in a salt solution</td>
<td>Predict the pH of a saline solution with and report the result</td>
<td>Preparation of calcium acetate salt</td>
</tr>
<tr>
<td>4.12</td>
<td>Buffer Solution</td>
<td>make a buffer solution with a certain Ph</td>
<td>Preparation of buffer solutions for plants</td>
</tr>
<tr>
<td>4.13</td>
<td>Titration</td>
<td>Carry out acid-base titration experiments and report experimental results</td>
<td>Calculating the concentration of acid-base titration</td>
</tr>
<tr>
<td>4.14</td>
<td>Colloid</td>
<td>Make products with colloidal principles</td>
<td>Preparation of a dish soap from natural ingredients</td>
</tr>
</tbody>
</table>
Be based on the results of the analysis, it is acknowledged that every basic knowledge competency (KD.3) in chemistry learning is always accompanied by a basic skill competency (KD.4). In addition, chemistry is also a study of microscopic science that requires various models, methods and learning media so that the delivery of material can be carried out optimally to students [14]. Therefore, chemistry tutors are reinforced to always be ingenious and contemporary in designing active and innovative teaching and learning processes to increase students’ motivation and learning outcomes in chemistry, both in the cognitive, affective and psychomotor domains [8].

3.3 Development of a STEM-PjBL-based chemistry practicum guide

The practicum guide advanced consists of 5 experiments, according to the basic competencies of skills contained in the syllabus. The practicum guide components developed include: (1) the identity of the experiment in the form of core competencies and basic competencies; (2) indicators; (3) laboratory rules; (4) work safety guidelines; (5) Chemical laboratory equipment, containing pictures and their uses; (6) practical material; (7) the format for writing reports and assessments; (8) Bibliography; (9) Glossary; (10) Periodic Table of Elements.

The validation of the feasibility of the chemistry practicum guide advanced was imposed by two chemistry teachers from the school where the research was conducted and two chemistry lecturers from Medan State University. The feasibility level of the STEM-PjBL-based chemistry practicum guide developed is described in Figure 1 as follows:

The results of the validation carried out by chemistry teachers and lecturers on the STEM-PjBL-based chemistry practical guide book that was advanced showed an average result of 3.5, which means that the criteria are very suitable to be used. The results of the feasibility of the development were tested with the BSNP feasibility standard, it was found that the category was suitable for use and did not need to be revised.

3.4 Implementation of a STEM-PjBL-based chemistry practicum guide

The implementation of the STEM-PjBL-based chemistry practical guide that was developed was carried out in 2 groups of classes, namely the authority class and the preliminary class. The STEM-PjBL-based chemistry lab guide that was developed was used in the preliminary class, while the authority class used a chemistry guide commonly used in schools. The recapitulation of the pretest and posttest output in both classes can be seen in the Figure 2.
From these data it can be seen that there is a difference in the average value between the two classes, with the lowest posttest score being in the au class. It can be concluded that there is an increase in student learning result after being applied using the advanced chemistry practicum guide. The output of the normality and homogeneity check of all data showed that all the data obtained were normally distributed and homogeneous with the value of $t_{\text{count}} < t_{\text{table}}$.

### 3.5 Evaluation

Independent test was conducted to see the improvement or difference in learning result. The results obtained showed that the data in the experimental class got a significant value of 0.01 and $t_{\text{count}} = 2.838$ with the conclusion that there were differences in the experimental class and authority class. This shows that learning using a STEM-PjBL-based chemistry practical guide advanced on acid-base solution material is more able to improve graduate learning output compared to the use of a practical guide book used by students on the same material. The difference in learning activities in the preliminary class and the authority class can be seen in Figure 3 below:

The Figure 3a. shows the situation of authority class, the students are accustomed to doing practicum in accordance with the detailed procedures provided so that students can work actively but are less creative in conveying what they have learned. Whereas in the Figure 3b. which is the preliminary class that uses a STEM-PjBL-based practicum guide, students can work actively and creatively because the practicum instructions given are limited to general steps but require students to get more literature, prepare, and estimate the final results that can
be achieved. In addition, the use of natural ingredients also stimulates students’ curiosity to try again with different materials and procedures.

Science Process Competence are the overall directed scientific skills used to find facts, concepts, or theories. This ability will make students have direct experience of a phenomenon around them and change the perception of important things into something meaningful [2]. Therefore, the teacher acts as a facilitator who can create student learning conditions through the implementation of fun learning activities with a variety of sequential activities according to the indicators listed so that students understand a learning not only on the results but accompanied by the process [13]. Both of classes showed an increase in learners' science process competence, but in the preliminary class the increase was higher than in the authority class.

The comparison of the average value of the science process competence of learners in the two classes shows that the components that have been integrated into the STEM-PjBL-based chemistry practicum guide can make students more active in carrying out the practicum. the average value obtained in the preliminary class is 80.14 while in the authority class is 75. the magnitude of the role of science process skills on student learning results in the preliminary class that uses a STEM-PjBL-based chemistry practicum guide is 48% and the pausing 52% is determined by by other factors.

4 Conclusion

Based on the results and discussion of the investigation described, it can be defined: (1) The STEM-PjBL-based practicum guide that has been advanced appearance an average value of 3.5 which is included in the category convinient for apply in chemistry learning and does not need to be revised; (2) the effectiveness test shows that the learning results learners of s who are taught with a STEM-PjBL-based practicum guide are better than learner who are taught with a chemistry practicum guide commonly used in schools; (3) The results of the validation and effectiveness of improving learning outcomes indicate that the STEM-PjBL-based practicum guide advanced is feasible to be applied as a training medium for high school learners.

Acknowledgement. The author would like to thanks Dr. Ajat Sudrajat, M.Si, and Dr. techn. Marini Damanik, M.Si. who have agreed to become expert validators. The authors also thank the principal and chemistry teacher of MAN Insan Cendekia Aceh Timur for their participation in this study.

References


Development of Sharia Economy E-Module Contextual Based on Student Economic Science Study Program Medan State University T.P 2021/2022

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Abstract. This study aims to determine the feasibility and effectiveness of contextual-based Islamic economics e-modules for Medan State University students. Furthermore, based on the results of the feasibility of material expert validation for e-modules, namely 86.67% in the very valid category and 81.67% media expert validation in the very valid category and 83.33% design expert validation in the very valid category. In addition, based on the results of individual trials, small groups, and field tests are very valid and the results of the t test where the value of sig 2 tailed is 0.00 < 0.05 in this case there are differences in learning outcomes before and after being given treatment. So it can be concluded that contextual-based Islamic economics e-modules for students of the Medan State University economic study program are feasible and effective to be used as teaching materials or student learning resources.

Keywords: E-Module Development, Sharia Economics, Contextual Based, Sigil

1 Introduction

Education is an important component in life, especially in the era of the industrial revolution 4.0, education is increasingly advanced and growing rapidly. Many things are marked by the progress of the system, including learning that is starting to be sophisticated, effective and efficient. Learning is also the most important thing to support the knowledge of students where in this case to support the learning system an entity is needed, both the quality of educators and students, including the teaching materials. One of the supporters of varied learning in the current era is to have technology-based teaching materials, such as e-modules, electronic books, and others.

This is a challenge and a demand that is felt in this era of globalization through the advancement of technology in the world of education. Educators are required to be able to follow developments in this technological era. According to Medina Azizah (2020:
48) the advancement of technology cannot be avoided from life because the advancement of technology coincides with the advancement of a science.

An effective step to overcome the challenges of increasingly sophisticated technological developments, especially in the world of education, is that educators must be able to manage and utilize technology in learning. Educators must prepare efforts to increase competence and ability in managing electronic-based teaching materials, one of which is with the help of sigil software. The use of sigil software in the manufacture of materials can be adapted to changing ways of working in the technological era, in this case, requires maximizing teaching materials for learning. Teaching materials are part of a learning support device that can stimulate students' interest in learning. Kirana (2020: 82) explains teaching materials as learning resources needed by students and teachers who become tools in teaching. Anna Elvarita (2020:2) explains that teaching materials must be made according to the instructional rules and used in the learning process according to the students' circumstances and the learning strategies of the lecturers.

From the results of interviews with lecturers who teach Islamic economics courses, it is known that the facilities in the implementation of learning in the Economics Study Program only rely on books and journals as a means of supporting learning. As well as learning methods modeled lectures, discussions and questions and answers. And student learning outcomes in Islamic economics courses, obtained in the 2019/2020 FY, are said to be good. It is known that 25.5% got a very good score and 68.25% got a good score and 6.25% got a bad score. Although the average student is categorized as good, but it must be improved again so that it is more optimal. To maintain and improve learning outcomes for the better, there is a need for learning innovations including varied teaching materials to increase the quality of student learning outcomes. According to Novianti (2016: 4), teaching materials play an important role in determining learning outcomes. Furthermore, Rahmawati (2020:108) explains that teaching materials can motivate students' desires in the current era of globalization using interactive teaching materials.

On the other hand, based on observations that researchers found in the field, students of the Medan State University Economics Study Program found it difficult to follow Islamic economics subjects. This is based on the heterogeneity/diversity of beliefs or beliefs held by students. The data on the diversity of beliefs held by Economics Study Program students in 2018-2020 are:
Furthermore, to add the effectiveness of student learning to student learning in Islamic economics courses, a learning model is needed in order to increase student success which is not only from the teacher or curriculum but also from the learning method. This method provides demands for students according to their cognitive, affective and psychomotor development. Learning activity can be seen in students' activities while studying, namely: visual and verbal activities, listening activities, writing, drawing, motor activities, mental activities, emotional activities (Sardirman, 2007). Dimyati and Mudjiono (2006: 114) explain effectiveness as something that has an important role in each learning process. A learning model that makes students active, independent, responsible, has the initiative to recognize the need for learning resources, and implements skills and knowledge for life, namely the contextual learning model. According to Nanik Rubiyanto, the contextual learning model (2010: 72) is the concept of learning to make it easier for teachers to convey material in real situations and make students associate their knowledge with daily application. Research GAP researchers on previous research found that there is research explaining scientific-based learning models are more significant on student learning outcomes compared to contextual-based learning models (Taufiq Akbar Tanjung, 2017: 47). Based on the description of this problem, the author will develop a module by applying a learning model to the e-module, namely contextual teaching and learning. The following research is entitled: “Development of Contextual-Based Islamic Economics E-Module on Students of the Economics Study Program, State University of Medan T.P. 2021/2022”.

2 Research Results & Discussion

This research is Research and Development (R & D). The development model used refers to the ADDIE model which consists of 5 stages, namely analysis, design, development,
implementation and evaluation. In the ADDIE model, the first stage is performance analysis and needs analysis stage. After knowing the needs, then proceed to the second stage, namely design. The design made is expected to be able to answer whether the learning program that will be designed can overcome problems at the analysis stage. The third stage is the development stage, in which research will develop teaching materials according to the needs of students. The fourth stage is the implementation stage, namely the application or trial of the teaching materials that have been developed. The fifth stage is the evaluation stage, assessing whether teaching materials have met the quality of a product that is valid, practical and has a potential effect (Resmawan, 2020:5). Furthermore, the learning tools that will be developed in this research are in the form of Islamic Economics Learning E-Module on the material of fiscal policy in Islam, monetary policy in Islam and Islamic financial institutions.

3 Research results & discussion

This research was conducted at the State University of Medan, Faculty of Economics, Study Program of Economics. The following research is a development research with the ADDIE model. The research product is the Contextual-Based Islamic Economics E-Modul. In the e-module development stage, it is validated and revised by a team of experts and the assessment of lecturers who support Islamic economics courses. Next, individual trials, small group trials and field trials were carried out.

Analysis

The analysis phase aims to get an initial picture related to the information on the learning process experienced by the research sample. The next stage is the analysis by interviewing the lecturer. This interview will make it easier for researchers to develop their products. From the results of interviews with lecturers who teach Islamic economics courses, it is revealed that they are not familiar with the sigil application and this is something new to hear considering that during the learning process they always use printed teaching materials and in this case require an e-module of Islamic economics with the help of the sigil application in the learning process. Students also stated that they did not understand the sigil application, and explained if they needed an e-module with the help of the sigil application for learning. Because students need e-modules which can be accessed using Android or laptops where their use can be accessed either online or offline and as part of other learning resources in introductory courses in Islamic economics.

Design

The next stage in the development procedure of the ADDIE model is the design stage, this design stage includes the creation of contextual-based e-modules with the help of monetary policy materials in Islam, fiscal policy in Islam and Islamic financial institutions. This stage is carried out so that the e-module that develops maximum results with the following preparations:
Fig. 2. Display of e-module creation using the sigil application

Development

The development stage is an advanced stage of the design that is formed to become a product. The product must be validated so that the product is suitable for use, validation from validators and lecturers in Islamic economics courses. The assessment is in the form of suggestions that become provisions in product revisions. Furthermore, validation of the development of contextual-based sharia economic e-modules is one of the steps used to validate a product. Validation is carried out by validators who have expertise in the field of the product being developed.

Implementation

Implementation as a stage before the contextual-based sharia economic e-module is properly revised. The implementation was carried out in the Economics Study Program, Faculty of Economics, UNIMED with individual trials conducted by 5 students, small group trials conducted by 10 students, and field trials on Economics class B students found 35 students.

Evaluation

The evaluation stage is carried out at each stage of the e-module development by researchers in order to obtain responses and inputs and then the e-module revision is carried out. At the development stage, evaluations related to the development of contextual-based sharia economic e-modules were carried out. Furthermore, the evaluation of the implementation stage of the contextual-based Islamic economics e-module in this case the results of the e-module trial developed for students of the Economics Study Program UNIMED. The evaluation was carried out in order to obtain student responses and learning outcomes after using contextual-based sharia economic e-modules with the help of the sigil application which aims to determine the practicality and effectiveness of the developed modules.
4 Results and Discussion

This study a e-module development using the ADDIE model. The research began with direct observation to UNIMED, namely by interviewing lecturers who teach Islamic economics courses and students of the Economics Study Program, State University of Medan. From the interview, it is known that the development of contextual-based Islamic economic e-modules has never been implemented and is in accordance with the ADDIE model, namely the analysis, the researchers analyze if contextual-based Islamic economics e-modules are needed in the Economics Study Program, State University of Medan. After getting an overview of the learning process of Islamic economics in the Economics Study Program, State University of Medan, the researcher continued his research step, namely designing an e-module for learning Islamic economics. Research related to the material of fiscal policy according to the Islamic view, Islamic monetary policy and Islamic financial institutions is one of the main topics of discussion in the e-module. In terms of media, the module was created using the Sigil application.

The next stage is the development of sharia economic e-modules, namely text, images, and videos. The initial e-module product was tested for evaluation and to obtain complete data for the material to revise the e-module. Aspects that are subject to revision are media feasibility, material presentation, and e-module design in order to obtain products that can be used by students of economics study programs on fiscal policy in Islam, monetary policy in Islam, and Islamic financial institutions. The design stage is expected to answer the learning program designed to complete the analysis stage. The third stage is developing e-modules based on student needs. The fourth stage is implementing the developed product. And the fifth stage is evaluating whether the product is valid, practical, and has potential.

The development of contextual-based sharia economics e-modules for students of the UNIMED economics study program, based on the evaluation of the validators as follows:

1. The results of the feasibility carried out by material expert validation, namely "very valid" in this case can be seen based on 4 aspects of the category which include material clarity, material quality, presentation of material content, presentation of self-evaluation. The results of the assessment of the four aspects were declared "very valid" with an average percentage of 86.67%.

2. The results of the feasibility by the media expert validator are "very valid" which can basically be seen based on 6 aspects, namely aspects of media benefits, general appearance, media interactivity, media presentation, media design, media roles. Furthermore, it can be seen that the assessment of the six aspects is declared "very valid" with an average percentage of 81.67%.

3. The results of the validation of the design expert are declared "very valid". The assessment was carried out in terms of aspects of the feasibility of content, presentation, and graphics with the results of "very valid" amounting to 83.33%.

4. The results of the assessment by lecturers who support Islamic economics courses on contextual-based Islamic economics e-modules, namely "very good" amounted to 94.11%.
5. In addition, based on the results of the assessment, student trials were carried out through 3 processes, namely individual trials, small group trials, and field trials. The individual trial results obtained are "very good" which has a value of 92.78%. Meanwhile, it can be seen from the results of the small group trial that it has a "very good" value with a percentage of 91.67%. and for obtaining the results of field trials, namely "very good" the funds have a percentage rate of 91.11%.

Based on the conclusion of the study, it is explained that the e-module developed is "feasible" because we can know that the assessment from the expert team is categorized as "very valid". Meanwhile, the test results on students and lecturers were categorized as "very good". This is in line with research conducted by Rifki Risma, et al (2019: 201) the development of Sigil software e-module teaching materials that are developed and suitable for use can improve student learning outcomes with a percentage value of 92.85% in the very good category. According to Silvi Andryani (2020) where contextual-based modules are categorized as valid with the results of media expert validation, namely 75%, material experts 80%, practical criteria from educator response questionnaires 82%, student responses 88.88%. So, it is concluded that the developed e-module is categorized as feasible to use. Furthermore, based on the post-test results of students who became research samples on the concept of fiscal policy in Islam, Islamic monetary policy systems and Islamic financial institutions using contextual-based Islamic economic e-modules with the help of the sigil application. as for the post-test data on student learning outcomes as follows:

**Table 1.** Data table of student posttest score results

<table>
<thead>
<tr>
<th>Class</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Highest Score</th>
<th>Lowest Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment Class (Ilmu Ekonomi B)</td>
<td>87.00</td>
<td>7.75</td>
<td>95</td>
<td>75</td>
</tr>
<tr>
<td>Control Class (Ilmu Ekonomi C)</td>
<td>73.14</td>
<td>6.77</td>
<td>85</td>
<td>60</td>
</tr>
</tbody>
</table>

Based on the learning outcomes of experimental and control class students, it can be seen that the average score of students after using the e-module has a difference in the value of learning outcomes where experimental class students are higher at 87.00, then the control class gets a score of 73.14.

Then based on the test of two average differences on the learning outcomes of the experimental class and the control class as follows:
Table 2. Tables experimental and control class t test results

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Levene’s Test for Equality of Variances</th>
<th>F</th>
<th>Sig.</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td>1.997</td>
<td>.162</td>
<td>9.092</td>
<td>68</td>
<td>.000</td>
<td>13.857</td>
<td>1.524</td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td></td>
<td>9.092</td>
<td>66.288</td>
<td>.000</td>
<td>13.857</td>
<td>1.524</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the independent sample T-Test above, a significance value of 0.000 < 0.05 was obtained, then Ho was rejected and Ha, then the conclusion was that if there was a difference in the learning outcomes of the experimental class with Islamic economics e-module assisted by the sigil application and the control class without using e-module. -Islamic economics module with the help of the sigil application.

The difference in student learning outcomes can be concluded if the contextual-based Islamic economics e-module with the help of the sigil application is "effective" in Islamic economic learning to increase student output or learning outcomes which can be seen in terms of t-test where the significance value is 0.000 < 0.005. Mujanip Alperi (2019:7) explains the role of effective digital sigil books to facilitate student learning in the millennial era where the learning system uses a lot of digital, in this case it can help students carry out learning more interestingly and motivate them to learn. independent both when there is a teacher and when there is no teacher. Dwi Rayana Siregar (in Novianti, 2016:4) explains that teaching materials play an important role in learning outcomes. According to Dwiyanti Wuri (2019: 87) it is known that the significance level of the t test is 0.000 < 0.05, in conclusion the effectiveness of using e-modules assisted by sigil applications on body care learning materials is 80.46% while the learning outcomes of group students without e-modules are 71.72%. So there is a significant difference in the experimental class and the control class.

Conclusion

Based on the experts, where the material aspects of the contextual-based Islamic economics e-module are very valid with a percentage value of 86.7%. For e-module development media, it has a percentage value of 81.70%, which is very valid. Meanwhile, the learning design has a percentage of 81%, namely the very valid category. So it can be concluded that the contextual-based Islamic economics e-module is feasible to be used as teaching material.

Based on the results of the post-test experimental and control classes where the results of individual trials on 3 students had an average score of 92.78% categorized as very good. The results of the small group trial on 9 students had an average score of 91.67% categorized as very good. And the results of field trials on 35 students had an average score of 91.11% categorized...
as very good. Furthermore, based on the results of the independent sample t-test analysis, it was found that sig.2-tailed > = 0.05 then Ho was rejected and Ha was accepted, so that there were differences in learning outcomes before and after being given treatment with contextual-based Islamic economics e-modules. Thus, this e-module is effective for learning, where the results of the effectiveness of the Islamic economics e-module on the average value of the experimental class students, which is 87.00%, then the control class gets a score of 73.14%.

References

[21] Sigil. version 9.1.2
Development of Android-Based Mobile Learning Economic Learning Media with Problem Based Learning (PBL) Flows to Improve Learning Outcomes of High School Students at Negeri 2 Binjai Academic Year 2021/2022

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Abstract. The product of this development research is an Android-Based Mobile Learning learning media with Problem Based Learning (PBL) flow to improve student economic learning outcomes. The problem of this research is the low learning outcomes of students at SMA Negeri 2 Binjai. In theory, many influencing factors include still using the usual learning media during the Covid-19 pandemic. This research is a learning media development research using the ADDIE development model which has 5 stages. The data in the study is in the form of learning outcomes with the average during the Covid-19 pandemic year from 2020-2022. This study aims to develop learning media that are more practical and effective for students to use with smartphones. The research design used (ADDIE), the test subjects in this study were students of XI IS SMA Negeri 2 Binjai FY 2021/2022.

Keywords: Learning Media, Mobile Learning, Learning Outcomes, Covid-19, Based on Android, SMA Negeri 2 Binjai

1 Introduction

Economics is one of the important subjects for high school students, especially for students who take the field of social sciences. In economics, one aspect of the assessment that is tested to determine student understanding is the cognitive aspect by looking at student learning outcomes. Learning outcomes can be determined by quality learning activities and of course students are able to absorb the learning. The following table data from student learning outcomes,
Table 1. data from student learning outcomes

<table>
<thead>
<tr>
<th>NO</th>
<th>YEAR</th>
<th>KKM LEARNING RESULTS</th>
<th>SEMESTER</th>
<th>AVERAGE RESULT CLASS X-1 - XI IS 1</th>
<th>AVERAGE RESULTS FOR CLASS X-1 - XI IS 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2020</td>
<td>80 -100</td>
<td>ODD</td>
<td>81.40</td>
<td>82.4</td>
</tr>
<tr>
<td>2</td>
<td>2021</td>
<td>80 -100</td>
<td>EVEN</td>
<td>78.9</td>
<td>79.4</td>
</tr>
<tr>
<td>3</td>
<td>2021</td>
<td>80 -100</td>
<td>ODD</td>
<td>79.4</td>
<td>80.1</td>
</tr>
</tbody>
</table>

From the data above, it is necessary to change the learning media. The teacher has provided a lot of material to students during learning with the Google Classroom (GCR) application and the Whatsapp application. When learning with this application, students tend to be constrained by networks, quotas and learning media that cannot be used offline. So students are only active when the teacher explains on Google Meet after being given assignments and additional material students tend not to open when they are ready to go online. This causes learning outcomes to tend to be low because students do not tend to use learning media appropriately.

Based on interviews with teachers of economics subjects, they asked for an analysis of learning media needs and an analysis of teaching media used online in the development of Mobile Learning learning media. The teacher gives an opinion on the need for learning media to be with technology that can be used with smartphones so that it makes interactive learning media. For the analysis of teaching media, it is necessary to use materials, summaries, syllabus, lesson plans and learning models that can be applied directly to the program. So that teachers can easily apply directly to students.

Teachers can apply learning using Mobile Learning media which has been developed to support the learning process during the Covid-19 pandemic. As Suratman, et al (2021:2382) "that the pandemic has changed the learning system in high schools so that technology with learning media can be used to overcome this". Applications that are still often used online are Google Classroom, Google Meet, Zoom and Whatsapp Group. This application has been widely used but the effect has not yet reached the independent learning process for students. Google Meet is most often used by being able to accommodate up to 250 video conference accounts for video communication.

Mobile Learning With this PBL flow will be made in the learning process with Mobile Learning with a syntax that will be adapted to the learning material. It is hoped that student learning outcomes can increase and the teacher becomes a reference that Mobile Learning can be a place for teacher creativity in presenting learning material with the concept of a smartphone. Learning with Mobile Learning media with PBL flow The above can be a solution for teachers in maximizing the learning process according to the current needs of students. Mobile Learning learning media is a learning media that utilizes the support of internet technology. In Mobile Learning, the teacher does not just upload learning materials that can be accessed online and offline by students, but the teacher also evaluates, establishes communication, collaborates and manages other aspects of learning. Mobile Learning is an
effective learning process that is produced by combining digital delivery of material consisting of support and services in learning.

Learning using *Mobile Learning* with the PBL model can be used as a variation of learning that can reduce student boredom and can stimulate critical thinking skills and independent learning so that students are interested in being active in understanding and solving problems related to the material being studied. With the application of Android-based *Mobile Learning*, it can foster students' attention to learning outcomes, can provide interesting and challenging learning materials for students, can use appropriate and interesting learning aids, and can create a comfortable and fun learning atmosphere for students.

With the above problem that the use of *Mobile Learning* media by utilizing *smartphones*, can be done as an effort to overcome student learning difficulties which are related with the level of cognitive learning outcomes to be achieved by these students. Because by using *Mobile Learning media*, students will be more interested in learning and in addition to using the media the students students can learn anytime and anywhere without having to carry many textbooks which very troublesome. Especially in the 2022 period where learning will be face-to-face with a strict process. So that *Mobile Learning* can also be used online or offline.

Based on the various problems that the author has stated above, writer want to lift study this as the thesis that title: "Development of Android-Based Mobile Learning Economic Learning Media with Problem Based Learning (PBL) Flow to Improve Student Learning Outcomes at SMA Negeri 2 Binjai for the Academic Year 2021/2022".

1. Literature Review
   a. Learning outcomes

Learning outcomes cannot be separated from learning activities, because learning activities are a process, while achievement is a result of the learning process. Understanding the meaning of learning outcomes in outline must be based on the notion of learning itself. Learning outcomes can also be seen from changes in a person's behavior both in terms of knowledge or attitudes after carrying out both formal and informal learning processes. Learning outcomes cannot be separated from learning activities, because learning activities are a process, while achievement is a result of the learning process. Understanding the meaning of learning outcomes in outline must be based on the notion of learning itself. Learning outcomes can also be seen from changes in a person's behavior both in terms of knowledge or attitudes after carrying out both formal and informal learning processes.

b. Learning Media

By general media is say plural from "medium", which means intermediary or introduction. In Dictionary Big Language Indonesia (KBBI) media means intermediary; liaison; located in between two parties (people, groups, and so on); The word media applies to various activities or effort, like media in delivery message, media introduction magnet or hot in field technique. Term media also used in field teaching or education so that the term be a medium of education or learning media.
c. Mobile Learning

Mobile learning (m-Learning) defined as all type environment study and spaces which take into account mobility technology, mobility student and mobility study. (Tamimuddin. 2014). Based on this definition According to this definition, the definition of learning has evolved following technological developments so that in order to gain knowledge, students can acquire it anywhere and whenever, no longer just being in room class. Another opinion is Bambang (2018:63). Mobile Learning is a learning model that adopts the development of cellular technology and mobile devices (HP) which are used as learning media. This supports learning media as a combination of technology to advance education.

d. Learning model

Problem Based Learning (PBL) in Indonesian called Problem Based Learning (PBM) is the use of various kinds of intelligence needed to confront real-world challenges, the ability to face everything new and existing complexities. The PBL model was developed based on the concepts proposed by Jerome Bruner. The concept is discovery learning or discovery learning. This concept provides theoretical support for the development of a PBL model that is oriented towards information processing skills. The teacher's PBL learning model must provide a space that is arranged in such a way that it is comfortable and open for competitive exchanging ideas so that students have the opportunity to increase their discoverability and intelligence (Wisudawati and Sulistyowati 2014:88).

e. Mobile Learning Development With PBL Flow

Mobile technology that supports education in a flexible, accessible and personal way. By using personal technology, students can build knowledge whenever the need arises. This helps develop a culture of lifelong learning. With Mobile access to learning content, learning can occur in everyday and unconventional contexts, which promotes lifelong learning (Kukulska & Hulme, 2010). Mobile Learning with a combination of PBL models on BUMN, BUMS and Cooperative materials is one of the breakthroughs made by the author. In the Mobile Learning software, a problem will be created with the material for BUMN, BUMS and Cooperatives. These problems can make the learning process active with smartphones. The material in BUMN, BUMS, and Cooperatives will be made about the performance of BUMN, BUMS and Cooperatives which will stimulate students to be more active in learning.

2 Research Design

This study uses a type of research and development (Research and Development) which is a research method that is usually used to produce a certain product and test the feasibility of the product (Sugiyono, 2014: 296). The main purpose of research and development is not to study or formulate theories, but to produce an effective product for schooling (Putra N. 2015). This research produces a product that can be used in the learning process in the form of an android-based application in a smartphone. Research on the development of a learning media product was conducted to determine the feasibility of the media in the learning process. Therefore, it is necessary to have a research design that has stages so that this research can run in the right direction. The stages of this research are carried out referring to the ADDIE development model which includes Analysis, Design, Development, Implementation and Evaluation. The stages of this research design were carried out through the analysis stage (needs analysis of teaching media and analysis of the teaching media used), design (design of
material items to be presented, preparation of material manuscripts, and preparation of the PBL model flow, delivery of material in the form of flowcharts, development of media using software, assessment by revision validation experts), implementation (trial), evaluation (revision of media from the results of suggestions and comments after a limited trial.

3 Research Results & Discussion

This research produces a product in the form of mobile learning-based learning media on smartphones with the android platform. This product is to answer the student learning outcomes which are still low with an average of 79. So with this the development of learning media that will be made will help improve student learning outcomes. A Mobile Learning product made according to the advice of an economics subject teacher during observations and interviews at SMA Negeri 2 Binjai. The Mobile Learning product is made from Smart Apps Creator 3 with the material and flow of the PB model. Instructions from the Mobile Learning program will be made easily so that students are active in independent learning. In addition, summaries and questions are also made to see student learning outcomes. So it can be seen from the analysis as,

Analysis. Analysis of teaching media needs is carried out based on the needs of learning media in the field. The analysis phase was carried out by observing economic learning at SMA Negeri 2 Binjai. Based on the results of observations made, it is known that most of the students have android-based smartphones. The analysis phase of teaching media for students is used to analyze the needs of the SMA Negeri 2 Binjai curriculum with the revised 2013 curriculum as recommended by the government. In economics learning, BUMN, BUMS and cooperatives in the Indonesian Economic System are one of the main materials that must be taught in the 2013 curriculum. This is because the material at the time of research was for testing Mobile Learning products.

Design. The storyboard is used as a guide in making the design view from one page to the next, so that the components on a page can be used to know. Flow chart serves to help design the navigation structure from one view to the next. This will clarify the picture of the design of media creation. For clarity, the following is a flow chart of the learning media developed. Before the development of learning media is carried out, it can be tested with a small scoop, namely with 3 students. Product trials only use storyboards to find out interest in the developed learning media. On this small scale, some suggestions from students with storyboards should be added animation to the material so that it is real to learn. In the second scale stage with 6 students the storyboard design was improved from stage 1 so that they would know to see the development of the Mobile Learning learning media. At stage 2, the suggestion is only to see the flow of the learning model so that students can see the orientation of the problem so that students can immediately find a solution to the problem. In Stage 3 for 10 students to see the storyboard design that is almost complete, whether it is suitable for use by students to be developed. Suggestions at stage 3 students only ask that the smartphone memory size is not large to be used as an android application. After being tested with 3x, the design will be developed so that it becomes a nice display and makes students learning fun.

Development. At this stage of development, the researcher will build a program that refers to the storyboard and flowchart that has been made previously. In addition, at this stage an
assessment of the data collection instrument is carried out by the validator so that there is a validation value and input it into the Mobile Learning product.

The results of the application design that have been made on the smart apps creator will be displayed on the android program, so that it becomes a learning media product based on Mobile Learning. with login and password display.

![Fig. 1. Mobile Learning. with login and password display](image)

On the Mobile Learning menu page, there are five menu options. The menus are Syllabus & RPP, Materials, PBL Flow, Summary and Questions. This syllabus & lesson plan menu contains information about learning which consists of Core Competencies (KI), Basic Competencies (KD), and RPP with PBL Flow.

![Fig. 2. Core Competencies (KI), Basic Competencies (KD), and RPP with PBL Flow](image)

On the main menu page there is a material menu which if the material menu is selected, the display will change directly to the SOE, BUMS and Cooperative sub-materials. When the user selects the material, he can press "next" to go to the next page with the material for BUMN, BUMS and Cooperatives.

On the main menu page there is a PBL flow menu for students as M-Learning media collaboration with the PBL model. The page on the PBL flow will contain an issue on the discussion of BUMN, BUMS and Cooperatives. The students immediately formed groups so that they immediately looked for information about the problem. On the main menu page there is a Learning Video menu on BUMN, BUMS and Cooperative material. So when selected, it will display the contents of the entire video material and can continue to be reviewed by students.
On the main menu page there is a summary menu on the material for BUMN, BUMS and Cooperatives. So when selected, it will display the contents of the overall material summary and can continue to be reviewed by students. On the main menu page there are questions from BUMN, BUMS and Cooperative materials that can be tested on students and see learning outcomes with scores that appear directly on the smartphone screen. In this question, when the answer turns out to be wrong, the question will immediately move to the next number so that students do not press with 2 answers. This is designed so that students also do not copy their friends' answers because the answer choices move automatically.

**Evaluation.** At this stage, it is useful to find out how effective the Mobile Learning product that has been tested on 27 students of class XI IS with the material BUMN, BUMS and Cooperatives. The product was evaluated to find out how effective it can improve student learning outcomes in class XI IS SMA Negeri 2 Binjai. The technique to find out whether Android-based Mobile Learning products can improve student learning outcomes or not is done by giving pretest questions before using Android-based Mobile Learning products. After using the Mobile Learning product, students were given posttest questions. The pretest value is compared with the posttest value to get the results of the effectiveness of the Android-based Mobile Learning product.

**Research discussion.** In the product of learning media development, namely the Android-based Learning Car with the Problem Based Learning (PBL) flow, it is made with the smart apps creator application. The advantages of Android-based Mobile Learning products with the PBL flow 1) the apk file can only be sent via bluetooth or whatsapp without having to download, 2) features made according to class XI students and making it easier for students to use Mobile Learning, 3) questions are made according to the material and can immediately see the direct value, 4) Make it easier for teachers to use technology in designing learning because smart apps creators are easy to get, 5) make learning media that can be used anytime and anywhere by students. This can be seen from the feasibility of the product from media, design and material experts. So that the trials on their students also saw firsthand the benefits of the product with the results of the product being 87.49% and the product effective at 84.69%.

**4 Conclusion**

Based on the results of research and discussions that have been carried out, the following conclusions can be drawn:

Producing Android-based Mobile Learning with the PBL flow using the smart apps creator application which is indispensable in supporting the economic learning process with SOE,
BUMS and Cooperative materials can foster student learning enthusiasm and make it easier for teachers to deliver subject matter in online or offline learning. The feasibility test of Android-based Mobile Learning learning media with the PBL flow is said to be feasible with 88.74% product results and 84.69% product effectiveness. Thus the product is said to be feasible to use to improve learning outcomes.

Mobile Learning with PBL flow is needed to improve student learning outcomes. This is supported by previous research with other applications. For Mobile Learning, the researchers themselves are said to be effective in improving student learning outcomes. It can be seen from the results of the comparison of pretest and posttest scores, \( t_{table} = 2.007 \) which is searched using table 0.05 and \( df = 52 \), while \( t_{count} \) obtained is 2.337, then \( t_{count} > t_{table} = 2.337 > 2.007 \). The scores for the experimental and control classes can be seen with 91.44 in the experimental class. Based on these results, it can be concluded that there is learning effectiveness before and after using Android-based Mobile Learning.

**Implication.** This study shows that the learning process using the Mobile Learning media through the Smart Apps Creator 3 application is feasible to be used as a learning medium when online or offline because the Covid-19 pandemic is still not over. The Smart Apps Creator 3 application fulfills the learning needs of its content referring to the Competency Standards and Learning Objectives for economic subjects. This learning media is expected to be a solution to create innovation and the rapid development of smartphone use among school-age children and the development of technology that knows no age limit. This learning media is used for everyone who wants to learn about BUMN, BUMS and Cooperatives. With this learning media, it is hoped that similar learning media will appear related to economics for class XI students. This research and development is expected to be followed and developed into a better product by further research.

**Suggestion.** Based on the conclusions above, from this research some suggestions can be made as follows: If the learning resources are of high quality and able to attract the attention of students, then the learning can help students understand learning. Researchers suggest economics subject teachers to use applications that have been developed so that the material provided is more practical, easy, interesting and effective with a positive response from students.

With the development of learning media, currently many applications are made for Mobile Learning. It is recommended for further researchers to find more interactive innovations so that the development of learning media with technology is wider and can improve student learning outcomes.

**References**


Education, 1–6.
The Effect of Virtual Laboratories on Student Learning Outcomes and Self-efficacy

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Abstract. Research aims to understand the influence of virtual laboratory on student learning outcomes and self-efficacy and to see the correlation between self-efficacy and student learning outcomes. The kind of research is quasi experiment with the design research two group pretest-postest. The results showed that post test average value of the experimental class 66.5 with a standard deviation of 16.39 and the control class an average value of 56.25 with a standard deviation of 13.65, both normal and homogeneous data and statistical hypothesis analysis showed that the significance was 0.04 < 0.05 then there is a difference in the average of the two classes, meaning that there is an effect of conventional practicum and virtual laboratory on student learning outcomes. Self-efficacy having strong correlation with student learning outcomes which is interpreted 0.76 value, its means the higher self-efficacy also the result of the higher student learning.

Keywords: virtual laboratory, student learning outcomes self-efficacy

1 Introduction

The 21st century, the technological revolution had a major positive impact on various fields including education.¹ The technology available today is basically a form of education. Development in the field of education will be directly proportional to future technological advances. The impact of education is determined by the teacher and how teachers can work to make education better through learning.

Supporting learning is very important to do to realize a better education, so important facilities are needed, namely, learning media. Learning media is a tool that can be used by teachers to achieve learning objectives, on the other hand the media can also be used to convey information, get feedback, increase motivation, and increase student concentration, thereby improving learning outcomes.² One way to improve student learning outcomes is laboratory activities. Laboratory activities are also influenced by psychological aspects, The psychological aspect that is closely related to learning outcomes is self-efficacy. The school laboratory is still under development, the tools and practicum materials are not complete, the study time is also lacking so that it is not possible to have a practicum in school. Virtual
laboratory is one solution to overcome the problems experienced by teachers. Virtual laboratory is a digital form of laboratory facilities and processes that can be simulated digitally. Virtual laboratory provides a series of laboratory equipment, algorithms, and other equipment to simulate activities in the laboratory.

Self-efficacy is a person's belief in one's abilities that one is able to do something or overcome a situation that one will succeed in doing. As Bandura suggests that self-efficacy is people's beliefs about their ability to generate levels of performance and master situations that affect their lives, then self-efficacy will also determine how people feel, think, motivate themselves and behave. Self-efficacy is a person's belief about his own ability to carry out certain behaviors or achieve certain goals.

The research objectives are 1. To find out whether there is an influence of laboratory virtual media on students' self-efficacy on Simple Harmonic Vibration material, it is tested using percentage descriptive analysis. 2. To find out whether there is an effect of laboratory virtual media on student learning outcomes on the Simple Harmonic Vibration material, it is tested using the t-test. 3. To find out whether there is a relationship between self-efficacy and student learning outcomes in the Simple Harmonic Vibration material, it is tested using the Regressive Correlation Test.

2. Method

This type of research is a quasi-experimental research which aims to find out something in this case the learning outcomes imposed on the subject, namely students. The research design used is by using pretest and posttest. Before the different treatments were carried out, a pretest was held to determine the initial ability of the two classes. Then a different treatment was carried out and then a posttest was carried out to determine student learning outcomes.

The instrument used to collect data on student learning outcomes is a test of student learning outcomes on the subject of Simple Harmonic Vibration, which consists of 20 questions in the form of multiple choice. Before conducting the research, the tests that have been prepared are tested for validity by two validators to take valid questions that will be used in the pretest and posttest. The validator is asked to determine each item in the valid or invalid category. The instrument of learning outcomes is a validity test by using a reliability test, discriminatory power and the level of difficulty of each question.

The indicators in the self-efficacy variable are: Interest in facing difficult tasks and fighting spirit in facing tasks; The strength and weakness of students' beliefs about their abilities; Confidence in one's ability to all situations

Data to measure students' self-efficacy can be obtained through a questionnaire compiled by the researcher based on indicators using a Likert scale. Answers on the Likert scale with positive statements are followed by 4 (four) possible answers, each of which is distributed with SS (Strongly Agree) with a score of 4, ST (Agree) with a score of 3, TS (Disagree) with a score of 2, and STS (Strongly Disagree) score 1. Negative statement followed by 4 (emoat) possible answers, each symbolized by SS (Strongly Agree) score 1, ST (Agree) score 2, TS (Disagree) score 3, and STS (Strongly Disagree) the score is 4. The data analysis technique used was normality, homogeneity and hypothesis testing. The relationship between self-efficacy and student learning outcomes analyzed using simple linear regression is an analysis to measure the magnitude of the influence between one dependent variable and predict the
dependent variable using the independent variable. In this study the dependent variable is self-efficacy and the independent is student learning outcomes.

3. Results

The data analyzed were student learning outcomes and self-efficacy questionnaires. After the research was carried out, it was obtained that student scores/values related to learning outcomes and self-efficacy were obtained where the results of student scores/values data will be analyzed with the following description.

Data Description

Description of Students' Initial Ability (Pretest)

Pretest was given to each student in the control class and the experiment was carried out at the first meeting. Pretest was given to determine the average equality of the experimental and control classes. The pretest and posttest questions have been validated by experts and forecast validation so that there are 20 valid multiple choice questions. It is expected that after being given learning treatment through conventional practicum and virtual laboratory practicum there will be changes in student scores.

<table>
<thead>
<tr>
<th>Class</th>
<th>Ideal Score</th>
<th>N</th>
<th>X_{min}</th>
<th>X_{max}</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>100</td>
<td>20</td>
<td>20</td>
<td>60</td>
<td>40</td>
<td>13,17</td>
</tr>
<tr>
<td>Experiment</td>
<td>100</td>
<td>20</td>
<td>20</td>
<td>70</td>
<td>45</td>
<td>16,46</td>
</tr>
<tr>
<td>Total/Average</td>
<td>100</td>
<td>40</td>
<td>20</td>
<td>65</td>
<td>42,5</td>
<td>14,81</td>
</tr>
</tbody>
</table>

Based on Table 1, the data description for each table in the control class (conventional practicum) obtained the lowest score of 20 and the highest score of 60, the average value of 40 with a standard deviation of 13.17. While in the experimental class (conventional practicum + virtual laboratory) the lowest score was 20 and the highest score was 70, the average value was 45 with a standard deviation of 16.46.

Description of Students' Final Ability (Posttest)

The second meeting started the learning process using a series of lessons that had been prepared, namely the experimental class using conventional practicum and virtual laboratory while in the control class using only conventional practicum. The last meeting of each class was given a test to review student learning outcomes after the learning was carried out, whether there was an increase or not. The description of the student's final ability test is carried out by calculating the mean and standard deviation. The summary results are presented in table 2.
Table 2. The Average Results of the Second Class Posttest Score

<table>
<thead>
<tr>
<th>Class</th>
<th>Ideal Score</th>
<th>N</th>
<th>X_{min}</th>
<th>X_{max}</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>100</td>
<td>20</td>
<td>35</td>
<td>80</td>
<td>57</td>
<td>13.99</td>
</tr>
<tr>
<td>Experiment</td>
<td>100</td>
<td>20</td>
<td>45</td>
<td>95</td>
<td>66</td>
<td>16.39</td>
</tr>
<tr>
<td>Total/Average</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>87.5</td>
<td>61.5</td>
<td>15.19</td>
</tr>
</tbody>
</table>

Based on Table 2, the data description for each table in the control class (conventional practicum) obtained the lowest score of 35 and the highest score of 80, the average value of 57 with a standard deviation of 13.99. While in the experimental class (conventional practicum + virtual laboratory) the lowest score was 45 and the highest score was 95, the average value was 66 with a standard deviation of 16.39. These data indicate that there is an effect of virtual laboratory on student learning outcomes in the experimental class.

Description of Student Self-efficacy

After the implementation of learning, students fill out a self-efficacy questionnaire, there are 30 questions that are filled out by students according to their own abilities. The description of students' self-efficacy tests is carried out by calculating the mean and standard deviation. The summary results are presented in table 3.

Table 3. The Average Value of Student Self-Efficacy

<table>
<thead>
<tr>
<th>Class</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>20</td>
<td>55</td>
<td>80</td>
<td>66.85</td>
<td>10.83</td>
</tr>
<tr>
<td>Experiment</td>
<td>20</td>
<td>70</td>
<td>92</td>
<td>78.65</td>
<td>8.08</td>
</tr>
<tr>
<td>Total/Average</td>
<td>40</td>
<td>40</td>
<td>87.5</td>
<td>61.5</td>
<td>15.19</td>
</tr>
</tbody>
</table>

Table 3 explains that the minimum self-efficacy score of students in the control class is 55 lower than students in the experimental class with a score of 70. The maximum self-efficacy score of students in the control class is 80 lower than students in the experimental class with a score of 92. The average score the control class is lower than the experimental class, but the standard deviation of the control class with a value of 10.83 is higher than the standard deviation of the experimental class with a score of 8.08.

Hypothesis Test

Testing the learning outcomes hypothesis using paired sample test
Table 4. Hypothesis Test Result Learning Outcomes

<table>
<thead>
<tr>
<th>Pair</th>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
</table>

The statistical hypothesis shows that the significance <0.05 means that there is a difference in the average of the two classes, meaning that there is an effect of conventional practicum and virtual laboratory on student learning outcomes. Testing the learning outcomes hypothesis using a paired sample test through the SPSS 26 application.

The results of the calculation of the relationship between self-efficacy and learning outcomes are described in table 5 below, the analysis was carried out using SPSS 26.

Table 5. Self-efficacy Hypothesis Test Result

<table>
<thead>
<tr>
<th>Correlations</th>
<th>SE</th>
<th>LO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Learning Outcome</td>
<td>Pearson Correlation</td>
<td>.796**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Self-efficacy on learning outcomes has a correlation with a value of 0.76 which is interpreted to have a strong degree of relationship and a positive relationship, which means that the higher the self-efficacy, the higher the student learning outcomes.

The results of the calculation of the relationship between self-efficacy and learning outcomes are described in table 6 below, the analysis was carried out using SPSS 26.
Table 6. The Correlation between Self-efficacy and Student Learning Outcomes

<table>
<thead>
<tr>
<th>Correlations</th>
<th>SE</th>
<th>Hasil Belajar</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>Pearson Correlation</td>
<td>1.796**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>20</td>
</tr>
<tr>
<td>Learning Outcome</td>
<td>Pearson Correlation</td>
<td>0.796**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>20</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Self-efficacy on learning outcomes has a correlation with a value of 0.76 which is interpreted to have a strong degree of relationship and a positive relationship, which means that the higher the self-efficacy, the higher the student learning outcomes.

4. Discussion

This section will describe the research discussion in accordance with the description of the data, the results of the analysis requirements test, the results of the hypotheses of learning outcomes, self-efficacy and the correlation of self-efficacy with learning outcomes. The requirements test analysis was conducted to test the hypothesis or the effect of the virtual laboratory on the sample, but before the requirements test, both samples had to be tested for prerequisites to test whether the two samples were normally distributed and homogeneous or not. The analysis prerequisite test used the data normality test and the data homogeneity test. The pretest data between the control and experimental classes were normally distributed and homogeneous tested through SPSS 26 with a significance level > 0.05.

Hypothesis testing of the control class and experimental class students was carried out by testing the data with normal distribution and homogeneity first. The results of the posttest data normality test showed that the significance value was > 0.05 and indicated that the data were normally distributed and homogeneous so that it could be continued to test the hypothesis using the T test. The T test used was the paired T test because there were two classes to be tested for its influence, namely the experimental class and control. The statistical hypothesis shows that the significance <0.05 means that there is a difference in the average of the two classes, meaning that there is an effect of conventional practicum and virtual laboratory on student learning outcomes.

Self-efficacy is a person's belief about his ability to organize, perform a task, achieve a goal, produce something and implement actions to display certain skills.

The self-efficacy analysis in the experimental class is higher than the self-efficacy in the control class. Students who follow self-efficacy who are taught using conventional practicum and virtual laboratories are more confident in understanding the concept of Simple Harmonic Vibration, because learning is not just transferring knowledge from the teacher to students, but a process that is conditioned or pursued by the teacher, so that students are active with various ways to build their own knowledge so that their self-confidence also increases.
The results of the Paired Sample Test calculation obtained a significance of 0.02 < 0.05, so there is a difference in the average of the two classes, which means that there is an effect of conventional practicum and virtual laboratory on students' self-efficacy.

The relationship between self-efficacy and student learning outcomes analyzed using simple linear regression is an analysis to measure the magnitude of the influence between one dependent variable and predict the dependent variable using the independent variable. In this study the dependent variable is self-efficacy and the independent is student learning outcomes.

Self-efficacy results on learning outcomes have a correlation with a value of 0.76 which is interpreted to have a strong degree of relationship and a positive relationship, which means that the higher the self-efficacy, the higher the student learning outcomes.

5 Conclusion

Student learning outcomes taught using conventional practicum and virtual laboratory on Simple Harmonic Vibration material in class X a higher average learning outcome than the control class, which is 66.5.

Self-efficacy of students who are taught using conventional practicum and virtual laboratory on Simple Harmonic Vibration material in class X has an average self-efficacy of 78.65.

The relationship between self-efficacy and learning outcomes has a correlation with a value of 0.76 which is interpreted to have a strong degree of relationship and a positive relationship, which means that the higher the self-efficacy, the higher the student learning outcomes.

References

The Use Of Stem-Based LKS In Biology Learning and Their Effect On The Motivation And Learning Outcomes Of Students Of Class XI MIA In Samosir District

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Abstract. This research was conducted to determine the use of STEM-Based Worksheets in Biology Learning and its Relationship with Motivation and Learning Outcomes of Class XI MIA Students in Samosir Regency. The research was conducted in March-April 2022. This study used a quasi-experimental research type with a qualitative approach. Based on the results of research conducted, the use of LKS can contain various activities and activities for students in the form of demonstrations and experiments. STEM-based teaching materials can improve student learning outcomes. Based on the research data, it is known that students’ learning motivation in the experimental class shows an average score of 80.45 and the control class an average of 75.01 which is included in the high category of the two classes. In this case, there is an effect of STEM-based worksheets in Biology learning on students' learning motivation. Students who have high motivation will be positive about their learning outcomes. This is supported by student learning outcomes in the experimental class that the average score is 67.85 higher than the control class with an average of 52.01. This proves that there is a significant increase from the control class that does not use worksheets to the experimental class that uses STEM-based worksheets.

Keywords: STEM-Based LKS, Biology Learning, Motivation, Student Learning Outcomes

1. Introduction

Science is considered to have an important position in the development of the character of society and the nation because it has a very rapid development of knowledge and the implementation of science in other fields which is very useful, as well as the content of values and attitudes that support the development of students' abilities. Science education has an important role in preparing the nation's generation to enter the world of the future. Science learning is a knowledge construction process (science) through students' thinking activities so that in this situation students are given the opportunity to develop their knowledge independently through a communication process that connects their initial knowledge with the knowledge they will find.
Biology as a branch of science that studies natural phenomena and their application to build technology that is useful in people's lives. Biology education plays a very important role in the achievement of various skills such as problem solving, collaboration skills, communication skills, communication skills, critical thinking skills, literacy, creativity, and creative thinking skills through learning and research to solve various problems in society.

The Covid-19 pandemic that we are currently facing can create a special attraction in biology learning related to the respiratory system material. Learning on the Respiratory System Material will specifically discuss the relationship between the structure of the tissue making up organs in the respiratory system in relation to bioprocesses and functional disorders that can occur in the respiratory process [45]. As many as 62.15% of students experienced misconceptions in the Respiratory System material. The factors causing this misconception include the students themselves, learning methods, teaching methods and context [9]. Based on this, we need a learning that can increase students' motivation and learning outcomes in studying this material.

Online learning during the Covid-19 pandemic reduced student interest in learning due to the absence of direct interaction between teachers and students [44] [19]. The quality of online learning determines students' interest in learning, meaning that the teacher's ability to use online learning methods has an influence on students' interest in learning [21]. During the Covid-19 pandemic, the decline in students' interest and motivation in learning was due to the quality of online learning itself, so it was necessary to implement new learning that was expected to be able to increase student interest and motivation to learn.

The low ability of science shows the low thinking skills of students so that students are categorized as still not having creativity in solving a problem. During the Covid-19 pandemic, the application of online learning only affected 35.3% of students' critical thinking skills [5]. According to [21] and [4] the application of the online learning model used has an influence on students' critical thinking skills.

The learning process can be said to be of high quality if the learning process runs smoothly, so that interesting teaching materials are needed for students, so that students are motivated to learn on their own (Rahmawati, 2016). One of the teaching materials that can support student learning activities in biology learning is the Student Worksheet (LKS). The use of LKS based on a scientific approach in learning during the Covid-19 pandemic can attract students' interest to be active and enthusiastic in learning, encourage students to become "researchers", and foster scientific, critical and analytical thinking skills [8]. There is a positive relationship between motivation and student learning outcomes, this is supported by [6] which explains that there is a significant positive relationship between interest in student biology learning outcomes.

One alternative that can be taken to improve the abilities and skills above is the integration of the STEM approach (Science, Technology, Engineering and Mathematics) into learning media, such as student worksheets. Morisson in [26] suggests several benefits of the STEM approach, among others, it can improve students' ability to solve problems, encourage students to become innovators, inventors, independent, logical thinkers, and have technological literacy. Various empirical evidences of the advantages of the STEM approach have been documented [13], [10], [33], [16], [31], [38]. The use of STEM-based worksheets in learning can improve critical thinking skills [10], [16], creative thinking skills [25], [31], [33],...
collaboration skills and improve the level of concept understanding [10] which leads to increased student learning outcomes [10], [38].

LKS apart from being a medium or source of learning also has other functions including (1) Accelerating teaching and saving on the presentation of a topic; (2) Optimizing limited tools; (3) Helping students to be more active in the teaching and learning process; (4) Generating students' interest in learning if the worksheets are arranged neatly, systematically and easily understood by students; (5) Can facilitate the completion of individual, group or classical tasks because students can complete tasks according to their learning speed; (6) Can improve students' ability to solve problems [43].

According to [41] LKS has several functions as follows: 1) as a guide for students in carrying out learning activities, such as conducting experiments; 2) as an observation sheet, where student worksheets provide and guide students to write down observational data; 3) as a discussion sheet, where the student worksheet contains a number of questions that guide students to conduct discussions in the context of conceptualization; 4) as a discovery sheet, where students express their findings in the form of new things that they have never known before; 5) as a vehicle to train students to think more critically in teaching and learning activities; and 6) Increase students' interest in learning if learning activities guided through LKS are more systematic, colorful and illustrated and attract students' attention.

According to BSNP [7], one way to achieve competence in learning is to use worksheets that have been adapted to the characteristics of students in the subject, namely by applying learning which includes the processes of exploration, elaboration, and confirmation. LKS are prepared by taking into account three quality requirements, namely didactic aspects, construction aspects, and technical aspects as well as student interest in the developed LKS products.

[37] details the characteristics in the preparation of worksheets, including the following: 1) formulating competencies that must be mastered, 2) packaging learning materials into more specific units so that it makes it easier for students to learn the material, 3) providing examples and illustrations to support the clarity of the material learning, 4) presenting assignments or examples of questions so that students can find out their mastery of the material they have, 5) presenting material according to students' conditions and environment (contextual), 6) using simple and communicative language, 7) providing information about references that support the material.

Biology learning that trains thinking skills in solving problems is guided by teachers so that students can be active in participating in learning and finding their own understanding related to learning materials. Problem solving activities characterize learning that develops creative thinking skills [26]. Therefore we need a media to support the learning process, one of which is Student Worksheets (LKS).

LKS or other designations also known as LKPD (Learn Worksheet) is one of the learning resource media developed by teachers as facilitators in learning activities. LKPD with a Science, Technology, Engineering and Mathematics (STEM) approach is equipped with STEM content such as science as a concept, science as a process, technology as the application of science, engineering as engineering science, and mathematics as a tool. Then LKPD is also made based on several components such as narratives, experiments, exercises, and knowledge information [1].
STEM-based worksheets are defined as printed teaching materials in the form of sheets of paper containing materials, summaries, and questions that integrate technology and engineering design concepts in the teaching and learning of science and mathematics in the school curriculum [39].

According to the NRC in [26], STEM learning needs to emphasize several aspects of the learning process including: (1) asking questions (science) and defining problems (engineering); (2) developing and using models; (3) planning and conducting investigations; (4) analyze and interpret data (mathematics); (5) using mathematics; computer information technology; and computational thinking; (6) building explanations (science) and designing solutions (engineering); (7) engage in evidence-based arguments; (8) obtain, evaluate, and communicate information. In addition to using the right learning approach, the use of teaching materials must also be appropriate so that students' thinking skills can be trained.

In learning activities, [30] states that motivation can be said as the overall driving force in students that causes learning activities and provides direction to learning activities. [12] argues that learning motivation is a change in energy in a person's personality which is characterized by the emergence of feelings and reactions to achieve goals.

So, based on the conclusions above, learning motivation is a condition or condition and encouragement that causes energy to feel happy and enthusiastic in carrying out learning activities. As for the factors that influence the learning motivation of students there are various kinds.

[46] divides motivation into two types, namely intrinsic motivation and extrinsic motivation by defining the two types of motivation as follows: Intrinsic motivation is a form of motivation to learn that comes from within a person and does not need external stimulation. While extrinsic motivation is a learning urge that comes from outside a person.

[14] states that the principles that can be applied to increase learning motivation are as follows.

Students will be more active if the topic to be studied is interesting and useful for them.

Learning objectives are clearly arranged and informed to students so that they know the learning objectives.

Students are always informed about their learning outcomes.

Giving praise and rewards is better than punishment, but sometimes punishment is also needed.

Utilize the attitudes, ideals and curiosity of students.

Try to pay attention to the differences in each student, for example differences in willingness, background and attitude towards a particular school or subject.

Try to meet the needs of students by always paying attention to them and arranging a good learning experience so that students have satisfaction and appreciation and directing their learning experience towards success, so that they have self-confidence and achieve learning achievement.

From the description above, it can be concluded that there are several principles to increase student learning motivation, namely if the topic to be studied is interesting and useful, the
Learning objectives are clearly formulated, student learning outcomes must be notified, rewards are given for those who excel, take advantage of positive attitudes. Attitudes, ideals and curiosity of students, paying attention to their differences, and trying to meet the needs of students by paying attention to them.

Learning outcomes as an indicator of the achievement of learning objectives in the classroom can not be separated from the factors that affect the learning outcomes themselves. [34], mentions the factors that influence learning outcomes, as follows:

Internal factors are factors that exist within the individual who is learning, which includes physical factors and psychological factors.

External factors are factors that exist outside the individual's body which include family factors, school factors and community environmental factors.

According to [23] found that parental acceptance has a significant role on achievement motivation in students. The large role of parental acceptance of students' achievement motivation has an effective contribution. It can be concluded that students' achievement motivation when viewed from parental acceptance turns out to have a significant role, so that the greater the role of parental acceptance, the higher the level of achievement motivation in students.

According to [8] the use of LKS based on a scientific approach in learning during the Covid-19 pandemic can attract students' interest to be active and enthusiastic in learning, encourage students to become "researchers", and foster scientific, critical and analytical thinking skills. However, most of the worksheets used today do not facilitate students to develop their creative thinking skills. The worksheets contain brief material and questions that students have to do, although they can support students in learning, they are still not effective as seen from the low level of student activity and students have not shown their creative thinking skills. [13] found that worksheets developed with the STEM approach can improve students' critical thinking skills. [25] also found that worksheets with a STEM approach have been effective in training students' creative thinking skills. So it is hoped that the application of STEM-based worksheets can increase students' interest, motivation, and creativity during the pandemic which will also have an impact on improving the quality of learning and student learning outcomes accompanied by an increase in students' thinking skills.

Through the results of observations conducted online for two weeks via google form at 7 public high schools in Samosir Regency at the beginning of the odd semester to see student learning motivation in Biology learning carried out on state high school students throughout Samosir Regency, it was found that from 203 people respondents as much as 44.3% of students agreed that the subject matter of Biology is very abstract so it is difficult to maintain attention. As many as 61.1% of students disagreed, Biology assignments and questions given by the teacher were easy to complete. As many as 51.2% of students agreed, it takes luck to be successful in learning Biology. As many as 48.3% of students agreed that Biology learning material was more difficult to understand than expected.

Meanwhile, based on the results of observations of teaching interviews with teachers conducted with SMA Negeri teachers in Samosir Regency, it was found that out of 16 respondents, 40% of teachers stated that sometimes teachers feel confident that students will graduate after presenting the material. As many as 80% of teachers stated that sometimes teachers were disappointed in the results that students got after studying Biology. As many as
60% of students did not take notes after the material was presented. As many as 40% of teachers sometimes feel confident that students will pass the KKM some time after giving the material. As many as 30% stated always and 30% of teachers stated that students need luck in order to succeed in learning. And as many as 50% of teachers stated that they sometimes apply learning by giving worksheets to students. Departing from the real (real) conditions above, to overcome so that students are able to play an active role in learning, it is necessary to innovate in using several approaches, strategies and learning models. The learning model has a very important role in the success of education. The use of the right model will determine the effectiveness and efficiency of a learning process.

Based on the description above, the researcher is interested in conducting research on the Use of STEM-Based Worksheets in Biology Learning and Its Effect on Motivation and Learning Outcomes of Class XI MIA Students in Samosir Regency.

From the problems found in the background above, the problem can be formulated as follows:

How can STEM-based worksheets be implemented in biology learning at the State Senior High School Level XI MIA in Samosir Regency?

How does the application of STEM-based worksheets in biology learning affect the learning motivation of Class XI MIA students in Samosir Regency?

How does the application of STEM-based worksheets in biology learning affect the learning outcomes of Class XI MIA students in Samosir Regency?

In line with the formulation of the problem above, the purpose of this research is to find out:

STEM-based LKS can be implemented in biology learning at the State Senior High School Level XI MIA in Samosir Regency.

The effect of applying STEM-based worksheets in biology learning on the learning motivation of Class XI MIA students in Samosir Regency.

The effect of applying STEM-based worksheets in biology learning on the learning outcomes of Class XI MIA students in Samosir Regency.

2. Method

This research was carried out in class XI MIA State Senior High Schools throughout Samosir Regency in the even semester of the 2021/2022 academic year, namely in January-March 2022. The type of research used in this study was a quasi-experimental approach with a qualitative approach. [35] defines that experimental research is research that is used to find the effect of certain treatments on others under controlled conditions. A similar opinion was also expressed by [2] who defines experimental research as research that is intended to determine whether or not there is an effect of treatment on the subject under investigation. The way to find out is to compare one or more experimental groups that were given treatment with a comparison group that was not given treatment.

Nine sub-districts in Samosir Regency have eight public high schools. Selected 2 public high schools with 1 class each as an experimental class, namely classes taught with STEM-based worksheets. Based on the purpose of this study, the population in this study were students of class XI MIA SMA Negeri 2 Pangururan and SMA Negeri 1 Palipi. Determination of
treatment in this study using purposive sampling technique, namely the technique of determining the sample with certain considerations. Schools were determined based on the similarity in quality and number of classes that were considered equal, two public high schools with one experimental class and one control class each were found. The class that was selected as the experimental class was taught with STEM-based worksheets. The experimental class was given a pretest (pretest) and a final test (posttest) to determine the effect of student learning outcomes before and after treatment and used a questionnaire to determine students' learning motivation after treatment.

Experiments to study the effect of certain variables on other variables, through trials under special conditions that are deliberately created through cause and effect. This research involves several classes. The class that was selected before being given special treatment was given a test (pretest) and then again given a test (posttest) after being given special treatment, namely being taught using STEM-based worksheets. Then after being given special treatment, students who were taught using STEM-based worksheets were given a questionnaire to determine students' interest and motivation to learn.

The research design used for the purposes of the investigation is One Group Pretest-Posttest Design, which uses one treatment group by giving pretest and posttest with the following design model:

<table>
<thead>
<tr>
<th>Pretest</th>
<th>Treatment</th>
<th>Postest</th>
</tr>
</thead>
<tbody>
<tr>
<td>$O_1$</td>
<td>$X$</td>
<td>$O_2$</td>
</tr>
</tbody>
</table>

Information:
- $O_1$: Pretest before being given treatment.
- $O_2$: Posttest after being given treatment
- $X$: The treatment of the experimental class is by using STEM-based worksheets

At the first meeting, a pretest was held to determine students' initial abilities and to determine understanding of concepts and student learning outcomes. Then students are taught with STEM-based worksheets. Then at the last meeting, a final test (posttest) was given.

Data collection techniques were carried out using a questionnaire and calculating the percentage of motivation. Questionnaire compiled based on assessments, corrections, and suggestions for improvement from experts (validators) or education experts.

To obtain the percentage can be calculated by the formula that has been proposed by [47] below:

$$ P = \frac{\sum x_i}{n} \times 100\% $$

Formula description:
- $P = \text{percentage}$
- $\sum x_i = \text{student scores}$
- $n = \text{maximum score}$
After obtaining the percentage, each student is classified according to his level of interest and motivation. Meanwhile, the classification of the questionnaire scores can be seen in the following table [48].

<table>
<thead>
<tr>
<th>Benchmark Interval (%)</th>
<th>Interest Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>81 – 100</td>
<td>Very High Motivation</td>
</tr>
<tr>
<td>66 – 80</td>
<td>High motivation</td>
</tr>
<tr>
<td>56 – 65</td>
<td>Moderate Motivation</td>
</tr>
<tr>
<td>46 – 55</td>
<td>Low Motivation</td>
</tr>
<tr>
<td>≤ 45</td>
<td>Very Low Motivation</td>
</tr>
</tbody>
</table>

The procedure adopted in this study consisted of two stages, namely as follows.

**Preparation Stage**

At this stage, the material to be taught is determined which is adjusted to the material that is currently running or being taught at school. Then prepare the learning tools that need to be prepared such as the Learning Implementation Plan (RPP) and STEM-based Student Worksheets (LKS). The learning tools are adapted to the application of STEM-based learning. The learning device is designed for 6 meetings. The learning tool is then validated by the validator. The results of the revision are used as improvements to be used during research. Data collection instruments were prepared to obtain information about students' motivation and learning outcomes. The instruments that have been compiled are then validated by the validator. The revised results adapted to the learning will be applied to several experimental classes. Learning tools in the form of lesson plans, STEM-based worksheets, test questions, and validated questionnaires will be distributed to teachers who teach in classes at predetermined sample schools. In this study, an observer is needed. Observers are tasked with observing the implementation of the learning approach and documenting the learning process.

**Implementation Stage**

The treatment will be carried out for 8 meetings. At the first meeting, a pre-test was held to determine understanding. Then students are taught the use of STEM-based worksheets for 6 meetings. During the treatment with the use of STEM-based worksheets, descriptive questions were included in the worksheets that were used to obtain data on student creativity during learning. Furthermore, at the last meeting, a post-test was given to determine the increase in student learning outcomes.

A motivation questionnaire was given to determine students' learning motivation after being taught using STEM-based worksheets. After learning using STEM-based worksheets is carried out, then questionnaires and tests are given to students to see the average value of students' motivation and learning outcomes which are measured based on the Likert scale (attitude scale) and objective assessment measurements in multiple choice questions, namely correct answers with scores 1 and wrong answer with a value of 0.

Data processing is done by collecting data using pretest and posttest on learning outcomes, and interest, motivation and creativity questionnaires by looking at the normality of the data.
using the Kolmogrov-Smirnov and homogeneity of the data using the Levene test. Tests for normality and homogeneity of data were carried out to determine the hypothesis testing used. In this case the normality test of the data is normal, the hypothesis testing is carried out by parametric measurements with independent sample t test (t test).

The steps for testing the normality and homogeneity of the data are as follows:

Normality Test

Testing the normality of each class to determine whether the pretest and posttest scores are normally distributed or not can use kolmogrov-smirnov. The steps for analyzing descriptive data and testing hypotheses are as follows [3]:

After knowing the mean, standard deviation, and variance, then determine the number of class intervals = 1 + 3.3 log n (n = many subjects/data)

Define range (r) = biggest data – smallest data

Determine the length of the interval (P)

\[ P = \frac{\text{range}}{\text{many classes}} \]  

Make a table listing the frequency of observations and the frequency of expectations

Determine the average

Varians (S^2) dan Standard deviation (SD)

Finding the Z-score value for the class boundary of the interval and finding the Z-O . Area

\[ Z = \frac{\text{class limit} - \text{average value}}{S} \]  

Homogeneity Test

Testing homogeneity to find out whether the pretest and posttest scores are homogeneously distributed or not by using variance or F test with Levene test, can use the formula with the following steps (Arikunto, 2013):

Looking for value F:

\[ F_{\text{count}} = \frac{V. \text{Biggest}}{V. \text{smallest}} \]  

Degrees of freedom (db)

\[ df_1 = n_1 - 1 \]  
\[ df_2 = n_2 - 1 \]

Determine the F value from the list

Determining homogeneity by comparing the Fcount value with the Ftable value based on the db value at the 1% confidence level or = 0.01. The stipulation is that if Fcount < Ftable the data is considered to have a homogeneous variance and Fcount > Ftable the data is considered to have a non-homogeneous variance.

Uji Hipotesis

Testing the hypothesis can be done using a formula with the following steps (Arikunto, 2013).
Finding the combined standard deviation

\[ s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \]  

Information:
- \( S \) = Combined standard deviation
- \( n_1 \) = The number of samples with large variance
- \( n_2 \) = The number of samples with small variance
- \( s_1 \) = Big variance
- \( s_2 \) = Small variance

Finding the value of \( t \)

\[ t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \]  

Determine the degrees of freedom \( db = n_1 + n_2 - 2 \)

Determining the hypothesis by comparing the value of \( t \) with the value of \( t_{tab} \) based on \( db \) at a confidence level of 1% or 0.01. The stipulation is that if \( t_{hit} < t_{tab} \) then the data is considered to have no significant difference (Ho is accepted and Ha is rejected) and if \( t_{hit} > t_{tab} \) then the data is considered to have a significant difference (Ho is rejected and Ha is accepted).

3. Research Results And Discussion

Research Results

The use of STEM-based LKS at State Senior High Schools in Samosir Regency is one of the teaching materials that can assist in the learning process for students, in which it contains a brief material, learning objectives, and work instructions or instructions, in the learning process and practicum/experiment to prove theory. concepts and a number of questions that must be answered by students so that students can expand and deepen the material learned by using the LKS. STEM-based worksheets developed with biology learning materials, especially the human respiratory system. Each student is required to participate actively to understand themselves about the subject matter studied through teaching materials. Based on these activities can make student learning outcomes better. By learning using STEM-based student worksheets (LKS), students do not only think abstractly, at the beginning of their learning they are given real problems that will be studied in teaching materials. Through the real problems given, students are given time to observe, observe, and solve the problem then the teacher confirms by asking questions. The use of STEM-based worksheets in the implementation of the Biology learning process is one of the most important parts that can have an influence on students' motivation and learning outcomes. This is shown from the learning activities that run
optimally seen from the willingness of students to ask questions, provide examples, and
provide statements about the material being taught.

The Influence of STEM-based LKS on Learning Motivation of Class XI MIA Students in
Samosir Regency

Students' learning motivation in the experimental class (STEM-based worksheets) showed that
the lowest score was 56 and the highest was 94, with the mean and standard deviation being
80.45±6.704 and the data were not normally distributed (Z = 0.150; P = 0.000). Meanwhile in
the control class, the lowest score was 57 and the highest was 97, with the mean and standard
deviation being 75.01±9.068 and the data being normally distributed (Z = 0.125; P = 0.007).
The results of the description of students' learning motivation in the experimental class are
categorized as high and the control class is categorized as high.

The results of the data homogeneity test showed the variation of the data between sample
groups in a homogeneous population (F = 0.010; P = 0.920) on the motivation variable of the
experimental class. While the homogeneity of the control class motivation variable is that the
sample in the population is homogeneous (F = 2.381; P = 0.127). Based on this, the data used
were analyzed by parametric t-test. Data analysis with this technique shows that the use of
STEM-based worksheets in Biology learning affects the learning motivation of students in
class XI MIA in Samosir Regency (t = 111.014; P = 0.000).

Figure 1. The effect of STEM-based worksheets on student learning motivation is
significantly different with the probability value (P = 0.000)

Student learning motivation shows that there is a difference in the average value of motivation
in the experimental class which shows an average value of 80.45±6.704 (X ±SB) which is
higher than the learning motivation of control class students, namely the average value of
75.01±9.068 (X ±SB).
The Effect of STEM-based LKS on Student Learning Outcomes of Class XI MIA in Samosir Kabupaten

The results of the study on student learning outcomes in the experimental class showed that the lowest score was 35 and the highest was 95 with the mean and standard deviation of 67.85±12.098 and the data was not normally distributed (Z = 0.140; P = 0.001). Meanwhile in the control class the lowest score was 15 and the highest was 100 with the mean and standard deviation 52.01±19.001 and the data were normally distributed (Z = 0.084 ; P = 0.200). The results of the data homogeneity test showed the variation of the data between the sample groups in the homogeneous population (F = 0.035; P = 0.853) in the experimental class. While the results of the homogeneity test of the data in the control class showed variations in the data between sample groups in a homogeneous population (F = 0.842; P = 0.362). Based on this, it can be concluded that the data are normally distributed and homogeneous. Data analysis by t-test showed that the use of STEM-based worksheets in Biology learning had an effect on student learning outcomes in class XI MIA in Samosir Regency (t = 40.519; P = 0.000).

Student learning outcomes show that there is a difference in the average value of student learning outcomes in the experimental class and the control class. In summary, the experimental class showed an average value of 67.85±12.098(X ±SB).higher than the student learning outcomes in the control class, namely the average value of 52.01±19.001 (X ±SB).

Discussion

Based on the results of research conducted on XI MIA students in Samosir Regency, the use of LKS can contain various activities and activities for students in the form of demonstrations and experiments, aimed at making students more active in learning so that students are able to
optimize their creative thinking skills, as is the case at school. SMA Negeri in Samosir Regency which has higher motivation than interest and creativity and student learning outcomes.

Creative thinking skills are very important for students to have. Because skills in creative thinking can be developed through a learning process using STEM-based worksheets, and can also develop skills in creative thinking, STEM-based teaching materials can also improve student learning outcomes. Teaching materials are one of the effective learning media used in the learning process. Teaching materials can help teachers interact and encourage students to optimize students' intellectual abilities. Teaching materials for a learning model can develop creative thinking skills and learning outcomes. Use of STEM-Based LKS Effectively increases motivation and learning outcomes of Class XI MIA biology in Samosir Regency. This is supported by [39] which states that students' creative thinking skills increase after using STEM-based worksheets. The increase in creative thinking skills is in the high category on the fluency and elaboration aspects, the medium category on the flexibility aspect, and the low category on the original aspect. The increase in learning outcomes of the experimental class was higher than that of the control class. Overall, STEM-based Student Worksheets are feasible and effective to use in learning and can improve students' creative thinking skills. Students will have high enthusiasm and motivation that is positive for their learning outcomes. The learning motivation that exists in students will increase because the curiosity to learn is so enthusiastic and the enthusiasm for learning tends to require a student to try harder to achieve the desired goals.

With high learning motivation, students will try hard to follow the learning as well as possible so that they are able to achieve the expected learning outcomes well. Learning by using LKS will run smoothly if it is supported by the availability of teaching materials and LKS for the subjects to be taught and have broad and in-depth knowledge about the learning and the quality in learning will be achieved if a student can demonstrate a high level of mastery of a material being taught, taught and learned. At the first meeting, students still tend to be inactive and not confident. When learning enters the core activity, students have begun to show an urge to work. The distribution of worksheets that are done in groups creates the desire and desire of students to be able to complete them on time. Giving awards can make students in their groups feel happy by clapping each other showing satisfaction with the results obtained [42]. It is clear that by applying the STEM approach in learning can generate desires and desires, drives and needs, and rewards for students in learning.

In the process of implementing learning, it can be illustrated that the valid and practical STEM-Based LKS for biology learning for Class XI MIA in Samosir Regency can prepare a good and effective learning implementation process. With an approach that uses STEM-based worksheets, students can take and apply what they learn in the classroom for work and for their future in the real world.

The educational, industry, and business communities must work as a team to develop curricula that will promote effective STEM implementation for the future and success of students. LKS or Student Worksheet is a teaching material that can help in a learning process, which contains a material briefly, and learning objectives, as well as instructions in doing a lesson by use.

STEM-based worksheets can be used as printed teaching materials in the form of worksheets containing a material, as well as summaries, and questions that integrate a concept with design on technology in the teaching and learning process in schools. A valid STEM-based LKS
shows something true where the learning process for students will be easier to understand and with the use of STEM-based LKS it can make it easier for students and teachers and is practical for learning biology Class XI MIA in Samosir Regency. This will make students more motivated in the process of implementing learning.

Based on the description above, the use of STEM-based worksheets in Biology learning is one solution that can be done to increase student motivation and learning outcomes. A series of learning activities with a STEM approach can trigger students' enthusiasm for learning so that students are encouraged to strive to achieve the desired learning goals [18]. The existence of motivation in learning will certainly help students complete their education well [22]. With the motivation of both motivation from within and motivation from outside can increase the desire to learn students. Therefore, teachers need to apply LKS with a STEM approach in learning, especially in Biology subjects.

**Learning Motivation of Class XI MIA Students in Samosir Kabupaten**

Based on the research data obtained that the student's learning motivation is known in the experimental class, it shows that the average score is 80.45 and the control class is 75.01 which is included in the high category of the two classes. In this case, there is an effect of STEM-based worksheets in Biology learning on students' learning motivation. Students who have high motivation will be positive about their learning outcomes. With the motivation to learn in students, learning outcomes will be able to increase because the curiosity of learning is so enthusiastic and enthusiastic.

Motivation is an internal factor of the students themselves in the learning process which in turn will affect student learning outcomes. The higher the motivation to learn, the higher the learning outcomes achieved by students. Learning motivation tends to require students to try harder to achieve the desired goals. With this high learning motivation, students will try hard to follow the learning as well as possible so that they are able to achieve the expected learning outcomes well.

Motivation in student learning is in the moderate category and the teacher's communication skills are in the quite effective category, however, that teacher communication has a positive and significant influence on motivation in student learning. To increase students' learning motivation, it is necessary to improve the effectiveness of teacher communication, student learning motivation needs to be improved and a conducive learning environment to help students' learning barriers. And the teacher provides learning motivation to students [32].

Motivation has an important influence in learning, namely encouraging students, so that students become active and interested because motivation supports efforts and keeps students (learning) going, motivation directs and controls goals, students complete a task, achieve specific desired goals, Motivation can make selective, where students can determine what activities will be carried out and how the tasks will be carried out. Thus, motivation serves as a priority determinant for student success, including success in learning. Means motivation to encourage or encourage students to improve learning achievement. Motivation is one of the absolute requirements in learning, which students who learn without motivation (or lack of motivation) will not succeed as much as possible. Therefore, students need encouragement to learn if students have the motivation to learn [36].

The method used should basically be in accordance with the subject being discussed. The subject matter of a multicultural society can be used by all methods but the concept that is
implanted must be right. To provide many examples, the LKS method needs to be given to students because the worksheets to be worked on are loaded with important concepts of the subject. Therefore, LKS plays a role in improving student learning outcomes. Therefore, the implementation in the learning process must be carried out continuously, objectively and systematically [15].

Currently, teachers use worksheets conceptually so that learning is difficult and less meaningful. In addition, during the pandemic, there are limitations in both time and effectiveness. Students need teaching materials that are easy to understand and allow them to learn independently according to their abilities [28].

The development of STEM-based digital modules is carried out to meet the needs of students and lecturers in order to create an alternative teaching material based on learning models that can improve the ability of students to learn independently. The STEM-based learning digital module developed is very valid with a value of 92.44% and practical (81.70%) to be used as an alternative teaching material that can be used in learning Operating Systems [40].

Learning Outcomes of Class XI MIA Students in Samosir Regency

Based on student learning outcomes in the experimental class, the average score was 67.85 and the control class with an average of 52.01. This is a significant increase from the control class that does not use worksheets to the experimental class that uses STEM-based worksheets. This is in line with research by [15] which states that the use of Student Worksheets (LKS) media can improve student learning outcomes. However, this is done using the implementation which is carried out in two cycles, namely cycle 1 and cycle 2. In the implementation, the learning outcomes test for the first cycle was obtained with a value of 79.00 and learning outcomes in the second cycle were 87.00. As has been explained, to support integrated science learning in accordance with the demands of the 2013 curriculum, it is also necessary to develop integrated teaching materials. The development of teaching materials can be done with the STEM approach considering that STEM learning is proven to be able to improve student learning outcomes. In addition, it is hoped that STEM learning can also improve creative thinking skills [24].

Good learning outcomes are expected with the characteristics of being able to above average, trying hard to succeed, trying to achieve high learning outcomes, believing in their abilities, tending to work alone, tending to be in groups with smart friends, likes/likes to study even when sick, complete tasks for the future, study goals for self-satisfaction, and tend to choose questions that are moderate in difficulty.

Learning outcomes can be known after an evaluation is held, which is expressed in the form of values. Based on this, it can be seen the high and low student learning outcomes. Student learning outcomes are influenced by several factors, both from within students (internal factors) in the form of intelligence, talent, and motivation, as well as factors from outside students (external factors) in the form of the family environment (parents), school and society.

The factors that influence learning achievement are internal factors (interest, motivation, level of intelligence, and learning methods) and external factors (family environment, school, and community). Statements of achievement motivation, interest, and parental attention to cognitive biology learning outcomes and student independence described above have a significant correlation between these variables. This thinking is based on many studies conducted in accordance with the discussion described previously, that there is a significant
relationship between achievement motivation, interest, parental attention with learning methods such as independent study and student achievement.

Students (LKS) based on Science Technology Engineering Mathematical (STEM) media on Sub Concept Concepts to improve students’ creative thinking. The development of STEM-based worksheets was declared feasible to be used in the learning process. The results of product validation by four validators give an average very valid assessment. Student responses to LKS during small-scale and large-scale trials gave positive responses with percentages of 83.50% and 89%, respectively. The application of LKS has facilitated the improvement of students’ creative thinking. Hypothesis testing proves that there is a significant difference between the pretest and posttest [28].

The use of guided inquiry-based worksheets has a positive influence on student learning outcomes in the two sample classes. Learning outcomes in the experimental class using student worksheets based on guided inquiry were higher than the control class using ordinary worksheets which were not concluded H0 was rejected and H1 was accepted at a significance level of 0.05. This shows that student learning outcomes using guided inquiry-based worksheets are significantly higher than student learning outcomes without using LKS-based [49]

4. Conclusion

Based on the results of research and discussion that have been described previously, the conclusions in this study are as follows:

STEM-based LKS which was developed based on a modification of the LKS material from one of the Unimed Biology lecturers as well as the validator of the instruments used in the research. The use of STEM-based worksheets in the implementation of the Biology learning process is one of the most important parts that can have an influence on students' motivation and learning outcomes.

There is a significant influence in the use of STEM-based worksheets in biology learning on the learning motivation of Class XI MIA students in Samosir Regency with a significance value (P = 0.000 <0.05). Where there is a significant difference that the value of students' learning motivation in the experimental class obtained the average value is 80.45. While the value of students' learning motivation in the control class obtained an average value of 75.01.

There is a significant influence in the use of STEM-based worksheets in biology learning on the learning outcomes of Class XI MIA students in Samosir Regency with a significance value (P = 0.000 <0.05). Where the significant difference is that the posttest score of student learning outcomes in the experimental class obtained the average value of 67.85. While the post-test score of student learning outcomes in the control class obtained an average value of 52.01.

Efforts to improve learning outcomes, one of which is by using STEM-based worksheets in Biology learning. If teachers and other positive sources of information such as student worksheets can be applied by providing good direction for students, then this can increase the active participation of teachers and students to increase motivation and learning outcomes.

Learning by using STEM-based LKS in Biology learning is one of the supporting factors to improve student learning outcomes and to form better attitudes of interest, motivation,
creativity. With the STEM-Based LKS learning method, it can improve learning achievement that can provide benefits for teachers or other teaching staff.

With this learning method, teachers can develop and improve creativity in using worksheets well for students so that students not only act as recipients of lessons through verbal teacher explanations or lectures, but students also participate in finding the core of the lessons described in creative student worksheets. This supporting worksheet also plays an active role for teachers and students in improving learning achievement.

References


Development Of Project Based Learning (PjBL) Assistant Macromedia Flash Assistance To Improve Mathematic Problem Solving Ability And Student’s Independence

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Abstract. The purpose of this study is to determine: (1) the validity, practicability, and efficacy of learning tools. (2) PjBL-based learning tools with macromedia flash can help pupils enhance their mathematical problem-solving abilities. (3) PjBL-based learning tools with macromedia flash can help pupils gain independence. This study is a development study that employs the 4-D Thiagarajan development paradigm. (1) The learning aids produced were pronounced valid, practicable, and effective for use in improving students’ mathematical problem-solving abilities at SMPN 30 Medan. (2) Improving the mathematical problem-solving ability of students at SMPN 30 Medan who were taught utilising PjBL tools. It was reported via macromedia flash that there was an increase from Trial 1 to Trial 2, as seen by the N-gain in Trial 1 of 0.37, increasing to 0.56 in Trial 2. (3) Improving kids’ ability to learn independently. The average student learning independence in the first trial was 80.13 with a standard deviation of 9.82, and in the second trial it was 85.31 with a standard deviation of 11.42.

Keywords: PjBL Model, Learning Tools, Problem Solving Ability, Independent Learning

1. Introduction.

According to PERMENDIKNAS No. 22 of 2006, the mathematics topic taught in Junior High Schools (SMP)/Madrasah Tsanawiyah (MTs) aims to develop the following skills in students: (1) Using reasoning on patterns and properties, performing mathematical manipulations in making generalisations, assembling evidence, or explaining mathematical ideas and statements, (2) Using reasoning on patterns and properties, explaining the relationship between concepts, and (3) Applying concepts or algorithms in a flexible, accurate, and appropriate way when applying concepts or algorithms to problem solving [1].

One of the mathematics skills that has to be improved is problem solving. Because it enables students to practise using their prior knowledge and abilities to solve non-routine problems both during the learning process and after it is complete, problem solving is an essential part of the mathematics curriculum [2].
Problem resolution, in the opinion of Surya and Harahap [3], is a high-level mental process requiring a more intricate reasoning process. Problem solving is one of the high-level cognitive abilities that enables pupils to gain knowledge and skills [4]. Because problem-solving abilities are the cornerstone of studying mathematics, students must possess them. Additionally, problem solving is a crucial skill in learning mathematics because mathematics is one of the components of issue solving.

The reality on the ground, however, contradicts these notions. When students are solving problems, they still struggle to understand the core of the problem, struggle to express what is known and asked when solving the problem, are careless when performing arithmetic operations, and fail to draw conclusions from the problem because they cannot comprehend the topic being asked in the question.[5] According to students, the challenging and frightening nature of mathematics can also contribute to their poor problem-solving abilities.[6] SMP Negeri 30 Medan also has a low problem-solving capacity. The researchers administered a diagnostic test to 16 pupils in class VIII-1 at SMP Negeri 30 Medan to determine the mathematical problem-solving skills of students. Four questions make up the test. Based on the outcomes of the test answers, the majority of the students were unable to work on the questions. Nobody is qualified to respond to the researcher's questions. despite the fact that the subject of the problem—namely, building space—has been studied. Only two of the sixteen students were able to offer a solution to the issue; however, a calculation error prevented 14 students from offering a workaround.

Along with the significance of mathematical problem-solving abilities, students' attitudes toward learning mathematics are also important. One such attitude is the independent learner, also regarded vital. Independent learning is a learning process in which anyone, with or without the assistance of others, can take the initiative in matters that determine learning activities such as developing learning objectives, educational resources (in the form of people or materials), diagnosing educational needs, and controlling the learning process. themselves [7] . Students require independent learning so that they can organise themselves and become self-disciplined [8]. Furthermore, Haryanti believes that independent learning is one of the affective skills that kids must possess [8]. As a result, even if they are pursuing distant learning, students must take responsibility for themselves. Independent learning is an educational activity carried out by individuals in their own time, without the assistance of others, as an increase in their knowledge, abilities, or development of their accomplishments; they determine and oversee their own teaching methods, schedules, and utilisation of various educational resources. [9]

The truth is that junior high school (SMP) mathematics teachers rarely give growing student numbers the attention they deserve learning independence in mathematics. Inability to study independently Mathematics for junior high students is a significant issue in mathematics education. According to allegations, student participation in learning and the learning environment are less conducive because the learning model used is less enjoyable.

According to the researcher's observations, mathematical problem solving skills and independent learning students are lacking because teacher-designed mathematics does not encourage student participation in interacting with teachers and other students. The teacher must arrange and plan good and mature preparations in order to improve math problem solving skills and independent learning students. One kind of gadget is a learning one preparation that must be prepared by the teacher. Learning tools are items that must be prepared by the teacher prior to learning.
As a result, we require a suitable learning activity to increase mathematical reasoning abilities and student autonomy in learning, including the use of study tools. Learning tools are essential for teachers because: (1) they provide recommendations on what a teacher should do in the classroom. Assist in the development of instructional strategies. (2) As a benchmark, learning tools must be evaluated by a trained instructor. To improve, professionals must analyse their learning tools. This is critical for increasing a teacher's professionalism. (3) Learning tools as a medium for increasing professionalism, namely, a teacher's professionalism can be improved with learning tools, implying that learning devices are not enhanced with learning tools, implying that learning tools are not only as administrative completeness, but as a medium for increasing professionalism.

Teacher difficulties discovered at SMP Negeri 30 Medan indicate that the mathematics teacher's preparation of learning instruments in the school is inadequate. The tools employed and how they were arranged did not actively engage students, hence the indicator of problem solving abilities was not achieved. This is evidenced by the teacher's failure to employ the learning model during the learning process. Teachers exclusively employ scientific methods. The teacher does not carry out all steps of utilising a scientific method while learning. For instance, students rarely ask questions while they are learning.

In addition to using learning tools, teachers must focus on using learning models in order to improve students' problem-solving abilities. One of the learning strategies developed to improve problem-solving abilities is the project-based learning (PjBL) model. Purnomo [11] claims that PjBL is a cutting-edge teaching strategy that encourages contextual learning through challenging assignments. PjBL requires students to be able to select themes and presentation/product projects, create final products, and solve real-world problems while involving many disciplines. Students' learning motivation rose as a result of PBL [12].

Aside from selecting a learning technique or learning model that is consistent with the mathematical learning process, selecting the appropriate supplementary media is also critical. One method is to use macromedia flash media. Macromedia flash is a tool used to make animated logos, movies, interactive menus, interactive icon fields, e-cards, screen servers, and site development websites, as well as developing other website applications [13]. Macromedia Flash, according to Masykur [14], is a multimedia platform and programme that may be used to view, play, and run Adobe Flash Player-compatible animation, games, and internet-enrichment applications. The use of macromedia flash as a media learning technique, beneficial to teachers in producing teaching materials and organising learning. This media can also stimulate students' minds so that they can alter concepts and discover the true form of abstract mathematical concepts.

However, throughout the learning process, teachers continue to underutilize technology in the mathematical learning process. In practise, the teacher does not create opportunities for pupils to construct their own mathematical concepts during the learning process; instead, they simply copy what the teacher does. Furthermore, pupils are not given the opportunity to articulate and create their own ideas when answering the teacher's practise questions [15]. Mayasari [16] emphasised that activities consistently carried out by teachers continue to use ordinary learning, resulting in pupils becoming increasingly passive. Furthermore, the provision of media in schools is limited, with only a few media and mathematical teaching tools available.

This also occurred at SMP Negeri 30 Medan, where the teacher did not build learning media by employing existing software on the computer while students were learning mathematics.
Whereas, in order to face the globalisation period and welcome the free market era, it is required to master the development of learning technology, particularly in the form of interactive CDs.

2. Research Method

This is a development study that departs from the Thiagarajan Paradigm (Thiagarajan, Semmel 1974) by creating a learning device based on the PjBL model and aided by macromedia flash. This study will take place at SMP Negeri 30 Medan during the academic year 2021–2022, the even semester. Class VIII students from SMP Negeri 30 Medan served as the study's subjects, while the study's research tool was a model-based learning tool built on the PjBL paradigm and supported by Macromedia Flash. In this work, learning tools are developed using the modified Thiagarajan 4-D development paradigm (define, design, develop, and disseminate). The research school's topic teachers' discussion forum serves as the distribution stage's sole audience. As learning aids, a Learning Implementation Plan (RPP), Student Books, LKPD, research instruments in the form of examinations of students' capacity to solve mathematical problems, student response sheets, and validation sheets were created. Research methods and data collection techniques were put together to evaluate the validity, viability, and effectiveness of the creation of learning tools based on the PjBL paradigm and helped by macromedia flash. The validity of the instrument utilised in this study was evaluated using the learning device validity sheet, which also includes the RPP validation sheet, Student Book, LKPD, and student mathematical problem solving ability test sheets. The feasibility of the instrument utilised in this study was evaluated using the observation sheet on learning implementation. Four learning effectiveness indicators are used to evaluate the efficiency of teaching tools: (1) mastery of mathematical problem-solving abilities if at least 80% of students receive a score of 2.66 or at least a B on the mathematical problem-solving ability test; (2) efficient learning time; (3) positive student responses to learning.

3. Results and Discussion.

3.1. Development of Learning Tool Validation Results

Based on the validation results for each learning device component, "valid" is defined as having an average value of 3.59, 3.71, 3.65, 3.83, and 3.81. According to the expert team's notes, even though the components of the learning tools developed have met the validity criteria, there are still a number of issues that need to be fixed, including the use of language, writing or typing, and displaying images that must adhere to clearly defined conditions. As a result, with a small adjustment notice, this learning device has satisfied the requirements for validity in the "valid" category, according to the expert team's notes.

3.2. Development of Practical Results of Learning Devices

Validity is not the only requirement for good learning aids; practicality is also required. In this study, two practical indicators were determined: the reaction of a team of experts or validators stating that the learning device could be utilised with minor adjustments and the implementation of learning devices in the IO criteria = 3.86 good.
3.3. Development of Learning Device Effectiveness Results

Effectiveness, in addition to practicality, is required for good learning tools. The success of student learning mastery, the teacher's ability to manage learning, and the teacher's capacity to manage learning all received an average of 4, 4 or in the "good" category in this study. and the average of student responses to learning was 84.38%.

a. Problem Solving Ability Test Achievement

It is possible to draw the conclusion that the learning tools have satisfied the effectiveness criteria, indicating that they are already effective for use in learning, based on the results of individual and classical student learning mastery. Table 1 displays the degree of classical completion of the second trial's final mathematical problem-solving test.

<table>
<thead>
<tr>
<th>Category</th>
<th>Total students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>14</td>
<td>87.5%</td>
</tr>
<tr>
<td>Not Complete</td>
<td>2</td>
<td>12.5%</td>
</tr>
<tr>
<td>Amount</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1 shows that in the second trial, the conventional completeness of the final test of students' ability to solve mathematical problems was 87.5%. As a result, it can be concluded that in the second experiment, the development of learning aids based on the PjBL model and aided by macromedia flash met the criteria for gaining classical mastery.

b. Ideal Time Achievement

According to the findings of the analysis of the achievement of the ideal percentage of time for student activities at each meeting for the I and II trials in employing learning tools, there was a significant increase in activity. Table 2 shows a description of the average student observation outcomes in the second trial.

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Percentage of Achievement of Student Activity Ideal Time for Indicator (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>I</td>
<td>20.5</td>
</tr>
<tr>
<td>II</td>
<td>23.4</td>
</tr>
<tr>
<td>III</td>
<td>22.3</td>
</tr>
<tr>
<td>Average</td>
<td>22.07</td>
</tr>
</tbody>
</table>

Table 2. Analysis of the Percentage of Success in the Student's Ideal Period Activities Results

According to the findings of the analysis, the average percentage of students' desired time of achievement for three sessions in learning is 22.07%, 26.8%, 26.87%, 13.9%, 7.78%, and 2.32%. According to the results above, student activity has reached the percentage of achieving the ideal time. Based on the six indicators above, the percentage of student
activity is still on the threshold of the percentage of achieving the ideal time or the tolerance interval of a predetermined time category.

c. Student Response
Student responses to learning and learning tools include both good and negative responses. Positive reactions are distinguished by expressions such as "glad," "new," and "engaged in the components of the problem-based learning device." Negative remarks include phrases like "not happy," "not new," and "not interested in using the components of the learning gadget." Analysis of the data revealed that the student replies to all areas, particularly learning tools, such as student opinions on learning components such as student books, student activity sheets, and student learning outcomes assessments, above 80%, or 84.38%. This implies that students respond positively to every component, and the learning device is changed based on student feedback.

3.4. Improved Troubleshooting Ability
The results of the first and second trials of the problem-solving ability test revealed an improvement in the students' ability to solve mathematical problems. It was found that students' spatial ability had increased based on the average normalised gain with the criteria of "medium" with a score of 0.37 (N-Gain 0.3) in the first trial and an increase in the average value of Gain with the criteria of "moderate" with a score of 0.56 (0.3 N-Gain 0.7) in the second trial. As a result, it is possible to conclude that this designed learning tool can increase students' problem-solving abilities.

3.5. Improving Student Learning Independence
Learning independence skills among students improved between the first and second trials, according to the questionnaire analysis results. In the first trial, the average student learning independence was 80.13, with a standard deviation of 9.82; in the second trial, it was 85.31, with a standard deviation of 11.42.

4. Conclusion
Students at SMP Negeri 30 Medan found that learning resources in the form of RPPs, Student Books, and LKPDs that were produced using Project-Based Learning and Macromedia Flash were legitimate, relevant, and effective for enhancing their mathematical problem-solving skills.

The N-gain in Trial 1 of 0.37 grew to 0.56 on Trial 2, demonstrating an improvement in the students' mathematical problem-solving skills at SMP Negeri 30 Medan who were taught utilising Project Based Learning-based learning tools with assistance from Adobe Flash.

enhancing children's capacity for autonomous learning. In the first trial, the average student learning independence was 80.13, with a standard deviation of 9.82; in the second trial, it was 85.31, with a standard deviation of 11.42.
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Academic Perspective for Digital Transformation of Higher Education in Postgraduate School of Universitas Negeri Medan

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Abstract. One of the most basic requirements for a higher education institution to obtain international standards is the existence of a digital-based academic and administrative service system, systemized through one website page and using an international language. Several assessment indicators from several international accreditation and standardization institutions that are used to measure services at an institution are (1) the expected learning impact; (2) Program content and structure; (3) Learning and Teaching Approach; (4) Assessment; (5) Quality of Academic Staff; (6) Student Support Services; (7) Infrastructure and Facilities and (8) Outputs and Impacts. This paper describes the design of a digital-based and integrated system in the academic field and student services through the website so that it can be easily accessed by users around the world. With this integrated service system, it is easier for any individual or group who wants to interact and have an interest in the Graduate School of the State University of Medan.

Keywords: Digital Transformation; Postgraduate; Academic

1 Introduction

In the Industrial Revolution (RI 4.0) era, a university that will go to a world class university or at least will have an international standard will be able to be seen and known easily from the information system and academic administration services displayed on the website of the institution. Reflecting on universities that are ranked 100 in the world (QS-100), in addition to the quality of human resources (lecturers and academic staff), the administrative and academic service system is an equally important part and determines the success of the lecture programs conducted at the university. The institution visits the official website of the university. Before meeting face-to-face with stakeholders at the university, someone has obtained a lot of information and services through the website provided. As shown by the website of the University of Melbourne, Australia through the https://www.unimelb.edu.au page, it can be seen that almost all information is
related to academics, staff, teaching staff (lecturers), research, facilities, collaborations, lectures, routine activities, how to register, to the latest things currently related to the development of Covid-19 are displayed on the website page.

If further searches are made on the website, either by scrolling down or clicking on one of the information displayed on the home page, the user will get a lot of information. Meanwhile, more detailed information relating to program updating and cooperation can be forwarded by contacting the address or contact person for each field.

The goal of the Postgraduate Program of Universitas Negeri Medan (PPs Unimed) is to become a node for the quality of research-based education at the national and regional levels and to pioneer Unimed as one of the World Class Universities. Postgraduate of Unimed are the locomotive for driving innovation in education, research, and community service carried out by Unimed. The future portrait of the Postgraduate of Universitas Negeri Medan (Unimed) can be seen from the relevance, sustainability, and targets for the realization of the vision, the implementation of the mission, the achievement of the goals set for the short, medium and long term development of PPs Unimed.

Until now, the Postgraduate Program of Unimed manages 25 study programs including 19 (nineteen) Masters's Programs and 6 (Six) Doctoral Programs. The eligibility and credibility of the Unimed Postgraduate Program can be seen from the recognition of external parties for their performance and achievements, including: (1) of the 25 study programs organized by the Postgraduate Program of Unimed, there are 8 (eight) accredited study programs in category A, 2 (two) accredited Superior, 1 (one) accredited Very Good, 10 (ten) study programs accredited B, 1 (one) study program accredited Good, and 4 (four) new study programs; (2) the number of study programs increased by almost 100%, from 13 study programs until 2015 to 25 study programs in 2021, (3) the number of sinta accredited national journals increased by 100%, from 0 in 2015 to 13 journals in 2021, (4) the number of indexed procedures with scopus reputation
and web of science (WoS) increased by 100%, from 0 to 2 in 2020 (AISTEEL International Monday Proceeding and ICOSTA International Proceeding Conference, (5) research and publications for students and lecturers published in accredited national journals, reputable international journals, reputable international journals increased by 100%, from 0 manuscripts in 2015, to 1212 manuscripts in 2021, (6) the number of joint research lecturers of PPs Unimed with foreign educational institutions increased by 100%, from 0 in 2015 to 4 joint research in 2020. The Postgraduate Program also takes part in supporting Unimed's achievements in obtaining external recognition, such as (1) A accreditation rating for Digital Library Management from the Head of the National Library of Indonesia; (2) Ranking in the top 10 at the national level of financial management in Satker status; (3) The best rank 1 financial management at the level of North Sumatra Province; (4) Unimed LAKIP assessment in category B; (5) Rank 19 Green Matric in campus environmental management; (6) Third place at the national level in the field of PPID Management and LAPOR from the Ministry of Research, Technology and Higher Education; (7) Award as a PT at the level of "Informative Enough" in the PPID competition from the Indonesian Central Information Commission.

The eligibility and credibility of PPs Unimed which excels in the education and learning process can be interpreted that PPs Unimed is able to produce graduates who are skilled and competent in ways of thinking (creativity and innovation, critical thinking, decision making, learning to learn, and metacognition), ways of working (communication and collaboration), living in the world (life and carrier, personal and social, responsibility). Excellence in realizing quality learning through the implementation of the KKNI-based curriculum which is fulfilled with Independent Learning and Independent Campus, implementation of Problem-Based Learning and Project Based Learning with Blended/Hybyrd Learning supported by 6 (six) types of tasks (TR, CBR, CJR, RI, MR, and TP), laboratory, field, and seminar learning practices with the application of various innovative learning models and IT/ICT-based learning technology. Postgraduate Unimed has the responsibility to produce educators and education staff, academics, researchers, counselors, prospective leaders of educational institutions with character with academic qualifications of masters (S2) and doctorates (S3) who have broad insights about the world of work, business and industry, and the demands of the needs of society 5.0 in the era of the industrial revolution 4.0 through the implementation of the Independent Learning and Independent Campus (MBKM) curriculum. Excellence in education and learning is realized through the availability of 63 (six three) professors and 324 doctorates according to study program expertise as educational staff, the availability of learning facilities such as the Digital Library as a facility to access various learning resources, online learning system (SIPDA), various types of laboratories, implementation of 6 (six) types of tasks (TR, CBR, CJR, Idea engineering, Mini Research, and TP) and an authentic assessment system. In the implementation of Merdeka Learning and Merdeka Campus, collaboration with various educational institutions at home and abroad has been carried out in carrying out the learning process, general stadiums, national and international scientific seminars, book reviews, joint research, joint publications, and field practice in non-PT institutions and DUDI.
2 Discussion

2.1 Digital Literacy

"The term digital literacy is not new in the world of education, the term digital literacy was first proposed by Paul Gilster (1997:432) as the ability to understand and use information from various everyday sources (Kemendikbud, 2017:7)."

Restianty cites the definition of inquiry "digital literacy according to UNESCO is the ability to use information and communication technology (ICT) to find, evaluate, utilize, create and communicate content or information with cognitive, ethical, socio-emotional skills and technical or technological aspects" (Restianty, 2018: 78)."

Thus, referring to Restianty's opinion, digital literacy questions are more related to technical skills in accessing, compiling, understanding, and disseminating information (Kemendikbud, 2017: 7). "According to Douglas A.J. Belshaw (1997:2) in his thesis What is Digital Literacy? said that there are eight essential elements for developing digital literacy, which is as follows: 1). Cultural, namely understanding the various contexts of users of the digital world; 2). Cognitive, namely the power of thinking in assessing content; 3). Constructive, namely the creation of something expert and actual; 4). Communicative, namely understanding the performance of networks and communications in the digital world; 5). Responsible self-confidence; 6). Creative, doing new things in new ways; 7). Critical in addressing content; and 8). Socially responsible.

The cultural aspect, according to Özden (2018:26), is the most important element because understanding the user context will help the cognitive aspect in assessing content. From some of the opinions above, it can be concluded that digital literacy is knowledge and skills to use digital media, communication tools, or networks in finding, evaluating, using, creating information, and utilizing it in a healthy, wise, intelligent, careful, precise, and effective manner. obey the law to foster communication and interaction in everyday life.

Digital literacy is a set of basic technical skills for using computers and the Internet. In addition, understanding and being able to think critically and evaluate digital media and be able to design multimedia content (Rizvi, Nabi, 2021:7) According to Manderino "digital literacy is the ability to use technology and information from digital devices effectively and efficiently in various contexts such as academic, career, and daily life (Manderino, 2020:7).

According to Mitchell and Turner (2018:43-45), digital literacy is a combination of several forms of literacy, namely: computers, information, technology, visuals, media, and communication. "With these six basic literacy skills, Martin formulated several dimensions. the following digital literacy:"

a) Digital literacy involves digital action skills that are tied to work, learning, fun and other aspects of everyday life.

b) Individual digital literacy varies depending on the daily situations he experiences and also a lifelong process as well as the individual's life situation.

c) Digital literacy involves the ability to collect and use knowledge, techniques, attitudes and personal qualities as well as the ability to plan, execute and evaluate digital actions as part of solving problems/tasks in life.

d) Digital literacy also involves a person's awareness of his level of digital literacy and the development of digital literacy. Based on computer and information literacy."
“Cetindamar and Abedin (2020:1) developed a more comprehensive concept of digital literacy. Cetindamar and Abedin stated that digital literacy involves the following aspects:

1) Knowledge assembly, namely the ability to build information from various trusted sources.
2) The ability to present information including critical thinking in understanding information with awareness of the validity and completeness of sources from the internet.
3) The ability to read and understand non-sequential and dynamic information material.
4) Awareness of the importance of conventional media and connecting it to networked media (internet).
5) Awareness of people's network access that can be used as a source of referrals and help.
6) Use of filters on incoming information.
7) Feel comfortable and have access to communicate and publish information.”

Based on the various definitions above, digital literacy is an individual's preferences, attitudes, and abilities to use digital technology and communication tools such as smartphones, computers, and tablets. Tablet, laptop, and desktop computers to access, manage, integrate, analyze and evaluate information, build new knowledge, create, and communicate with others to participate effectively in society. This definition is in accordance with the Ministry of National Education's explanation that information and communication education capacity (Information and Media Literacy Skills) is the willingness and ability to understand and use various media to communicate various ideas and carry out collaborative and interactive activities with various parties. (BSNP, 2010: 44-45). So that digital literacy is specifically skills related to the mastery of digital resources and devices. The effect of digital applications that the author wants to discuss is that the application of digital literacy is a practice of teaching numeracy in schools (Siti, 2014:117).

Fig. 1. Simple Concept of Technology Acceptance Model

Source: Modified from Davis' theory (1989); Sayekti and Pulasna (2016) TAM Model (Technology Acceptance Model)

From Figure 1 it can be seen that the use of technology or information systems informs the ability and decisions of individuals to use or not to use technology to complete various tasks. In using information systems, users consider the advantages and uses of the system. The TAM model is based on Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Jogiyanto, 2007:331; Soda et al, 2021:1116). TRA is a well-researched intention as a specific model that
has been proven effective in predicting and explaining a person's behavior in the use of different domains.

“TRA has been used to predict behavior in many ways, to react to something, and then become a habit because of the values people believe in. Therefore, behavioral preference is a measure of a person's goal to perform a certain action. Attitude is a person's positive feelings about setting goals and behavioral goals. Based on TRA, users of a system are determined by individual perceptions and attitudes which will ultimately shape a person's behavior in the use of information technology. The use of multiple information systems shows the usefulness and ease of use of information systems. Someone will benefit from an information system on the grounds that it will benefit him (Soda, 2021:1117).”

Sayekti and Pulasna (2016) say that the success of an information technology system is not only determined by how the system can process input and produce information properly but is also determined by its suitability to the work environment because the information technology system uses advanced technology, the system cannot be said to be successful. when users of information systems can not accept it or are even reluctant to use it. The purpose of information technology is to assist humans in solving problems at work and in other activities, this is very helpful for human activities in performance so that they can get maximum results and facilitate human activities. Information technology also supports and opens creativity for someone to do a job in this modern era, to be creative in information technology, someone also increases effectiveness and efficiency in completing work.

Based on the explanation above, it can be concluded that, either directly or indirectly, information technology plays a very important role in the continuity of the organization, especially in helping users to do their work more efficiently and effectively.

“Along with technological advances, learning with technology must be carried out by teachers. Teachers must be smart in choosing which technology and how to use it in learning. Academic success with technology cannot be achieved without teachers. Teachers play an important role as agents and targets of change, facilitators, and technology integrators in the classroom (Hsu, 2015:3). Several research results show a relationship between the use of technology in learning and beliefs about technology. Teachers who apply technology in learning have confidence in the technology. Teachers' knowledge and beliefs about learning with technology determine the extent to which technology will be used in learning (Herring, Koehler, & Mishra, 2016: 38-43). Therefore, teachers need to master technology knowledge.”

Good teaching with technology requires at least three components, namely Pedagogical Knowledge (PK), Content Knowledge (CK), and Technological Knowledge (TK) and the relationship between these components is not an independent part. The three are interconnected to form Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Technological Pedagogical and Content Knowledge (TPACK). Koehler further explained that TPACK represents a collection of knowledge needed by teachers to teach effectively with technology. The technology referred to in TPACK is the use of information technology as proposed by the Committee of Information Technology Literacy of the National Research Council (NRC). The following is an image of the TPACK framework:
TPACK has elements that are an integral and inseparable part of its implementation. The basic TPACK framework can be expressed as having the following elements:

a. Pedagogical Knowledge (PK) is knowledge about processes, practicum and learning methods.

b. Content Knowledge (CK) is knowledge about subject matter in the form of knowledge, facts, concepts, theories, and procedures in certain fields of science.

c. Technological Knowledge (TK) is knowledge about standard technologies such as books, chalk, and whiteboards and modern technologies such as the internet and digital video.

d. Pedagogical Content Knowledge (PCK) initiated by Shulman. This knowledge relates to the representation and formulation of concepts, pedagogic techniques, and knowledge of easy and difficult concepts in learning.

e. Technological Pedagogical Knowledge (TPK) is knowledge about technology used in teaching and learning activities.

f. Technological Content Knowledge (TCK) is knowledge in using technology to present certain biological materials.

g. Technological Pedagogical and Content Knowledge (TPACK) is knowledge about the integration of the three components (pedagogy, content, and technology) in learning. (Koehler & Mishra, 2006:1026-1028).

A teacher can gradually master digital literacy because one level is more complex than the previous one. Digital competence requires knowledge of computers and technology. However, to qualify as a digital culture, a solid understanding of information, images, media and communication is required. Gilster (1997) and Spires (2017:2235) group them into four core competencies that a person needs to possess, so that it can be said that digital literacy includes:

a. Searching the Internet (Internet Searching)

Competency includes several components, namely the ability to search for information on the internet using search engines, as well as perform various activities in it.
b. Hypertext Directions (Hypertextual Navigation)

This competency is a skill for dynamic reading and understanding of the hypertext environment. So someone is required to understand the navigation (guidance) of a hypertext in a web browser which is certainly very different from the text found in textbooks. This competency includes several components including: knowledge of hypertext and hyperlinks and how they work, knowledge of the difference between reading a textbook and browsing via the internet, knowledge of how the web works including knowledge of bandwidth, http, html, and url, as well as the ability to understand webpage characteristics.

c. Information Content Evaluation

This competency is a person's ability to think critically and provide an assessment of what is found online accompanied by the ability to identify the validity and completeness of information referenced by hypertext links. This competency includes several components, including: the ability to distinguish between display and information content, namely the user's perception of understanding the appearance of a visited webpage, the ability to analyze background information on the internet, namely the awareness to explore further about sources and creators of information, the ability to evaluate a webpage by understanding the various domains for each particular institution or country, the ability to analyze a webpage, and knowledge of FAQs in a newsgroup/discussion group.

d. Knowledge Assembly

This competency is an ability to organize knowledge, build a collection of information obtained from various sources with the ability to collect and evaluate facts and opinions properly and without prejudice. This is done for certain purposes, both education and work. This competency includes several components, namely: the ability to search for information via the internet, the ability to create a personal newsfeed or notification of the latest news that will be obtained by joining and subscribing to news in a newsgroup, mailing list or other discussion group that discusses or discusses a topic. certain needs or specific problem topics, the ability to cross-check or double-check the information obtained, the ability to use all types of media to prove the truth of the information, as well as the ability to compile the sources of information obtained on the internet with real life that are not connected to the network.

"Based on the theory above, an index can be built to evaluate the ability to enrich digital skills as a research tool (Internal Validity Construct) as follows: a) internet searching, b) information content evaluation (content evaluation), c) knowledge compilation (knowledge assembly)."

2.2. International Standardization of Study Programs

International Accreditation. Based on the Regulation of the Minister of Education and Culture Number 5 of 2020 concerning Accreditation of Study Programs and Universities and the Decree of the Minister of Education and Culture No. 83/P/2020 concerning International Accreditation Institutions it is stated that study programs that have obtained international accreditation can be directly equalized by BAN-PT with superior predicate. In other words, study programs that have obtained international accreditation no longer need to compile documents (forms) as in general, which consist of Self Evaluation Reports (LED) and Study Program Performance Reports (LKPS). This policy turned out to have a major impact on the study program management system in universities. Study programs that have been accredited with rank A by BAN-PT are widely encouraged by universities to take part in international accreditation. Apart from the reason for getting international recognition, the proposal for
international accreditation is considered a study program to avoid the long process of the BAN-PT accreditation system. It is known that every study program and university must be visited by BAN-PT as part of a series of higher education national accreditation processes. With this policy from the Ministry of Education and Culture, several international accreditation institutions such as EQAR (European Quality Assurance Register for Higher Education); CHEA (Council for Higher Education Accreditation); USDE (United States Department of Education); Accreditation Board for Engineering and Technology (ABET); APQR (Asia Pacific Quality Register); The Accreditation, Certification and Quality Assurance Institute (ACQUIN) and several other international accrediting institutions are gaining a huge market for accrediting study programs in Indonesia. The trend to get international accreditation is getting higher in Indonesia in line with the Postgraduate Director's Key Performance Indicators (IKU) related to the number of study programs in PPs Unimed that are internationally accredited in 2021.

International Certification. The international certification body that is very trending in Indonesia today is the ASEAN University Network-Quality Assurance or AUN-QA. ASEAN University Network (AUN) is a network organization between universities in ASEAN. This institution has the main goal of strengthening and expanding cooperation in the field of higher education among countries in Southeast Asia. AUN has several focuses, to facilitate regional cooperation in the development of education in Southeast Asia [8]. These focuses are (1) strengthening the existing cooperation network between universities in ASEAN and its surroundings; (2) promote collaborative study, research and education programs in priority areas identified by ASEAN; (3) promote cooperation and solidarity between scientists, academics and researchers in ASEAN Member States; and (4) serving as a policy-oriented body in higher education in the ASEAN region.

One form of this collaboration is the quality assurance of the implementation of education in study programs at ASEAN universities, known as AUN-QA. AUN Quality Assurance (AUN-QA) is one of the activities carried out by AUN which aims to guarantee the quality of study programs that are members of AUN, which is a form of quality monitoring from AUN. This activity is carried out through a systematic, structured, and continuous measurement process for its member universities. AUN QA is an assessment, and not an accreditation. The assessment is carried out independently (self-assessment) by writing a SAR (Self-Assessment Report). This process is followed by confirming the completeness of the documents and determining the Action for Improvement of the SAR results. After compiling the SAR, then a visitation process was carried out by a team of reviewers from AUN members from other ASEAN countries to provide input on the self-assessment that had been carried out by study programs at various universities.

Based on the search results of the AUN-QA assessment guide version 4.0 issued by the ASEAN University Network (ASEAN University Network), it is known that the assessment component consists of 8 criteria, namely:

1. Expected Learning Impact
2. Program content and structure
3. Learning and Teaching Approach
4. Rating
5. Quality of Academic Staff
In more detail, the eight assessment criteria above can be shown in the form of an AUN-QA program-level assessment model as shown in Figure 3 below:

![AUN-QA assessment model at program level version 4.0](image)

**Fig. 3.** AUN-QA assessment model at program level version 4.0

Based on Figure 3, it can be explained that the implementation of activities in the study program begins with an understanding of the needs of internal and external stakeholders for the academic program in the study program. This need is formulated into the expected learning impact that will drive all components. There are three rows in the middle of the model. The first line describes issues on program content and structure, teaching and learning approaches used and how students will be assessed. The second line describes related to the resource requirements to run the program. Some of them are academic staff (promotion, management performance, research management, etc.), student support services (support staff, library, clinic, social environment, etc.) and infrastructure (classrooms, IT facilities, recreational facilities, etc.).

The third line focuses on explanations related to program outputs. This explains about the quality of graduates, job vacancies information, research outcomes, stakeholder satisfaction, etc. The rightmost column directs how to meet the needs of stakeholders.

Of the eight AUN-QA assessment criteria, the elaboration and development of observation instruments is carried out to determine the real state of the study program to be certified.

**ISO 9001:2008 Quality Management System.** The International Standards Organization (ISO) is a body that regulates the certification or ratification of a standard [3]. Meanwhile, ISO 9001:2008[3] is an international standard for quality management systems (quality). ISO 9001:2008 establishes the requirements and recommendations for the design and assessment of a quality management system, which aims to ensure that the organization will provide products
(goods or services) that meet the specified requirements. The main thought of PDCA (Plan-Do-Check-Action) can be explained as in Figure 1. Quality management system requirements for ISO 9001:2008, based on SNI-ISO 9001:2008 issued by the Indonesian National Standards Agency, the ISO quality management system has a content section and the explanation can be seen in Table 1.

2.3. Unimed Graduate Program Profile

The beginning of the formation of the Unimed Postgraduate Program has been stated in the 2017 Unimed Postgraduate program book. The Medan State University Postgraduate Program (PPs Unimed) was established in 2000 through the issuance of the Unimed Rector Decree (SK) No. 011/K10.KEP/KP. 02.18/2000 dated 21 December 2000. Subsequently, the UNIMED Graduate Program Management Structure was formed through the issuance of UNIMED Chancellor's Decree No. 012/K10/KEP/PP/2001 dated 03 January 2001, where Prof. Dr. Usman Pelly, MA was appointed as the Coordinator. The Master Program in Applied English Linguistics (LTBI) is the first Study Program (Prodi) organized by PPs UNIMED through the issuance of SK Dikti No. 313/DIKTI/KEP/2000 on September 1, 2000. The following year, PPs Unimed again opened two study programs, namely the Master of Education Administration Study Program and Master of Educational Technology through the issuance of an operating permit from DIKTI through Decree No. 97/DIKTI/Kep/2001 and No. 02/DIKTI Kep/2001. In 2004, PPs Unimed was trusted to open a new study program, namely Chemistry Education Master's Degree Study Program in accordance with SK Dikti No. 686/D/T/2004 dated February 18, 2004. From 2006 to 2007 the number of study programs increased with the issuance of permits to administer the Social Anthropology Master's Degree Study Program through Decree No. 1183/D/T/2006, Master's Degree Study Program in Economics through Decree No. 1923/D/T/2006, Master of Mathematics Education Study Program with Decree No. 1509/D/T/2007 and Basic Education Master's Degree Study Program with Decree No. 2460/D/T/2007. Subsequently, in 2008 the Doctoral Program in Education Management and the Masters Program in Biology Education were opened according to Decree No. 546/D/T/2008. In 2009 the Doctoral Program in Educational Technology was opened in collaboration with the Universitas Negeri Jakarta.

In the period from 2010 to 2017, the Postgraduate Program again opened a new study program, namely the Master's Program in Physics Education which was stipulated in Decree No. 139/D/O/2010, Masters Program in Indonesian Language and Literature Education (Dikbin) according to Decree No. 158/E/O/2014, Masters Program in Sports Education (Dikkor) according to Decree No. 385/E/O/2014, Masters Program in Sports Science according to the Decree of the Minister of Research, Technology and Higher Education No. 50/KPT/I/2016, Masters Degree in Accounting according to the Decree of the Minister of Research, Technology and Higher Education No. 249/KPT/I/2016, Economic Education Master's Degree Study Program according to the Decree of the Minister of Research, Technology and Higher Education No. 128/KPT/I/2017, and French Language Education Master's Degree Study Program according to the Decree of the Minister of Research, Technology and Higher Education No. 357/KPT/I/2017. With the increase in the number of master study programs, in October 2016 PPs Unimed was mandated to hold four doctoral programs, namely Educational Technology, English Applied Linguistics, Chemistry Education, Basic Education study programs through the issuance of Minister of Research, Technology and Higher Education Decree No. 414/KPT/I/2016 dated October 13, 2016. Following scientific developments and public interest in pursuing further education at a higher level, in 2020 PPs Unimed proposes the opening of
new study programs, namely a Masters's Degree in Physics, a Masters's Degree in Chemistry, and a Masters Program in Chemistry S3 Mathematics Education.

Until now, the Unimed Postgraduate Program has developed 24 study programs for masters and doctors. Of the 24 study programs held by the Unimed Postgraduate Program, there were 8 (eight) study programs with A accreditation and 12 (twelve) study programs with B accreditation, and 4 (one) new study programs.

1. Vision, Mission, Goals, Strategy, and Values

Unimed's vision, mission, goals, strategic goals, and values are stated in the 2016-2020 Strategic Plan book. The book contains hopes with the academic community individually, and in groups, overshadowing the vision of the study program and science, the results of the PPs Unimed self-evaluation study, depending on the VMTS Unimed, analysis to internal and external needs of stakeholders and paying attention to the RPJM and Strategic Plan of Kemristekdikti 20162020. Designing Vision, Mission, and Objectives, based on the Decree of the Unimed PP's Director Number 0079A/UN33.27/KEP/AK/2016, the Strategic Targets and Values of the Unimed Graduate Program are:

**Vision**

Graduate Program that excels in learning and research in education, humanities, science, and technology recognized at national, regional, and international levels.

The mission, objectives, and strategic objectives of the Unimed Postgraduate are described as follows:

**Mission**

1. Organizing competency-based quality learning in line with the development of science and technology-OR.
2. Creating an academic atmosphere and culture to foster scientific attitudes, trust, fairness, and creativity in the academic community.
3. Conducting research based on issues of education, business, and industry.
4. Building partnership networks for education, research, and community service at the local, national, regional, and international levels.
5. Building cooperation with educational institutions, businesses, and industry related to the implementation of research and development of Science and Technology-OR.

**Goals**

1. Produce graduates who are competent, professional, and competitive in the fields of education, humanities, science, and technology.
2. To produce graduates who have a scientific attitude, trust, fairness, creativity, and a national perspective.
3. Produce research-based scientific work as a solution to problems in education, business, and industry.
4. Produce research-based science and technology-OR innovation products that are useful for improving people's welfare.
5. Generate recognition of the quality of graduates and Unimed Postgraduate institutions based on partnerships in education, research, and community service at the national, regional, and international levels.
6. Disseminate and implement IPTEKS-OR products based on partnerships in education, research, and community service at the local, national, regional, and international levels.
7. Generate cooperation between postgraduate programs and stakeholders.

**Strategy**

In connection with the Indonesian Development Nawacita, the Ministry of Research, Technology and Higher Education's RPJM, L-RAISE for the development of higher education, the Unimed development program, and the 2016-2020 PPs Unimed Strategic Plan, there are 14 (fourteen) strategies for the development of the Unimed Postgraduate Program, namely:

1. Innovating to find a New Paradigm of Learning, Research, and Community Service that ensures the involvement of the parties and the empowerment of the potential of PPs Unimed;
2. Expanding access to education through the opening of new Masters and Doctoral Study Programs.
3. Increasing the relevance of graduates through strengthening the implementation of the Curriculum Based on the Indonesian National Qualifications Framework and National Higher Education Standards.
4. Strengthening quality academic services based on student active resources learning in each study program through updating learning resources, the relevance of lecturers' expertise, improving the quality of product-based research, and scientific publications in reputable international journals.
5. Strengthening academic administration services through the online system.
6. Improving the quality of the academic atmosphere through the implementation of professorship programs (national/international seminars, book reviews, educational parks and clinics, research, and school conservation) regularly.
7. Strengthening the acquisition of study program accreditation and piloting the acquisition of international accreditation.
8. Strengthening accountability and transparency of academic and financial administration of PPs Unimed.
9. Improve cross-sectoral coordination, both internally and externally to build an understanding of views on the domains of planning, control, quality assurance and quality culture;
10. Mapping the roles of all lines based on internal control to determine the main indicators of program success and their measurement;
11. Develop a new pattern of training for competency-based staff (CBT: Competency Based Training) that ensures staff reliability to accelerate program achievement;
12. Increasing the synergy of work units and the utilization of available resources in optimizing quality academic services oriented towards teaching, research, and institutional entrepreneurship;
13. Cooperating with domestic and foreign stakeholders in an effort to equalize the competence of graduates with regional and international competitiveness.
14. Strengthen the implementation of monitoring and internal control systems to ensure the accuracy of the execution of corrective actions (Continuous Quality Improvement).
Values

Universitas Negeri Medan is referred to as The Character Building University, thanks to its goal to shape the character of the nation's children, accompanied by an excellent Motto, namely working with sincerity and truth. The organizational culture formed and owned by all PPs Unimed academicians is applied in academic services, administration, research, and community service, namely a scientific culture, turning problems into opportunities, working creatively and innovatively and having knowledge of nationalism. This is practiced through the vision, mission, goals of each Study Program.

3 Conclusion

The era of the industrial revolution (RI 4.0) as it is today, a university that will go to a world class university or at least will have an international standard will be seen and known easily from the information system and academic administration services displayed on the website of the institution. Several assessment indicators from several international accreditation and standardization institutions that are used to measure services at an institution are (1) the expected learning impact; (2) Program content and structure; (3) Learning and Teaching Approach; (4) Assessment; (5) Quality of Academic Staff; (6) Student Support Services; (7) Infrastructure and Facilities and (8) Outputs and Impacts. This condition encourages the Postgraduate Program of Universitas Negeri Medan to become a node for the quality of research-based education at the national and regional levels and to pioneer Unimed as one of the World Class Universities. This is supported by digital literacy which aims to increase effectiveness and efficiency in obtaining information.

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Correlation Between Learning Motivation and Mathematics-Creative Thinking Ability

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Abstract. The research aims are as follows: describing the student's learning motivation and mathematics-creative thinking ability; testing their correlations; and calculating the contribution percentage of the learning motivation to the increase in the student's mathematics-creative thinking ability. The total sample size is 619 students from ten primary schools. Data was collected by two methods, as follows: a questionnaire and a test. There are sixteen questions in the learning motivation questionnaire and one open-ended question on the student's mathematics creative thinking ability test. The data is analysed quantitatively. The correlation between the learning motivation and the students' mathematics-creative thinking ability was analysed by using Pearson Product-Moment Correlation with $\alpha = 5\%$ and $N = 619$. The research showed that learning motivation and five of its indicators have positive and significant correlations and have contributed to the increase with a student’s mathematics creativity ability and three of its indicators.

Keywords: learning motivation, correlation, mathematics, creative thinking ability.

1 Introduction

Motivation is defined as an individual's will, desire, and desire to encourage others to engage in activities [1]. Motivation plays an important role in the learning process [2], because motivation can foster self-motivation, curiosity, and being active in learning, so that students are encouraged to study more seriously [3]. Learning motivation is a psychological condition that encourages someone to do something, and also acts as a driving force to cause learning activities so that learning objectives will be achieved [4-7]. Motivation is an urge to learn according to needs and the necessity to become an educated and knowledgeable person with essential goals [8].

Some students' own-self learning motivations are as follows: the desire to acquire skills, obtain information and understanding, develop an attitude to succeed, and enjoy life [6]. Students' learning motivation can be moved in some ways as follows: giving points; working in a group; assessments; field trips and excursions; educational films; learning through radio; clear goals; great interest; giving prizes; competing; giving tests; compliments [6, 8-9].
There are some indicators to measure motivation as follows: the desire [10] and the wish to succeed; the encouragement and needs in learning; the hopes and aspirations for the future; the learning appreciation; and interesting activities [11]. The desire and wish for success have five sub-indicators as follows: active to learn, nice to learn, not hopeless to learn too quickly, not satisfied with the results obtained too quickly, and tenacious to face the learning difficulties [7]. The drive and needs for learning have four sub-indicators as follows: having clear learning goals, being curious, having feedback, and being interested in learning. Hope and ambition for the future have two sub-indicators as follows: looking for things related to learning and perseverance in learning. The interesting learning activities have three sub-indicators as follows: avoiding punishment, receiving praise (an award), and achieving in class. A conducive learning environment has two sub-indicators as follows: comfortable learning place, and interested in teacher’s teaching way in class. Curiosity means that learning is not just knowing but also exploring further to give meaning to what is obtained in the learning process [12-15]. Curiosity is needed to get the relationship between concepts to solve problems.

Rewards and punishments can affect students’ learning motivation [16]. Awards are given to students as expressions of appreciation, while punishments are given to students for wrong actions. Students enjoy receiving awards [17]. Interest in learning and a conducive learning environment had an influence on students’ learning motivation. Students who do not have an interest in learning and are not supported by a conducive learning environment tend to weaken their ability and motivation to learn.

Students who do not have learning motivations will certainly not carry out the learning activities [18]. Learning motivation greatly influences a student’s learning success [19]. An increase in student motivation is directly proportional to an increase in learning outcomes [20]. There is a close correlation between learning motivation and a student’s learning outcomes [21]. Learning outcomes are influenced by a student’s learning creativity. Creativity is the ability to create something new, to give new ideas in problem solving, to see new relationships between elements [22-29]. Creativity is defined as the process of creating unique, unusual, useful, and adaptable works [25, 30-31]. Creativity as a theoretical approach is a multi-component process that not only involves cognitive and ability aspects but also affective, motivational, and other characteristics through social and cultural interactions [32]. This process gives rise to some new understanding, idea, practical solution, or product that is meaningful to the individual.

Creativity is the result of a creative thinking process. Creative thinking involves several ways in the thought process, including reasoning, association, and disclosure [33]. The thinking process is defined as activities that receive, remember, give critical analysis, and use the results for problem solving. In relation to mathematics, mathematics-creative thinking is a combination of logical and divergent thinking. When someone thinks creatively to solve a problem, intuitive divergent thinking generates many ideas [34-36].

Creative thinking ability has indicators as follows: fluency, flexibility, originality (novelty), elaboration [34, 35-38], and metaphorical thinking [39]. Fluency refers to the quantity of output; flexibility refers to several changes as follows: meaning, interpretation, use of something, settlement strategy, and/or direction of thought; originality (novelty) refers to a unique, uncommon, or unusual product; and elaboration refers to the detailed steps for creating a work plan [40]. Fluency refers to the many correct ideas, responses, or answers; 2)
flexibility refers to the many correct ideas, responses, or answers that come from different viewpoints, approaches, or thinking; 3) originality refers to the many correct ideas, responses, or answers that have unique, novel, or uncommon forms; 4) elaboration refers to the many correct ideas, responses, or answers that have detailed, coherent, or developed problem steps to solve the problems [41].

Motivation and creativity can spur activity and initiative, as well as direct and sustain learning persistence. Learning motivation and students’ learning creativity have a positive and significant correlation, with a correlation coefficient of 0.997 [42]. Achievement motivation and creative thinking ability have a positive and significant correlation, with a correlation coefficient of 0.475 and a significant value of 0.000 < 0.005 [43]. Students who have high motivation will also have high enthusiasm for learning [44]. Students motivate themselves to achieve something and are not easily discouraged. Learning motivation and a student’s creative thinking ability have significant and strong correlations with the value of $r_{xy} (0.665) > r_{table} (0.312)$ and $t_{test} (5.489) > t_{table} (2.024)$.

1.1 Research questions

The research questions are as follows:
1. What is the student's learning motivation and mathematics-creative thinking ability?
2. Is there any positive and significant correlation between learning motivation and a student’s mathematics-creative thinking ability?
3. How much is the contribution percentage of the learning motivation to the increase in the student’s mathematics-creative thinking ability?

1.2 Research aims

1. Describing the student's learning motivation and mathematics-creative thinking ability.
2. Testing the correlation between learning motivation and a student’s mathematics-creative thinking ability.
3. Calculating the contribution percentage of the learning motivation to the increase in the student’s mathematics-creative thinking ability.

2 Methods

The research was held in ten primary schools, namely seven state primary schools and three private primary schools in Medan City-Sumatera Utara Province-Indonesia. This research is quantitative. There are two main variables to be searched for in this research, namely: learning motivation (X), and mathematics-creative thinking ability (Y).

2.1 Population and sample

The research population is all students in primary schools in Medan City. The total sample is 619 students from ten primary schools, with an average of 60–65 students per school. There are 320 female samples and 299 male ones. They are the fifth or sixth grade students in their primary school age group (12–14 years old).
2.2 Data collection methodology

The research data was collected by two methods as follows: a questionnaire and a test. There are sixteen questions in the learning motivation questionnaire, which were arranged according to each indicator and sub-indicator as mentioned in Table 1. There are five choice options in each question of the learning motivation questionnaire to be chosen by the respondents (students), namely from 1 to 5 (scale 5). The number "1" means the lowest learning motivation and the number "5" means the highest learning motivation. A score is given according to the number in the choice option, namely from a score of 1 until 5. The minimum score is one, and the maximum score is five.

There is 1 open-ended question on the student’s mathematics creative thinking ability test, which is designed based on the material of two-dimensional figures. An open-ended question has multiple or more than one correct answer.

Validation and reliability tests were also performed for the learning motivation questionnaire. The validation test used Pearson Product-Moment Correlation with \( \alpha = 5\% \) and \( N = 619 \). The reliability test used Cronbach’s Alpha with \( N = 619 \) (the number of respondents) and \( n = 16 \) (the number of questions). All the sixteen questions in the learning motivation questionnaire are valid with each of \( r_{xy} > r_{table} \). The result of the reliability test is 0.947, which is very high [46]. It means that the learning motivation questionnaire is reliable and acceptable.

2.3 Technique for data analysis

The research data is analysed quantitatively. The learning motivation and the student’s mathematics-creative thinking ability are analysed by converting the score into a value. The score total of the learning motivation is divided by 5 (maximum score) and then multiplied by 100, with the maximum value of 100 and the minimum value of 0. There are five indicators of learning motivation (X) whose scores are converted into values. They are as follows: desire and wish for success (X1), drive and need for learning (X2), hope and ambition for the future (X3), interesting learning activities (X4), and a conducive learning environment (X5).

The quantity of the converted score of mathematics-creative thinking ability is different for each of the three indicators of creative thinking ability (Fluency (Y1), Flexibility (Y2), and Novelty (Y3)). It depends on the difficulty level of giving ideas, responses, or answers. The score total of mathematics-creative thinking ability is divided by 20 for the indicator "fluency", and 33.33 for each of the indicators "flexibility and novelty", with a maximum value of 100, and a minimum value of 0.

The categories of learning motivation and mathematics-creative thinking ability are as follows: very low (0–54), low (> 54–64), moderate (> 64–79), high (> 79–89) and very high (> 89–100) [47].

The correlation between the learning motivation and the students’ mathematics-creative thinking ability was analysed by using Pearson Product-Moment Correlation with \( \alpha = 5\% \) and \( N = 619 \). The categories of correlation are as follows: very low (0.000-0.199), low (0.200-0.399), moderate (0.400-0.599), high (0.600-0.799) and very high (0.800-1.000) [48]. The correlation significance test between the learning motivation (X) and the student’s mathematics-creative thinking ability (Y) is calculated by using \( t_{test} \), with the condition that \( t_{test} \leq t_{table} \) = not significant, and \( t_{test} > t_{table} \) = significant.
The contribution of the learning motivation to the increase of a student’s mathematics-creative thinking ability is calculated by using the formula of determination coefficient \( r^2 \times 100\% \), with \( r \) = coefficient correlation [49].

3 Findings

3.1 Students’ learning motivation & mathematics creative thinking ability

The results of the students’ learning motivation and mathematics creative thinking ability can be seen in Table 1.

Table 1. The results of the students’ learning motivation and mathematics creative thinking ability

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (Me)</th>
<th>Standard Deviation (SD)</th>
<th>The number of students in each category (persons)</th>
<th>Mean (Me)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Very low</td>
<td>Low Moderate</td>
</tr>
<tr>
<td>( X_1 )</td>
<td>57.906</td>
<td>21.057</td>
<td>357</td>
<td>79</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>59.871</td>
<td>20.904</td>
<td>302</td>
<td>72</td>
</tr>
<tr>
<td>( X_3 )</td>
<td>55.557</td>
<td>20.221</td>
<td>368</td>
<td>86</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>52.526</td>
<td>15.710</td>
<td>431</td>
<td>50</td>
</tr>
<tr>
<td>( X_5 )</td>
<td>52.246</td>
<td>21.516</td>
<td>368</td>
<td>109</td>
</tr>
<tr>
<td>( Y_1 )</td>
<td>62.359</td>
<td>26.879</td>
<td>229</td>
<td>183</td>
</tr>
<tr>
<td>( Y_2 )</td>
<td>54.545</td>
<td>26.510</td>
<td>304</td>
<td>0</td>
</tr>
<tr>
<td>( Y_3 )</td>
<td>43.614</td>
<td>28.797</td>
<td>420</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1 shows that all SDs of research variables are less than the mean (Me). It means that the SD value is getting closer to the Me value. The lower and lower SD values will be getting closer to the Me value, or the higher and higher SD values will be widening the range of data variations. The variable of the drive and need for learning (\( X_2 \)) has a higher mean (59.871) and the number of students who got very high levels of learning motivation (93 students) than the other variables. The variable of the drive and need for learning (\( X_2 \)) also has the number of students (73+79+93 = 245 students), or 39.580% of the 619 respondents who have a score/value > 64 or level/category > moderate. It means that the variable "drive and need for learning" (\( X_2 \)) contributes more to the student’s learning motivation than other variables.

Table 1 also shows that the Me value of the student’s mathematics-creative thinking ability is different for each of the three indicators. The indicator of fluency has the highest Me value (62.359) and most of the number of students who got the very high mathematics creative thinking ability (153 students) of the two other indicators. It depends on the level of difficulty in giving the variety of unique, novel, and uncommon answers. The indicators of flexibility and novelty need more and more unique/ uncommon answers than the indicator of fluency.

3.2 Correlation test between learning motivation and mathematics creative thinking ability

Table 2 shows the results of the correlation test between learning motivation and mathematical creative thinking ability.
Table 2. Correlation test between learning motivation and mathematics creative thinking ability

<table>
<thead>
<tr>
<th>Variable (X)</th>
<th>Variable (Y)</th>
<th>$r_{xy}$</th>
<th>Correlation category</th>
<th>$t_{test}$</th>
<th>$t_{table}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning motivation (X)</td>
<td>Mathematics creative thinking ability (Y)</td>
<td>0.7584</td>
<td>High</td>
<td>28.8997</td>
<td>1.6472</td>
</tr>
<tr>
<td>Desire and wish for success (X1)</td>
<td>Fluency (Y1)</td>
<td>0.7298</td>
<td>High</td>
<td>26.5186</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility (Y2)</td>
<td>0.6211</td>
<td>High</td>
<td>19.6843</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novelty (Y3)</td>
<td>0.6255</td>
<td>High</td>
<td>19.9120</td>
<td></td>
</tr>
<tr>
<td>The drive and need for learning (X2)</td>
<td>Fluency (Y1)</td>
<td>0.7297</td>
<td>High</td>
<td>26.5097</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility (Y2)</td>
<td>0.6359</td>
<td>High</td>
<td>20.4661</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novelty (Y3)</td>
<td>0.6103</td>
<td>High</td>
<td>19.1387</td>
<td></td>
</tr>
<tr>
<td>Hope and ambition for the future (X3)</td>
<td>Fluency (Y1)</td>
<td>0.5462</td>
<td>Moderate</td>
<td>16.1974</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility (Y2)</td>
<td>0.4327</td>
<td>Moderate</td>
<td>11.9227</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novelty (Y3)</td>
<td>0.5162</td>
<td>Moderate</td>
<td>14.9719</td>
<td></td>
</tr>
<tr>
<td>Interesting learning activities (X4)</td>
<td>Fluency (Y1)</td>
<td>0.5390</td>
<td>Moderate</td>
<td>15.8938</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility (Y2)</td>
<td>0.4482</td>
<td>Moderate</td>
<td>12.4554</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novelty (Y3)</td>
<td>0.5031</td>
<td>Moderate</td>
<td>14.4592</td>
<td></td>
</tr>
<tr>
<td>A conducive learning environment (X5)</td>
<td>Fluency (Y1)</td>
<td>0.5528</td>
<td>Moderate</td>
<td>16.4777</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility (Y2)</td>
<td>0.4554</td>
<td>Moderate</td>
<td>12.7073</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novelty (Y3)</td>
<td>0.4891</td>
<td>Moderate</td>
<td>13.9279</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows that all $r_{xy}$ values of variables are positive, and the $t_{test}$ values of variables are greater than $t_{table}$. It means that 1) there is a positive and significant correlation between learning motivation (X) and mathematics-creative thinking ability (Y); 2) there is a positive and significant correlation between desire and wish for success (X1) and fluency (Y1); there is a positive and significant correlation between desire and wish for success (X1) and flexibility (Y2); and there is a positive and significant correlation between desire and wish for success (X1) and novelty (Y3); 3) there is a positive and significant correlation between the drive and need for learning (X2) and fluency (Y1); there is a positive and significant correlation between the drive and need for learning (X2) and flexibility (Y2); and there is a positive and significant correlation between the drive and need for learning (X2) and novelty (Y3); 4) there is a positive and significant correlation between hope and ambition for the future (X3) and fluency (Y1); there is a positive and significant correlation between hope and ambition for the future (X3) and flexibility (Y2); and there is a positive and significant correlation between hope and ambition for the future (X3) and novelty (Y3); 5) there is a positive and significant correlation between interesting learning activities (X4) and fluency (Y1); there is a positive and significant correlation between interesting learning activities (X4) and flexibility (Y2); and there is a positive and significant correlation between interesting learning activities (X4) and novelty (Y3); 6) there is a positive and significant correlation between a conducive learning environment (X5) and fluency (Y1); there is a positive and significant correlation between a conducive learning environment (X5) and flexibility (Y2); and there is a positive and significant correlation between a conducive learning environment (X5) and fluency (Y3).

3.3 Learning motivation's contribution to the improvement of students’ mathematics-creative thinking ability

The contribution of learning motivation to the increase of students’ mathematics creative thinking ability can be seen in Table 3.
Table 3 shows that the learning motivation has a contribution of 57.512% to the increase in the students’ mathematics creative thinking ability. The variables of desire and wish for success (X₁) and the drive and need for learning (X₂) have the highest contributions (53.266% and 53.249%) of the other variables, to give the fluency of various answer alternatives. The two variables contribute more to increasing the students’ mathematics creative thinking ability than the other variable.

4 Discussion

There are some research findings to be discussed in this article, namely: 1) desire and wish for success, the drive and need for learning, hope and ambition for the future, interesting learning activities, and a conducive learning environment contribute to the student’s learning motivation. The drive and need for learning have the highest Me value of them all; 2) the Me value of mathematics-creative thinking ability for one student is different in each of its indicators. The indicator of fluency has the highest Me value and most of the students who got the very high mathematics creative thinking ability of the other two indicators (flexibility and novelty); 3) learning motivation has a positive and significant correlation with a student’s mathematics-creative thinking ability. Five indicators of learning motivation also have positive and significant correlations with three indicators of creative thinking ability, and 4) learning motivation has a contribution to the increase in the students’ mathematics creative thinking ability. Five indicators of learning motivation have also contributed to three indicators of creative thinking ability each. The desire and wish for success, as well as the drive and need for learning, contribute the most to the fluency of various answer alternatives.

First, the research finding (1) is supported by [7], who said that the desire to become an expert and educated individual; learning with an interest; and learning with the feelings of pleasure are intrinsic learning motivations that come from students themselves to support learning. Extrinsic learning motivations include learning for obligations; learning for needs; learning for
rewards; learning for increasing prestige; learning to receive praise from teachers, parents, and friends; and learning to avoid punishment or to get rewards.

According to [8], every student has a different learning motivation. Some students have learning motivation for just avoiding the worst value or teacher’s punishment or just getting the high value. Meanwhile, some other students have the learning motivation to really increase their knowledge and insight. Giving praise to motivate the students to learn is much better than being motivated because of avoiding the teacher’s punishment. Every student likes praise and dislikes punishment. Giving awards to students for their work accomplishments is an example of praising them. This gives them encouragement to further improve their work performance. In contrast to praise, punishment is given to students with the aim of stopping their negative behavior. The frequency of students’ errors is expected to be reduced after being given punishments.

According to [50] opinion in their research finding, a conducive learning environment can stimulate and motivate students to be interested in learning. The teacher manages the learning situation wisely to motivate them to learn. Teachers give the maximum attention to students, especially those whose learning outcomes are lower than other students. Teachers must be more observant of the students’ learning conditions. Teachers should provide motivation and explain the learning objectives, so that students are more motivated to participate in learning activities. Learning motivation plays an important role in supporting the learning spirit to achieve the students’ desired learning goals.

Second, the difference in the mathematics creative thinking ability of one student in each of its indicators is caused by the different difficulty level in giving the answer alternatives in each of its indicators. The indicator of novelty is the most difficult level of the 2 other indicators, and the indicator of fluency is the easiest level of the 2 other indicators. The research finding (2) is supported by [51], who said that there are 3 indicators of creative thinking ability, namely: fluency, flexibility, and novelty. The three indicators are distinct and can function independently. Students with diverse backgrounds and abilities have varying mathematical and creative thinking abilities, depending on their ability level or the influence of their environment. Thus, it means that there will be a possible creative thinking level according to the students’ learning achievement in each of the 3 indicators of creative thinking ability. There will be students who are able to reach all 3 indicators at once, or 2 indicators, or just 1 indicator. Creativity has different production abilities in each of its indicators, namely: fluency, flexibility, originality, and elaboration [46].

Third, the research finding (3) is supported by some opinions that say that there is a positive and significant correlation between the learning motivation and the student’s mathematics creative thinking ability [46, 52-54]. According to [46], learning motivation will increase the desire to learn, so that creativity will also increase. One of the factors that can encourage the individual's creativity is the student's own encouragement (intrinsic learning motivation). Every individual has the tendency or drive within himself to be creative, to realize his potential, to reveal and activate all his capacities. This drive is the primary motivation for creativity when individuals form new relationships with their environment. According to [41] in [46] article, individuals must have intrinsic motivation to do something on their own accord, in addition to being supported by attention, encouragement, and training from the environment.
According to [52], intrinsic learning motivation has a more significant correlation with creative thinking ability than extrinsic learning motivation. It is not dependent on the encouragement and correlation of others, but comes from the students themselves, who always think about the future, full of challenges. According to [53], the higher and higher student’s mathematics creative thinking ability also has the higher and higher learning motivation, or vice versa, the lower and lower student’s mathematics creative thinking ability also has the lower and lower learning motivation. According to [54], students have a strong desire to learn mathematics for their own progress. They also have the perseverance and tenacity to face the learning difficulties. According to [55], partial learning motivation has a correlation with creative thinking ability. Students with a moderate level of learning motivation also have a moderate level of creative thinking ability.

Forth, the research finding (4) is supported by [56] opinions (2020) that say that the learning motivation has a contribution of 36% to the increase in the students’ mathematics creative thinking ability, and the rest of 64% comes from other factors. Learning motivation has a contribution of 34.6% to the student’s creativity [53]. According to [57], learning motivation has a 40% contribution to the students’ creative thinking, and the rest of 60% comes from other variables. According to [58], having good learning motivation is one way to increase creative thinking. Learning motivation is the driving force or impetus behind the learning activities that will mobilize all abilities, power, and efforts to achieve a desired goal. According to [59], high levels of learning motivation tend to make students enthusiastic about participating in school-based learning activities, whereas students who are easily bored or lazy about participating in school-based learning activities demonstrate a lack of motivation to learn.

5. Conclusion

Every student has learning motivation and mathematics-creative thinking ability with different levels/categories according to their potency and knowledge of each. The variables that contribute to the student’s learning motivation are as follows: desire and wish for success, the drive and need for learning, hope and ambition for the future, interesting learning activities, and a conducive learning environment. The drive and need for learning have the highest contribution of them all.

The mathematics-creative thinking ability of one student is different in each of its indicators. The indicator of fluency has the highest value, and most of the students who have very high mathematics-creative thinking ability of the other two indicators (flexibility and novelty).

Learning motivation has a positive and significant correlation with a student’s mathematics creativity ability. Five indicators of learning motivation also have positive and significant correlations with three indicators of creative thinking ability. Learning motivation has contributed to the increase in the students’ mathematics creative thinking ability. Five indicators of learning motivation have also contributed to three indicators of creative thinking ability each. The desire and wish for success, as well as the drive and need for learning, contribute the most to the fluency of various answer alternatives.
References


Creative Problem-Solving Stage by Implementing RME: Learning Activity & Cognitive Knowledge

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Abstract. This research aims at finding the creatively problem-solving stages by implementing RME. This is qualitative research. This research was conducted with some steps: research initiation; data collection & analysis; and data validation test. The results show that there are 4 stages to solve the math problem creatively by implementing RME, namely: 1) a real problem situation stage. The student’s cognitions are to simplify; identify; and analyze, orient, and try to solve the problem; 2) mathematics model stage. The student’s cognitions are to formulate models, analyze parts of mathematics ideas, find the main mathematics ideas, connect mathematics ideas to other ones, and state mathematics ideas; 3) evaluation stage. The student’s cognitions are to check, revise, verify, validate, redesign, do metacognition, and do a trial-error system, and 4) mathematics concept stage. The student’s cognitions are to analyze the character and components of mathematics and connect mathematics to other lessons and daily life.

Keywords: rme, mathematics education, problem-solving stage, cognitive knowledge, learning activity.

1 Introduction

Creativity is not entirely born offhand but needs to be constructed and stimulated. The teachers should be able to facilitate students learning that can help them to think creatively, including the facilities of instructional media, books, and other references. Posing the problem is a starting point to construct the student’s creativity [1].

Realistic mathematics education (RME) can construct a student’s creative ability [2]. Stages in RME to solve the mathematics problem are situational, referential, general, and formal [3-6]. The situational stage is the most basic one as a starting point in RME learning. At this stage, students still try to understand and identify the mathematics problem and search for some information to know. They represent the problem in the real situation. At the referential stage, students develop and create models and strategies to describe the context situation, then called “model of” in the mathematical modeling process. They represent the problem in problem-solving models. They possibly design many different problem-solving strategies and models with each other. They represent the real situation into a “model of”. At the general stage, then called “model for”, students just focus on math, no the real situation again. They have used and understood the mathematics concepts such as subtraction, addition, division, or the
concept of the two-dimensional figure as a basis to solve the mathematics problems. At the formal stage, students already used mathematical symbols and representation. The formal stage is the formulation and confirmation stage for mathematics concepts the students have developed. They begin to develop algorithms or procedures. The teacher’s role is very crucial in concluding the mathematics concept from the students’ mathematics activities.

The mathematics problem is generally solved with the mathematical modeling process by students themselves to find the mathematics solutions creatively. Blum states that the stages to solve the mathematics problem sequentially consist of a real problem situation, real model, and mathematics model [3, 7-10].

On the other side, stages to solve the mathematics problem sequentially consist of the real problem situation, real model, mathematics model, mathematics solution, and evaluation [11-13]. According to [11], students’ learning activities are to try to understand and structure the problem; simplify and interpret the context; assume, formulate and do the mathematizing process; verify, compare, criticize, validate, communicate [14], justify, and report the results in writing; and revise the incorrect results based on the verification result obtained.

According to [15], stages to solve the mathematics problem sequentially consist of a real model, mathematics model, mathematics solution, validation, and implementation. The students analyze, try to understand and search the additional information; construct the model and do the mathematics process from the real situation to mathematics model; discover the suitable model by manipulating the mathematics objects; validate and introduce the model, and understand the mathematics results and its implementation on the real system to provide the answer for the real problem situation mentioned.

According to [16], there are 6 mathematical modeling process stages to solve the problem, namely: understanding the task, simplifying/structuring the task, mathematizing, working mathematically, interpreting, and validating. The mathematical modeling process with 7 stages are for understanding the problem, choosing variables, making assumptions, solving the equations, interpreting the solution, validating the model, and criticizing and improving the model [17]. According to [18], she/he had formed the 7-stage modeling process to solve the problem by giving attention to these modeling processes of [16] and [17], as 1) understanding the problem. The real-world problem is defined and the problem is examined by required data for the problem; 2) choosing variables and making assumptions. The variables and the assumptions are identified for the solution to the problem regarding the real-world situation. The variables to be used in the construction of the model are defined in this stage; 3) mathematizing. It requires transforming the real world into the mathematical world. In this stage, the general solution strategy is identified; 4) constructing mathematical models and correlating them. The mathematical model/s to present or define the real-world situation is constructed by using mathematical structures such as graphics, tables, equations, etc, by following the assumptions, pre-knowledge, and mathematical abilities; 5) working mathematically. The solution of the problem is figured out through the developed mathematical model/s; 6) interpreting solutions. The mathematical results obtained from the solution of the problem are analyzed and the solution is expressed and evaluated verbally. The mathematical results are interpreted in the context of the real-world situation; and 7) validating the model. The data needed for the validation of the model are decided.
1.1 Research problem and research focus

Many literatures show that there are many different statements/opinions/assumption about the problem-solving stages as shown in the above in the “introduction” section, at least any 7 different opinions of problem-solving stages in this paper, as Gravemaijer, Blum, Galbraith & Stillman, Voskoglou, Ferri, Barry & Houston, and Hıdıroğlu, et al.

The 7 opinions about the problem-solving stages as shown in the above are different from the number of problem-solving stages and/or the problem-solving process. This difference depends on how the researcher/s understand/s the problem-solving process and the complexity of the given problem in some situations [16].

Researcher think that this difference is a unique phenomenon, so it is interesting to discuss it through research. The research focus is to search and find for problem-solving stages by implementing RME from the viewpoint of student’s creativity to solve the mathematics problem as the value of novelty in this paper.

1.2 Research aim and research questions

Q1: What are the students’ learning activities and cognitive knowledge to solve the mathematics problems by implementing RME?
Q2: What are the students’ problem-solving stages to solve the mathematics problems by implementing RME?

For addressing the two questions above, the research goal is to find the students’ problem-solving stages to solve the mathematics problems by implementing RME by analyzing their learning activities and cognitive knowledge.

2 Research methodology

This is qualitative research. Operationally, this study was conducted with some steps such as research initiation, data collection, data analysis, and data validation test [19-21].

Research initiation step. Researchers did some work as choosing and determining school such as research location; designing the instructional tools and research instruments; and implementing RME. The researchers chose Hikmatul Fadhillah Elementary School in Medan City as a research location with the reasons of 1) this school has implemented RME in Indonesian version, 2) the mathematics teachers at this school have got training of RME, 3) one of the goals to learn mathematics at this school, and also mentioned in mathematics curriculum in Indonesia is to develop and increase the student’s critical and creative thinking, and 4) the school has also Art Creativity lesson.

Then, researchers designed instructional tools based on principles and characteristics of RME integrated with creativity as a lesson plan, guidance handbook for teacher and students and students’ activity sheet. The research instruments are mathematics test based on creativity, and interview and observation guidelines.

The mathematics test is one open-ended problem for the material of a two-dimension in class VI of elementary school. Here is the test “ please divide a piece of sized-F4 paper shaped a rectangle with a length of 21 cms and a width of 33 into 2 parts of two-dimensional figures which have equal area each other. Give a variety of answer alternatives for the unique and novel two-dimensional figure”.

Please note: The text seems to be a part of a larger document, and I've provided a summary of the sections as per your request.
The test has no certain or absolute answers. The test has no special mathematics formulas, procedures, and concepts to solve it. The mathematical questions that the students should answer to solve the open-ended problem are 1) how do the students divide a rectangle into 2 parts of a two-dimensional figure with unique and novel shapes? and 2) how do the students ensure the area of 2 parts of a two-dimensional figure equals each other? The 2 mathematical questions need creativity to answer them. It depends on students’ mathematics creativity to solve it.

The research was conducted in 2021. The students were tested with the mathematics test. Six of 26 students who took the test were chosen to be key informants. They were chosen based on their creativity level namely: “very creative” refers to the student’s ability to provide several unique and novel answer, then called “Student S1 and Student S2”; “creative” refers to the student’s ability to provide several flexible answers, then called “Student S3 and Student S4”; and “enough creative” refers to student’s fluency to provide several answers, then called “Student S5 and Student S6”.

### Table 1. Students’ answers as key informants in this research

<table>
<thead>
<tr>
<th>No.</th>
<th>Student Initial</th>
<th>Number of Answer</th>
<th>Number of various Answer</th>
<th>Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Student S1</td>
<td>7</td>
<td>3 novel answers</td>
<td>97</td>
<td>Very creative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 flexible answers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Student S2</td>
<td>5</td>
<td>3 novel answers</td>
<td>92</td>
<td>Very creative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 flexible answers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Student S3</td>
<td>4</td>
<td>2 novel answers</td>
<td>82,5</td>
<td>Creative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 flexible answers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Student S4</td>
<td>3</td>
<td>1 novel answer</td>
<td>81,8</td>
<td>Creative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 flexible answers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Student S5</td>
<td>3</td>
<td>3 flexible answers</td>
<td>75,9</td>
<td>Enough creative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Student S6</td>
<td>2</td>
<td>2 flexible answers</td>
<td>71,6</td>
<td>Enough creative</td>
</tr>
</tbody>
</table>

**Note:**
Category: Criteria

Very creative: Score: > 90; Number of novel answer: > 2

Creative: Score: 80 – 90; Number of novel answer: 1-2

Enough creative: Score: 70 – 79; No novel answer

**Data collection and data analysis steps.** Researchers collected data with 3 ways such as test, observation (video recorder), and an in-depth interview. The test was used to evaluate students’ creative answers. The observation was used to see the student’s learning activity from the beginning to the end of the instructional process. Researchers interviewed 6 students as key informants about what and how they had their cognitive knowledge to solve the mathematics problem. Researchers used a tape recorder to record the interview results. The acquired data and information from the various data collection techniques were in complementing each other.

Data was analyzed qualitatively. According to [22], data were analyzed with 3 phases as data reduction, data presentation, and conclusion or verification. Researchers analyzed the whole of students’ learning activities and cognitive knowledge to determine every problem-solving stage. The researchers collected all students’ learning activities and cognitive knowledge in accumulation from the six students as key informants. Researchers referred to the 7 opinions
about the problem-solving stages as mentioned above to determine every problem-solving stage and finally decided problem-solving stages confidently.

*Data validation test step.* The research data is qualitative which comes from many resources, not only from one student but more. The research data is obtained through some data collection techniques. Collecting data from many resources and through some data collection techniques may get bias data very much. Here is the reason why the research data needs to be validated to get valid data. The researchers must ensure that the research data has no difference before and after the data validation test.

Data was validated in 3 ways as 1) data clarification by asking the students based on the previous data that the researchers got. If students did not do the activities as shown on previous data, so data is invalid. It means, data cannot be used. The previous data refers to students’ learning activities and cognitive knowledge; 2) data verification by checking data from different sources as an in-depth interview (tape recorder), video recorder, and students’ answer sheet. If data does not contradict each other, data is valid, however, if the data contradicts each other, researchers will review data; and 3) reviewing data. Researchers will retest students. According to students’ test results, researchers redo an in-depth interview as alike a previous data collection and revise data if any mistake or contradiction.

### 3 Research Results

The description of the research results is sequentially presented by following the steps of RME. Researchers present the whole of students’ learning activities and cognitive knowledge in every RME step to be analyzed to determine and decide the problem-solving stage. To search the students’ learning activities and cognitive knowledge, researchers got data and information from the in-depth interview, tape recorder, video recorder, and/or test results.

*First.* the teacher poses a mathematics problem. Based on the interview results, when the teacher posed the mathematics problem, the students tried to recognize and understand the teacher’s order; what and how they should do it; what requirements to divide a piece of paper into two parts of a two-dimensional figure with the equal area an each other. The students thought about how to solve the problem and restated the original problem into a more operational form. Based on observation results, Student S5 and Student S6 were initially staying silent for a moment while holding the paper and then occasionally tried to cut the paper. Student S5 discussed and shared the problem with her friends about what problem will be solved. Based on the interview results, she did not know what should be solved. Student S6 and his friends tried to simplify the problem.

Based on the observation results, Student S3 read the contextual problem, asked other students and the teacher about the problem. Student S3 asked for additional information about what should be searched. Student S4 seemed thinking about something to do. Based on the interview results, Student S4 identified and analyzed the problem. From his identification and analysis results, He got and understood what the real problem from the contextual problem, namely how to divide a piece of paper into two equal parts of two-dimensional figure with unique and novel shapes. The problem for Student S4 is that he did not know how to make the paper parts into unique and novel shapes. He did not know the concept of uniqueness and novelty. All learning activities of Student S3 and Student S4 were still in their mind without writing anything on their students’ activity sheets provided by their teacher (interview results).
Based on the interview results, the researchers got some information that Student S1 and Student S2 tried to search and remember the similar problems that they have ever solved previously. According to them, their teacher has ever posed a similar problem previously. From the previous problem, they tried to find the correlation between the known and asked information about the posed problem. Student S1 still remembered the unique and novel two-dimensional figure from the previous learning. Student S2 tried to imagine something about the two-dimensional figure in this real-lives as a mat in a rectangular shape, table surface in circular, rectangular, or square shape. Based on the interview and observation results, they read some books and asked their friends data and information about the two-dimensional figure which has various shapes as semicircle, rectangular, square, rhombus, triangle, and so on.

Based on the interview and observation results, the six students as key informants wrote whatever information asked and given from the contextual problem; required data; and problem-solving steps on their answer sheets.

For example:

Given: the paper posed by the teacher is a rectangle;

Asked: divide a piece of paper into two parts of two-dimensional figures which have equal area each other and the unique and novel shapes;

Required data: samples of the unique and novel two-dimensional figures;

Problem-solving steps: divide, measure, cut and/or fold the paper into two parts of two-dimensional figures which have equal area each other and the unique and novel shapes.

Second, the students solve the problem. Based on the interview and observation results, they tried to formulate the patterns of the two-dimensional figure as one of their strategies or ways to solve the problem. They used pieces of paper as instructional media to draw several two-dimensional figures. Student S1 or Student S3 divided and folded a piece of paper into 2 parts of two-dimensional figures (rectangles), which have an equal area each other. Student S2 divided and cut both of the parallel sides of the paper to ensure that the paper is divided into the equal-area each other. Student S4, Student S5, and Student S6 used a compass to divide the paper to be two parts of two-dimensional figures which have circular shapes. They ensured that the semicircle two-dimensional figure has the same radius size as each other. They also divided and cut the paper into zig-zag shapes.

Here are 2 students’ answers as samples (Fig. 1). Based on Fig. 1, researchers can explain that the students solve the mathematics problem by mathematization process. When they divided and cut the paper into 2 equal parts that have equal area, it means that they were being in horizontal mathematization process, then called “Model Of” in RME learning. They changed the problem into the situation model. After that, they changed “half of the part of the paper” into a number “1/2”. It means that they have worked with the mathematical variables, and then added both of half of the part of the paper into “1”, then is called vertical mathematization process (called Model for in RME learning).

When the researchers asked the students how they could solve the mathematics problem, they said that they analyzed parts of mathematics ideas to find the main mathematics ideas, connected one mathematics idea to another one and stated mathematics ideas to be realized (based on the interview results). Based on the interview results, Student S1 and Student S2
stated that they initially had ideas “circle figure” to divide the paper into 2 parts, but they realized it is the wrong idea because the paper of rectangular shape cannot be divided fully into 2 parts of circle shapes. Then, they changed their mathematics ideas to divide the paper into 2 parts of the two-dimensional figure which have semicircle shapes. The semicircle shapes are integrated or connected with the other different shapes, so it looks novel and unique. Based on the interview results, Student S3 and Student S4 had ideas “zig-zag” shapes to divide the paper into 2 parts that have equal area. For Student S5 and Student S6, they had no novel answer, but flexible ones.

Fig. 1. Mathematization process for solving the math problem.

Based on the interview and observation results, all the students as key informants solved the mathematics problem individually and/or in groups. When they solved the problem in groups, they discussed and shared something. The student who has more knowledge is to be a tutor for other students. They discussed their mathematics ideas. The teacher and researchers monitored, motivated, and gave scaffolding to them to both individuals and the groups.

Third, the students presented their answer results individually and/or in groups. The teacher and researchers give chance to all students to communicate their answer results by presenting them individually or in groups in front of the classroom, so the other students who do not present their answers can correct or check their answers as one of their ways to evaluate the answers. The teacher and researchers comment on their presentation/answers, and give suggestions and correct their answers when any mistakes in their answer results.

Based on the observation results, the teacher asked Student S1 to present her answers in front of the class, while other students paid attention and tried to check their answers. The students presented their answer results in the front alternately. The teacher and researchers checked the answers and gave suggestions and comments for an incorrect answer. Student S3 and Student
S4 revised their answer by erasing the previous two-dimensional figure and redesigned the unique and novel two-dimensional figure. Student S2 also verified the answer by doing metacognition by using some guiding questions, for example: have I made a novel answer? is the two-dimensional figure I drew unique? is my answer correct? and so on. Student S2 asked herself as a metacognition concept. Student S2 was not sure whether the answers were correct or not. Student S2 was busy with some questions in her mind while she herself did not know what to do to revise her incorrect answers, exception staying in thinking alone. The student’s doubt raised questions in her mind to be solved urgently.

By realizing the Student S2’s doubt to correct her incorrect answers, researchers gave a guiding question about how she proved that 2 parts of a two-dimensional figure which she divided from a piece of paper have equal area each other. On the other hand, she got difficulty to determine the area of a two-dimensional figure by using the mathematics formula because the shape and the pattern of two-dimensional figure that she drew are very unique, and no a special mathematics formula to determine the area. The researchers suggested her to prove it by restoring the shape and the pattern of the two-dimensional figure to the previous shape and pattern, without using the mathematics formula. If the shape and the pattern of the two-dimensional figure may be restored into a rectangle with equal size as on the test, so the answer was correct and vice versa.

Based on the observation results, Student S5 tried to change her answer by cutting the new sized-F4 paper to form a more various and unique two-dimensional figure than the previous one. The Student S6 validated the answer by doing a trial-error system. She tried to restore the 2 parts of the two-dimensional figure to the previous shape. She checked whether a couple of two-dimensional figures has an equal area, but in this case, she has not got the trick yet. She tried again in a different way but still no success yet. Eventually, the student found the correct way to do it. It means that Student S6 has tried 3 times in the trial-error system process to validate her answers.

Fourth, the teacher and the students conclude the learning today together. The teacher and researcher ensured the students’ understanding of the concept of the two-dimensional figure as a conclusion for the learning today. The students concluded that the two-dimensional figure is a geometry that has two dimensions such as length and width but no height and thickness. The characteristics of the two-dimensional figure are the kite has two different size diagonal lines; the square has the same 4-side length, 4 same angles, the same perpendicular 2-diagonal length; etc. The researchers asked the students how they could conclude the material. Based on the interview results, the students analyzed the character and components of the two-dimensional figure and its relationship as a basis of students’ knowledge to conclude. They understood the character and component of two-dimensional figures such as the number of the lines of the two-dimensional figure, angles of two-dimensional figure and their sizes, vertices of two-dimensional figure and their function, diagonal lines of the two-dimensional figure, etc. The students also connected the two-dimensional figure with other lessons and students’ daily lives. They tried to connect the concept of the two-dimensional figure as an abstract mathematics object to the real objects that they often found in their everyday lives.

4 Discussion

First, the students’ learning activities and their cognitive knowledge when the teacher posed the mathematics problem at the first phase of RME learning are to try to recognize and
understand the teacher’s order, think to solve the problem, restate the original problem, staying silent for a moment, discuss and share the problem with her friends, try to simplify the problem, read the contextual problem, ask, identify and analyze the problem, try to search and remember the similar problems, imagine something relevant, and read books. The students did the whole learning activities as mentioned just now to orient the real problem situation, and then try to solve the problem.

According to [3], the students’ learning activities and their cognitive knowledge when they are in the "situational" stage are to try to understand and identify the mathematics problem and search for some information to know, represent the problem in the real situation. According to Galbraith & Stillman, the students’ learning activities and their cognitive knowledge when they are in the "real problem situation" stage are to try to understand and structure the problem; simplify and interpret the context. According to Voskoglou, the students’ learning activities and their cognitive knowledge when they are in the "real model" stage are to analyze, try to understand and search the additional information. In this research context, the students did not do the real model at the first phase of RME learning, but just orient the real problem situation, although the students’ learning activities and their cognitive knowledge in this research are almost similar with the students’ learning activities and their cognitive knowledge in the "real model" stage as the first phase of Voskoglou. According to Ferri, Berry & Houston, and Hıdıröglu, et al, the first phase of problem-solving is to understand the problem. This is the students’ main purpose to orient the real problem situation in this research.

Based on the explanation, the researchers decide and state confidently that the first stage of problem-solving by implementing RME is a “real problem situation” stage.

Second, the students’ learning activities and their cognitive knowledge at the second phase of RME learning are to formulate the patterns of the two-dimensional figure, draw several two-dimensional figures, divide and fold the paper, ensure the radius size of the semicircle of two-dimensional figure, work with the mathematical variables, do the mathematical addition, analyze parts of mathematics ideas, find the main mathematics ideas, connect one mathematics idea to another one, state mathematics ideas, and discuss and share the mathematics ideas.

Based on the students’ learning activities and their cognitive knowledge at the second phase of RME learning, the students solved the mathematics problem by the matematization process such as horizontal and vertical matematization processes, or “Model Of and Model For” in RME learning. According to Gravemaijer, the students’ learning activities and their cognitive knowledge at the “referential” stage are to develop and create models and strategies to solve the problem, represent the problem in problem-solving models, design many different problem-solving strategies and models. The students’ learning activities and their cognitive knowledge at the “general” stage are to focus on mathematics and use the mathematical variables. According to Galbraith & Stillman, the students’ learning activities and their cognitive knowledge at the “mathematics model” stage are to use, formulate and do the matematization process. According to Voskoglou, the students’ learning activities and their cognitive knowledge at the “mathematics model” stage are to construct the model and do the mathematics process from the real situation to the mathematics model, and discover the suitable model by manipulating the mathematics objects. According to Ferri, some stages to solve the mathematics problem are matematizing and working mathematically. Hıdıröglu, et al. explained that some stages to solve the mathematics problem are matematizing, constructing mathematical models and correlating them, and working mathematically.
The students’ learning activities and their cognitive knowledge at the second phase of RME learning in these research findings are in line with [23]. He/she states that the students represent or manipulate the problem into mathematics objects and formulate a model/strategy of contextual problem solution. Manipulating the problem refers to the student’s effort to visualize the abstract mathematics objects to be concrete. According to [24], students analyze pieces of mathematics ideas and synthesize them, find the mathematical main idea, connect the mathematical ideas with others, and solve the contextual problem. Based on the explanation, the researchers decide and state confidently that the second stage of problem-solving by implementing RME is a “mathematics model” stage.

Third, the students’ learning activities and their cognitive knowledge at the third phase of RME learning are to present the answers in front of the class, check the answers, revise the answer, redesign the unique and novel figure, verify the answer, do metacognition, doubt the answer, change the answer, validate the answer, and do a trial-error system.

According to Galbraith & Stillman, the students’ learning activities and their cognitive knowledge at the “evaluation” stage are to verify, compare, criticize, validate, justify, and report the results, and revise the incorrect results based on the verification results. According to Voskoglou, the students’ learning activities and their cognitive knowledge at the “validation” stage are to validate and introduce the model. According to Ferri, one of the stages to solve the mathematics problem is validating. Berry & Houston explain that some stages to solve the mathematics problem are validating the model, criticizing and improving the model. Hıdıroğlu, et al explain that one of the stages to solve the mathematics problem is validating the model.

Researchers found students’ metacognition activities as findings in this research. According to [25], there are 3 ways of metacognition in mathematics learning such as belief and intuition, knowledge about the thinking process, and self-awareness or self-regulation. Belief and intuition refer to what mathematics ideas prepared to solve mathematics problems and how these ideas construct a way/strategy for solving the mathematics problem. Knowledge about the thinking process refers to how accurate someone to express his or her thinking process. While self-awareness or self-regulation refers to someone’s accuracy in guarding and arranging what should to do for solving the mathematics problem, and how accurate to use input from his or her observation in directing the problem-solving activities [26].

In verification activities as one of the ways to evaluate the mathematics solution as research findings are in line with [27]. She/he states that students verify creative mathematics solutions; revise invalid mathematics solution and find innovative and creative mathematics solutions. Based on the explanation, the researchers decide and state confidently that the third stage of problem-solving by implementing RME is the “evaluation” stage.

Fourth, the students’ learning activities and their cognitive knowledge at the fourth phase of RME learning are to make a conclusion, analyze the character and components of mathematics, and connect mathematics to other lessons and daily life. According to Gravemajjer, the students formulate and confirm the mathematics concepts at the end of the learning process. According to Rahayu, the students communicate the mathematics results in their daily lives. Voskoglou explains that the mathematics results must be implemented in daily life, and its implementation on the real system to provide the answer for the real problem situation. Based on the explanation, the researchers decide and state confidently that the fourth stage of problem-solving by implementing RME is the “mathematics concept” stage.
Besides analyzing the students’ learning activities and their cognitive knowledge to decide and state the problem-solving stages, the researchers would also explain the difference between these research findings with the other researches as the value of research novelty. Based on the explanation above, there are 4 creatively problem-solving stages as the research findings, sequentially such as real problem situation, mathematics model, evaluation, and mathematics concept.

Blum has got 3 problem-solving stages, sequentially such as real problem situation, real model, and mathematics model. The researchers explain that in this research context, the students did the real model and the mathematics model simultaneously to solve the mathematics problem, so the researchers integrate the “real model” stage to the “mathematics model” stage. Blum did not find the “evaluation and mathematics concept” stages to solve the problem in his/her research.

Galbraith & Stillman have got 5 problem-solving stages, sequentially such as a real problem situation, a real model, a mathematics model, mathematics solution, and evaluation. In this research context, the researchers judge that the real model and mathematics model are the representation of the whole of mathematics solutions. The number and the sequence of problem-solving stages depend on the difficulty level of the problem to solve. According to Galbraith & Stillman, one of the cognitions at the “evaluation” stage is to communicate the mathematics results in daily life. In this research context, communicating the mathematics results to daily life is one of the cognitions at the “mathematics concept” stage as research findings.

Voskoglou has got 5 problem-solving stages, sequentially such as a real model, mathematics model, mathematics solution, validation, and implementation. In this research context, validating is one of the cognitions at the “evaluation” stage. According to these research results, validating is not the only way to evaluate the mathematics results, but more such as clarify, check, revise, verify, etc. The stage “implementation” in accordance with Galbraith & Stillman is just one of the cognitions at the “mathematics concept” stage in this research.

Ferri has got 6 mathematical modeling process stages, sequentially such as understanding the task, simplifying/structuring the task, mathematizing, working mathematically, interpreting, and validating. In this research context, the researchers define the “understanding the task, simplifying/structuring the task” stages as just cognitions at the “real problem situation” stage. The researchers also define the “mathematizing, working mathematically, interpreting” stage as just cognitions at the “mathematics model” stage, because the students did the 3 cognitions simultaneously in this research.

Berry & Houston have got 6 mathematical modeling process stages, sequentially such as understanding the problem, choosing variables, making assumptions, solving the equations, interpreting the solution, validating the model, and criticizing and improving the model. In this research context, the researchers define the “understanding the problem, choosing variables, making assumptions” stages as just cognitions at the “real problem situation” stage. The stages “solving the equations, interpreting the solution” are as just cognitions at the “mathematics model” stage, because the students did the cognitions simultaneously in this research. The “validating the model, criticizing and improving the model” stages are also just cognitions at the “evaluation” stage in this research.

Hıdıroğlu, et al. have got 7-stage modeling process to solve the problem, sequentially such as understanding the problem, choosing variables and making assumptions, mathematizing, 
constructing mathematical models and correlating them, working mathematically, interpreting solutions, and validating the model. The stages “understanding the problem, choosing variables and making assumptions” are cognitions at the “real problem situation” stage in this research. The stages “mathematizing, constructing mathematical models and correlating them, working mathematically, interpreting solutions” are also just cognitions at the “mathematics model” stage. The stage “validating the model” is one of the cognitions at the “evaluation” stage in this research.

5 Conclusion & Implication

There are 4 creatively problem-solving stages by implementing RME, sequentially such as 1) a real problem situation stage. The students simplify, identify, and analyze the problem. They orient the problem, and try to solve it; 2) mathematics model stage. They formulate models, analyze parts of mathematics ideas, find the main mathematics ideas, connect mathematics ideas to other ones, and state mathematics ideas. They solve the mathematics problem by a mathematization process; 3) evaluation stage. They check, revise, verify, validate, and redesign the results, do metacognition, and do a trial-error system. They evaluate the mathematics results, and 4) mathematics concept stage. They analyze the character and components of mathematics and connect mathematics to other lessons and daily life. They formulate and confirm the mathematics concepts.

These research findings are maybe different from the other researches because the number and the sequence of problem-solving stages depend on the difficulty level of the problem to solve. The research results have implications for students to build their mathematics creativity to solve the problem, so they: 1) become more active to participate in learning and more often express their ideas; 2) have more opportunities to get the unique and different answers, and comprehensively mathematical knowledge and skills; 3) freely provide various responses to solve the problems; 4) have a reasoning experience; 5) think and argue mathematically; and 6) discovery something and get the recognition from other students.

References


Diversity of Pollinator Insects in The Vegetable Plantation in Kecamatan Dolat Rayat

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Abstract. The presence of insect pollinators plays an important role in the pollination process. The purpose of this study is to analyse the diversity of insect pollinators in vegetable plantations in 3 villages at Kecamatan Dolat Rayat, Kabupaten Karo. Sampling was carried out on five types of plantation: bean plant, chayote, peas, eggplant, and chilli. At each sampling point, five plots of 1.2m x 10m were established with a spacing of 2m between the plots. Insect pollinator observation technology using sampling scan method combined with insect net. The results of the study identified 7 families of 10 species and 880 individuals. Diversity index that used is The Shannon-Weiner with \( H' = \pm 1.24 \) in the villages. The most prevalent order was Apidae, and the most abundant species was *Apis cerana*. The greatest variety of pollen hybrids was found on chayote plantations.

Keywords : Pollination; Fertilization; Shannon-Weiner index.

1. Introduction

A pollinator is a insect that goes about for the purpose of joining dust to the pistil [1]. Fertilization is the method involved with moving dust from the anther to the pistil (disgrace) [2]. The insects engaged with fertilization predominantly comprise of Hymenoptera (subterranean insects and honey bees), Coleoptera (beets), Lepidoptera (butterflies and moths) and Diptera (flies) [3]. These insects assist with pollinating both wild and rural blooming plants. The job of insect fertilization for people incorporates expanding agrarian creation and keeping up with normal plants [4]. Tropical plants are overwhelmingly over 90% pollinated by pollinators and 75% by insects [5]. Insect pollinators are fundamental since some plant species can't self-fertilize (self-fertilization). Fertilization happens on the grounds that pollinating insects are drawn to the plant's blossoms. The fertilization cycle starts with the pollinating insect roosting on a blossom, then, at that point, contacting the dust, and the dust sticks to the insect's feet, and as the insect moves to search out the honey quintessence of another bloom, it sticks to the insect's feet. Dust tumbles to disgrace [6].

Flowering plants contain sugar (nectar), which serves as food for pollinating insects. The presence of pollinating insects in blooming plants relies upon various factors, for example, blossom tone, bloom aroma, dust, nectar, bloom shape, blossom size, number of blossoms, and
similarity of pollinating insects with bloom attributes. impacted by natural elements [7]. Over 80% of plant species depend on insects for fertilization and transport of dust from one blossom to another [8]. Besides, this can likewise happen on the grounds that it is impacted by natural factors, for example, neighborhood temperature, stickiness, light power and wind speed [9]. The presence of pollinating insects is additionally emphatically impacted by the accessibility of blossoming plants in the biological system. Loss of blossoming plants can prompt a diminished presence of pollinating insects. The woodland harm that happens can upset communications among plants and insects. Around 95% of wiped out creatures are spineless creatures, generally insects (Myers et al. 2000). Another element that lessens pollinator insects is the abuse of pesticides to control bothers on agrarian land [10].

Kecamatan Dolat Rayat, situated in Kabupaten Karo, North Sumatra is a region that has rural land which is generally planted with vegetables. The presence of pollinating insects on rural land in Kecamatan Dolat Rayat is vital in assisting the fertilization with handling, bringing about an expansion in vegetable yield creation. The utilization of pesticides by ranchers in killing irritations on vegetable yields will actually want to lessen the number of inhabitants in pollinating insects. The consequences of the study on the utilization of pesticides on vegetable yields showed that most ranchers in Dolat Rayat Region utilized insect poisons with various medicines that surpassed the necessities. This will lessen the variety of pollinating insects on the agrarian land. In farming, fertilization of plants by insects is one of the keys to the progress of rural creation [11]. The variety of pollinating insects on rural land in Kecamatan Dolat Rayat has not been generally considered and distributed. In view of the depiction above, concentrating on the variety of pollinator insects in vegetable manors in Kecamatan Dolat Rayat is fundamental.

2. Research Methods

The examination on pollinating insects was done in three towns, Kubucolia Village, Bukit Village and Melas Village in Dolat Rayat District. The review range is resolved utilizing GPS to decide how far the perception site is from local locations. Each plot is 1.2m x 10m, the dispersing between plots is ± 0.5m, and each site comprises of 5 plots. Insect perceptions were separated into his three time allotments: morning (07.00-09.00), early afternoon (10.00-12.00) and evening (13.00-15.00). Visiting insects are seen on one plant each time, so the plant utilized for perception differs relying upon the season. Perception time per plot is an hour. Until the observation is complete, and so on. Visiting insects were observed only in fine weather, and the total observation time was 15 days. Scan sampling is the method of observing insects [12]. That is, count the number of species and individual visiting insects. Insects not yet known at the time of observation were caught and identified with sweep nets. The insect identification process was performed in the Biology Laboratory of the Faculty of Mathematical Sciences at UNIMED. Identification by book “Identifikasi Serangga” [13], “Entomologi Pertanian” [14], “Kunci Determinasi Serangga” [15], serta “Taksonomi dan Bioekologi Lalat Buah Penting di Indonesia (Diptera: Tephritidae)” [16].
3. Results and Discussion

The total pollinator insects collected on pineapple plants were 734 individuals consisting of 5 families from 2 orders, namely Diptera and Hymenoptera. Order Diptera consists of 4 families namely Syrphidae, Tephritidae, Calliphoridae and Muscidae. The order Hymenoptera is Apidae.

<table>
<thead>
<tr>
<th>Table 1. Total of Insect Pollinators of The Vegetable Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Famili</strong></td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>1 Syrphidae</td>
</tr>
<tr>
<td>2 Calliphoridae</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>3 Tephritidae</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>4 Muscidae</td>
</tr>
<tr>
<td>5 Apidae</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Amount</strong></td>
</tr>
</tbody>
</table>

The data in Table 1 show that the maximum number of pollinating insects occurred between 07.00 and 10.00 WIB with a total of 563 individuals and a total of 400 individuals dominated by bees. However, the lowest number of pollinating insects occurred between 10:00 and 12:00 WIB with a total of 65 individuals, again dominated by bees. Insects have a specific temperature range past which they kick the bucket [14]. By and large, the powerful temperature range is 15°C least, 25°C ideal, and 45°C greatest. Besides, Since insects are poikilothermic organic entities, the internal heat level of insects is emphatically impacted by the surrounding temperature, since temperature affects the physiological cycles of insects [17]. Temperature influences insects movement, dispersal, development and generation. And then, how much nectar in blossoms likewise assumes a significant part in impacting the variety of pollinating insects in nature [18]. How much nectar in blossoms is high in the first part of the day and keeps on diminishing until the night. This influences insects visits to plants. The most reduced number of pollinating insects happened somewhere in the range of 10:00 and 12:00 WIB. This might happen in light of the fact that pollinating insects action happens essentially toward the beginning of the day (07.00-09.00 WIB) and evening (13.00-15.00 WIB). Then, at that point, there is the affecting element, in particular the surrounding temperature. Somewhere in the range of 10:00 and 12:00 WIB there was a temperature climb over 33 °C, the ideal temperature limit for insects. This is reliable that articulation that pollinating insects generally visit toward the beginning of the day when the blossoms are open or the temperature is around 26°C [19]. Moreover, made sense of that the quantity of plant pollinating insects diminishes during the day contrasted with the morning [20]. The information in Table 1 likewise show an expansion in the quantity of pollinating insects between 13.00 WIB and 15.00 WIB. This might happen in light
of the fact that the air temperature around 13.00-15.00 WIB is inside the adequate temperature range for pollinating insects action, for example 28°C. This is upheld by the clarification that the satisfactory temperature conditions for insects to support life are around 15-45 °C [14]. Figure 1 shows the organization of every group of pollinator insects got in this review.

![TOTAL COMPOSITION OF POLLINATING INSECTS](image)

**Fig. 1.** Families composition of pollinating insects

It can also be seen from Table 1 and Figure 1, that there are several families of pollinator insects with little or no numbers. According to Amalia (2013), some families rest during the day in areas or areas protected from the sun's rays, i.e. shade trees and plants. This family activity time is spent in the afternoon and evening to rest and seek shelter in the treetops or shade. Abundance of pollinating insects in flowering plants such as vegetables indicates insects' interest in vegetables. Bloom thickness and blossom variety are the main factors and decide the variety of pollinating bugs in blooming plants and result in the security of the populace thickness of pollinating bugs [21]; [9]. Blooming plants will create and build the variety of pollinating bugs. Simultaneously, pollinating bugs fundamentally need two primary parts, in particular a spot to settle and the accessibility of food hotspots for these bugs. In this manner, the variety of pollinator not entirely set in stone by the accessibility of food sources in a plant, to be specific nectar and plant dust [22]. Variety or variety is a mix of the quantity of species and the quantity of people of every species locally. Issues with respect to variety for the most part lead to species variety [23]. In this way, estimation of variety should be possible by checking out at the quantity of specific species and the overall overflow of these species locally. Diversity or diversity is determined by two components, namely the number of species of organisms in a community and the number of individuals between species is the same or balanced [24]; [9]. Diversity analysis results The Shanon-Wiener index in this study is presented in Table 2.
Based on Shannon-Wiener Diversity Index calculations (Table 2), exhibition of pollinating insects at a vegetable crops in Kecamatan Dolat Rayat Moderate diversity, i.e. $H' = 1.24$. The degree of biodiversity is classified as moderate $1 < H' < 3$ [25]. Various pollinating insects are conserved. Probably because it is affected by several factors such as number and color of flowers to vegetable crops. The number and color of flowers is plant species are determinants of the presence of pollinating insects [18]. Diversity of pollinating insects is related to resource abundance Pollen and nectar contained in plants, especially the plants themselves. [26] Biodiversity can be used to assess status Communities and diversity when the number of species of organisms is large Even one area is big.

4 Conclusion

As a result, it was found that there are 734 vegetable pollinating insects consisting of 2 orders and 5 families of Diptera and Hymenoptera. The highest number of pollinators was between 07:00 and 10:00 WIB and the lowest between 11:00 and 14:00 WIB. Kecamatan Dolat Rayat, Kabupaten Karo the highest diversity category of pollinator insects in vegetable crops is moderate ($H' = 1.24$).

Acknowledgments

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References


Analysis Difficulty Understand The Mathematical Concept of Integers Viewed from the Metacognitive Abilities of Class VII Students of Private Junior High Schools Dwiwarna Medan

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Abstract. This study aims to analyze: (1) the level of difficulty in understanding students' mathematical concepts on integer material in terms of students' metacognitive abilities; (2) describe the process of students' answers in understanding students' mathematical concepts on integer material in terms of students' metacognitive abilities. This research is a qualitative research with a descriptive approach. The instrument of this research is the ability test of Concept Understanding, Learning Implementation (RPP), Student Books, and Student Worksheets (LKPD). From the results of the study, it was found that: The level of understanding the concept in terms of students' metacognitive abilities from 25 students with 'high' abilities as much as 8%, namely 2 students, then 'medium' abilities as much as 40%, namely 10 students. Then, the 'low' ability was 28%, namely 7 students, and the 'very low' ability was 16%, namely 4 students.

Keywords: Understanding of Mathematical Concepts, Integer, and Metacognition Ability

1 Introduction

Education is very important for humans, because with education humans can gain knowledge and skills and can develop their abilities, attitudes and behavior. Some of the challenges in the 21st century are climate change (climate change), global poverty (global poverty), population growth (population growth), wars in the 21st century (all out war), species extinction (losing species), creativity, transhumanism, and the divide between skills and wisdom (skills and wisdom gap) (Martin, 2007)¹.

Education is the process of changing the attitudes and behavior of a person or group of people in an effort to mature humans through teaching and training efforts. Education This is an important thing and must be taken by everyone.

Mathematics is one of the disciplines that is part of the educational process in schools and has an important role in all kinds of dimensions of student life which serves to develop the ability to calculate, measure, and so on that are needed in everyday life.

Learning mathematics is a process of acquiring knowledge that is built by students themselves and must be carried out in such a way as to provide opportunities for students to rediscover mathematical concepts.

The Ministry of National Education (2007) stated that there are several aspects that need to be developed in learning mathematics, including understanding concepts, problem solving as well as reasoning and communication. While mathematics is considered a basic science that is very important for human life.

This is in accordance with Erman's statement (in Ella, 2006) that mathematics is growing as a service provider for the development of other sciences so that understanding the concept of a material in mathematics must be placed on top priority.

According to Sanjaya (2006) Concept understanding is the ability of students in the form of mastery of a number of subject matter, where students not only know or remember a number of concepts learned, but are able to express them again in other forms that are easy to understand, provide data interpretation and are able to apply concepts in accordance with its cognitive structure².

TIMSS (Trends in International Mathematical and Science Study) in Ella, 2016) and STUI International on mathematics achievement show the fact that in Indonesia there are still many students who have difficulty understanding mathematical concepts, to be exact, Indonesia is ranked 36th out of 49 countries.

According to Sumarmo (2011), broadly speaking, basic mathematical abilities can be classified into five standards: (1) Knowing, understand, apply mathematical concepts, procedures, principles, and ideas. (2) Solve math problems. (3) Mathematical reasoning. (4) Make mathematical connections. (5) Mathematical communication. One of the basic skills of mathematics is the ability to reason mathematics³.

Asrul (201) states that to achieve conceptual understanding, problem identification can help create an atmosphere of thinking for students. Cleanliness in learning is largely determined by the state of the applied learning process. But for this era, students' understanding of mathematical concepts is getting less and less which causes difficulties in learning solve math problems. The difficulty can be seen both in the results and in the process of solving mathematical problems. This is where we need metacognition in a student.

Metacognitive ability according to Mutjis (in Rahayu, 2015) is an ability to understand and determine a person's cognitive activity in the learning process. With metacognitive abilities, students can find out how students learn, know their abilities and learning modalities and know the best learning strategies for affective learning.

Metacognition from an educational point of view according to Alzahrani (2017) refers to one's knowledge and monitoring and controlling one's systematic cognitive activity that requires certain metacognitive skills such as planning and evaluation.

² Sanjaya, W. Learning Strategies oriented to the standard of the educational process. (Jakarta, Prenada Media Group, 2010)
³ Sumarmo, Utari. Berpikir dan Disposisi Matematik (Bandung, 2010)
⁴ Alzahrani, Assessment of the burden on caregivers of patient with mental disorders in Jeddah, (Saudi
Sjutz (in Fauziana, 2008) describes strategies that can be used to control the steps of metacognition including: planning, monitoring, and assessment. The success of students in solving problems is very dependent on their awareness of thinking. A person's thinking awareness can be observed so that the level of students' thinking awareness can be observed in the steps he takes in solving a problem.

This is in line with the opinion of Anderson and Krathwhol (2001) because someone uses metacognition control and self-regulation in their thinking processes including the use of other dimensions such as remember, understand, apply, analyze, evaluate and create in the category of cognitive processes in the previous Bloom's taxonomy. Therefore, one aspect of the knowledge and skill dimensions that is interesting to study more deeply, especially in learning mathematics is the metacognitive aspect.

According to Kurniasih & Sani (2014) discovery learning is defined as a learning process that occurs when learning material is not presented in its final form, but students are expected to organize themselves. A further statement was put forward by Hosnan (2014) that discovery learning is a model for developing an active way of learning by finding it yourself, investigating it yourself, then the results obtained will be faithful and long-lasting in memory.

Through discovery learning, students can also learn to think analytically and try to solve the problems themselves. The discovery model is a learning that emphasizes direct experience and the importance of understanding the structure or important ideas of a discipline, through the active involvement of students in learning. Teaching materials are presented in the form of questions or problems that must be solved. So students acquire knowledge that they do not know not through notification, but through self-discovery.

2 Research Method

The type of research used in this research is descriptive qualitative research. According to Moleong (2007) that “Qualitative research is research that aims to understand what phenomena are experienced by research subjects. For example, behavior, perception, motivation, action, and others. Holistically and by way of description by utilizing natural methods.

In this research, the steps or designs in this research will be described as follows: Observation, Compiling Research Proposals, Validation of learning tools and research instruments carried out by validators (expert validation), Implementation of learning with the Discovery Learning learning model, Implementation of interviews, Data analysis and research findings, Report Writing.

5 Moleong, Lexy J, Qualitative Research Methodology. (Bandung, PT. Offset Rosdakarya Youth, 2013)
3 Results and Discussion

3.1 Level of Understanding of Students’ Mathematical Concepts

Based on the results of the test of understanding mathematical concepts in terms of the metacognitive abilities of 25 students, the students' metacognitive ability levels are spread across five levels. Here's the table:

<table>
<thead>
<tr>
<th>No.</th>
<th>Score Interval</th>
<th>Amount</th>
<th>Percentage</th>
<th>Rating Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 KCM&lt; 45</td>
<td>4</td>
<td>4%</td>
<td>Very low</td>
</tr>
<tr>
<td>2</td>
<td>45 KPKM&lt; 65</td>
<td>7</td>
<td>7%</td>
<td>Low</td>
</tr>
<tr>
<td>3</td>
<td>65 KCM 80</td>
<td>10</td>
<td>40%</td>
<td>Currently</td>
</tr>
<tr>
<td>4</td>
<td>80 KCM 90</td>
<td>2</td>
<td>8%</td>
<td>Tall</td>
</tr>
<tr>
<td>5</td>
<td>90 KCM 100</td>
<td>2</td>
<td>8%</td>
<td>Very high</td>
</tr>
</tbody>
</table>

From the 25 students, it turned out that the level of understanding of mathematical concepts in terms of metacognitive abilities of moderately capable students had the highest proportion and was followed by low-ability students. The level of understanding of mathematical concepts in terms of students' metacognitive abilities with 'very low' abilities as much as 16%, 'low' abilities as much as 28%, 'medium' abilities as much as 40%, 'high' abilities as much as 8% and 'very high' abilities as many as 8%.

3.2 Students’ Mathematical Metacognition Level

The level of students' metacognition in the ability to understand students' mathematical concepts was obtained from the tests given after carrying out the Discovery Learning learning model. The results of students' metacognition are presented in Table 2 below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Score Interval</th>
<th>Metacognition Level</th>
<th>Total students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.41 - 4.00</td>
<td>Reflective Use</td>
<td>4</td>
<td>16%</td>
</tr>
<tr>
<td>2</td>
<td>2.67 - 3.40</td>
<td>Strategic Use</td>
<td>11</td>
<td>44%</td>
</tr>
<tr>
<td>3</td>
<td>1.33 - 2.66</td>
<td>Aware Use</td>
<td>6</td>
<td>24%</td>
</tr>
<tr>
<td>4</td>
<td>0.00 - 1.32</td>
<td>Tacit Use</td>
<td>4</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Total students</td>
<td></td>
<td>25</td>
<td>100%</td>
</tr>
</tbody>
</table>
Based on Table 2 above, it can be seen that the percentage level of Reflective Use and Tacit Use has a lower proportion than the level of metacognition of Strategic Use and Aware Use.

![Student Metacognition Level Chart]

Based on Figure 1 above, students who have metacognition with Reflective Use level are 4 people (16%), Strategic Use level is 11 people (44%), Aware Use level is 6 people (24%) and Tacit Use level is 4 people (16%).

Analysis of Difficulty in Understanding Mathematical Concepts in terms of Students’ Metacognitive Ability. Difficulty in understanding mathematical concepts in terms of the metacognitive abilities experienced by students during the learning process which is applied to the Discovery Learning learning model as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Difficulties Experienced by Students</th>
<th>Indicator</th>
<th>Total students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fact</td>
<td>Students are unable to understand the use of symbols, notations, and mathematical facts in solving problems</td>
<td>10</td>
<td>40%</td>
</tr>
<tr>
<td>2</td>
<td>Draft</td>
<td>Students are not able to apply the concept of integers</td>
<td>9</td>
<td>36%</td>
</tr>
<tr>
<td>3</td>
<td>Principle</td>
<td>Students are not able to apply mathematical formulas (rules) in solving problems</td>
<td>17</td>
<td>68%</td>
</tr>
<tr>
<td>4</td>
<td>Procedure</td>
<td>Students are not able to apply the steps in understanding mathematical concepts in sequence and correctly Students are not able to develop strategies to understand mathematical concepts well</td>
<td>21</td>
<td>84%</td>
</tr>
</tbody>
</table>

From Table 3, it is found that 10 students (40%), who have metacognitive difficulties in understanding mathematical concepts, have 9 students (36%), who have metacognitive
difficulties in understanding mathematical principles, as many as 17 people (68%), and students who experience metacognitive difficulties in understanding mathematical procedures are 21 people (84%).

**The Process of Student Answers on the Test of Understanding Mathematical Concepts in terms of Students’ Metacognitive Ability.** From the results of the students' answers above, we can analyze the results of students' metacognition in understanding mathematical concepts in high-ability students according to the following metacognitive indicators:

### Results of the Answer Process of Students with High Metacognitive Ability

<table>
<thead>
<tr>
<th>Criteria Aspect Achievement Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restate a concept</td>
</tr>
<tr>
<td>Give examples of concepts and not examples of concepts</td>
</tr>
<tr>
<td>Applying concepts in problem solving</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>explain the reasons for the solution made based on his own understanding of what he learned</td>
</tr>
<tr>
<td>interpret the results of the answers obtained in accordance with the context of the problem to the mathematical model and provide arguments appropriately</td>
</tr>
<tr>
<td>explain in part what is learned from solving problems that have been made correctly.</td>
</tr>
</tbody>
</table>

### Metacognition Results of Students with Medium Ability

<table>
<thead>
<tr>
<th>Criteria Aspect Achievement Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restate a concept</td>
</tr>
<tr>
<td>Give examples of concepts and not examples of concepts</td>
</tr>
<tr>
<td>Applying concepts in problem solving</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>explain the reasons for the solution made based on his own understanding of what he learned</td>
</tr>
<tr>
<td>interpret the results of the answers obtained in accordance with the context of the problem to the mathematical model and provide arguments appropriately</td>
</tr>
<tr>
<td>explain in part what is learned from solving problems that have been made correctly.</td>
</tr>
</tbody>
</table>
Table 6. Results of the Answer Process of Students with Low Ability

<table>
<thead>
<tr>
<th>Criteria Aspect Achievement Indicator</th>
<th>Restate a concept</th>
<th>Give examples of concepts and not examples of concepts</th>
<th>Applying concepts in problem solving</th>
</tr>
</thead>
<tbody>
<tr>
<td>explain the reasons for the solution made based on his own understanding of what he learned</td>
<td>Aware Use</td>
<td>Aware Use</td>
<td>Strategic Use</td>
</tr>
<tr>
<td>interpret the results of the answers obtained in accordance with the context of the problem to the mathematical model and provide arguments appropriately</td>
<td>Aware Use</td>
<td>Strategic Use</td>
<td>Aware Use</td>
</tr>
<tr>
<td>explain in part what is learned from solving problems that have been made correctly.</td>
<td>Aware Use</td>
<td>Aware Use</td>
<td>Aware Use</td>
</tr>
</tbody>
</table>

3.3 Analysis of Students’ Difficulties and Interviews in Understanding Mathematical Concepts

**High Ability Students.** From the results of the interview above, it can be seen that the subject understands what he wrote by showing his ability to provide arguments to support his thoughts. Based on the triangulation of data obtained from the description of the answer sheets and the results of interviews with students in terms of subjects with the ability to understand mathematical concepts in the high-ability category, the metacognitive characteristics are:

1. The subject is aware of the abilities he already has
2. The subject generally knows what to do
3. Subjects can provide an argument that supports their own thinking
4. The subject is able to provide an explanation to convince what he will do.

**Medium Ability Students.** From the results of the interview above, it can be seen that the subject understands what he wrote by showing his ability to provide arguments to support his thoughts. Subjects are also aware of their abilities. The subject showed that the problem solving he made was based on metacognition and had a way of convincing what he was doing. The subject had little difficulty in answering the metacognitive questions given at the stage of applying the concept in problem solving.

Based on the triangulation of data obtained from the description of the answer sheets and the results of interviews with students in terms of subjects with the ability to understand mathematical concepts in the high-ability category, the metacognitive characteristics are:

1. The subject is aware of the abilities he already has
2. The subject generally gives an explanation to convince what he has done
3. The same subject is aware of his weaknesses to convince what he is doing
4. The subject begins to know what he is not aware of.
**Low ability students.** Based on the triangulation of data obtained from the description of the answer sheets and the results of interviews with students in terms of subjects with the ability to understand mathematical concepts in the high-ability category, the metacognitive characteristics are:

1. Subjects are less aware of the abilities they already have
2. The subject has a weakness in giving explanations to convince what he has made
3. Subjects are less aware of their weaknesses when solving problems (not realizing that the results they get are not right)
4. The subject does not know that many of the reasons given are meaningless.

Based on the characteristics listed above, the subject of S-22 with a high score of understanding mathematical concepts is at the level of metacognitive ability of *Tacit use*. This is because the characteristics that arise from students' thinking awareness meet the indicators of the *Tacit use* level.

**4 Conclusion**

Based on the results of the analysis, findings and discussions that have been presented in chapter IV during learning with the *Discovery Learning model*, several conclusions are obtained which are answers to the questions posed in the formulation of the problem. The conclusions are as follows: The level of understanding the concept in terms of students' metacognitive abilities from 25 students with 'high' abilities as much as 8%, namely 2 students, then 'medium' abilities as much as 40%, namely 10 students. Then the 'low' ability was 28%, namely 7 students, and the 'very low' ability was 16%, namely 4 students. The final results of students in metacognition with *Reflective Use level* are 4 people (16%), *Strategic Use level* are 11 people (44%), *Aware Use level* are 6 people (24%) and *Tacit Use level* are 4 people (16%).

The process of students' answers to understanding concepts in terms of students' metacognitive abilities in solving problems: Students explain the prerequisite material to solve the problem. Students explain what needs to be done if they do not understand the problem given, explain the strategy/method used and believe that the answer process is correct. Students also explain the reasons for choosing a resolution strategy, and students also re-examine the answers obtained and conclude the results obtained after solving the problem.

Difficulties in understanding concepts in terms of students' metacognitive abilities experienced by students in solving mathematical problems are: Fact difficulties, namely students' difficulties in understanding the use of mathematical symbols in solving problems and difficulties in presenting symbols to design models mathematics of the given problem. Based on the results obtained, there are 40% or as many as 10 people out of 25 students who have difficulty with facts. Concept difficulties, namely students' difficulties in applying the concept of integer arithmetic operations and fractions to solve the problem. Concept difficulties, namely difficulties in applying the concept of integers. Based on the results obtained, there are 36% or as many as 9 people out of 25 students who have conceptual difficulties. Principle difficulty, namely the difficulty of students in applying mathematical rules and difficulties in connecting the concepts given to solve problems. Based on the results obtained, there are 68% or as many as 17 people from 25 students who have difficulty in principle. Procedural difficulties, namely the difficulty of students in completing the steps in solving problems, as well as difficulties in formulating strategies in solving problems effectively and efficiently.
References

Development of an Object Test of Natural Science Subject Base on Science Process Skills in Class IV SDN 101976 Bandar Kuala

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Abstract. This study aims to develop a KPS-based test for fourth grade students at SDN 101976 Bandar Kuala on Gaya material which has good qualifications (standard test) including validity, reliability, level of difficulty, discriminatory power and effectiveness of distractors. This type of research is development research, using the ADDIE model. The data analysis technique used is qualitative and quantitative. The average ideal percentage result is 98.1%. The results of the quantitative analysis of the quality of the KPS-based test questions are good. Analysis of 40 items in the small group test obtained 35 items (87.5%) were accepted and 5 items (12.5%) were rejected. The large group test obtained 34 valid items (97.1%), invalid questions 1 item invalid (2.9%). The reliability of the questions is included in the "very high" category with a value of 0.801. at the level of difficulty with the difficult category of 1 item (2.8%), moderate category 30 items (85.8%), easy category 4 items (11.4%) the distinguishing power of questions with good category 34 items (97.1%), with a sufficient category of 0 items (0%), with a poor category of 1 item (2.9%) the level of effectiveness of distractors with an effective category of 34 items (97.1%) and an ineffective category of 1 item questions (2.8%). From the data above, it can be accumulated that 34 items can be accepted (97.1%) and 1 item is rejected (2.8%).

Keywords: KPS-based test instrument, science

1 Introduction

Education for human life is very important and is an absolute necessity that must be fulfilled throughout life. Without education, it is absolutely impossible for a group of people to live and develop in line with their aspirations (aspirations) to progress, prosper and be happy according to their concept of life view. Education is also an aspect of life that is very basic for the development of a nation.

To achieve this goal, learning activities must be held. Learning is a process of changing behavior obtained from the five senses which will provide meaning through interactions between individuals and the environment. For this reason, a set of learning is very important, including learning science (Natural Sciences). Science is a subject that studies all events that occur in nature containing material about natural knowledge that is around us.
Various ways are carried out to improve the quality of our education, starting from completing facilities and infrastructure, improving the quality of education, improving the curriculum and so on. Science learning at school can be a vehicle for us to study the nature around us. Learning science studies symptoms through a series of processes known as scientific processes that are built on the basis of scientific attitudes and carried out by scientific work and the results are realized as scientific products composed of three components in the form of universally applicable concepts, principles and theories (Trianto, 2011:36).

Teachers also play an important role in improving student learning outcomes. Teachers as facilitators must be able to choose good learning resources for their students to use, and make appropriate test instruments for students to use. Teachers must be able to analyze the needs of learning resources based on the material, objectives, and learning indicators. Teachers must be able to analyze the needs of good learning resources for students to use.

In this case, the teacher must be able to have the knowledge and ability to conduct evaluations to identify the type of test and determine the appropriate instrument and can be used in learning activities. Evaluation can be done by using a measuring instrument in the form of a test instrument.

The preparation of a good measuring instrument can provide accurate information on the level of mastery of student competencies (Kunandar, 2014). The importance of making instruments, especially in the context of learning science, especially the results of the study of test items that have a tendency to assess student learning outcomes, both in daily tests, monthly tests and semester tests.

Science process skills are a very important aspect in science learning because it is through these process skills that an understanding of facts, concepts, laws and theories of physics is obtained (Bundu, 2006). According to Ergul et al. (2011) KPS are the skills possessed by scientists to acquire and develop scientific products. This is because KPS involves cognitive or intellectual, manual and social skills so that learning will be more meaningful (Adisendjaja, 2010).

The problems that occurred at SDN 101976 Bandar Kuala for fourth grade students showed that the test instruments used in evaluating learning in schools did not present scientific phenomena that could trigger science process skills in students at school. In addition, students are familiar with questions that refer to counts only. Students still find it difficult to understand material whose basic competencies are theoretical and broad in scope. In addition, the results of field studies conducted through interviews with educators show that educators only evaluate each chapter after learning, the questions are not purely the result of the educator's own thoughts but are taken from textbooks, worksheets used and some are from the internet. Educators rarely make grids when making questions so that the achievement that is measured is not clear, some educators already understand KPS but have not made questions that measure students' KPS.

This condition spurred the author to conduct research by developing instruments based on science process skills according to the characteristics and needs of students.

2 Method

The assessment instrument is one part of the evaluation instrument, the evaluation instrument is one of the measuring tools used by educators in evaluating the learning process and the learning outcomes of students, Suharsimi Arikunto (in Martono, et al, 2016). The instrument is a tool that can be used to measure the level of competence achievement. Instruments are defined as tools that are selected and used in learning activities so that learning activities become systematic and facilitated (Trianto, 2011). According to Collegiate (in Arikunto, 2012) a test is a series of questions or exercises or other tools used to measure skills, knowledge, intelligence, and talents possessed by individuals or groups. The written test is a test in which the questions must be answered by students by providing written answers. According to Matondang (2009) the test is a systematic observation process to find out the behavior or abilities of students and describe it with a definite scale or categories. studies are carried out by asking experts for considerations, including studies of material, construction and language aspects. A qualitative study was conducted based on content validity. Content validity is divided into two, namely face validity and logical validity. Appearance validity is qualitative and judgmental because it comes from expert judgment.
Meanwhile, logical validity is quantitative, which is done by calculating how high the agreement of the experts is. This can be done by finding the Aiken’s content-validity coefficient or Lawshe’s CVR content-validity ratio.

Validators are asked to rate whether an item is essential (i.e. necessary and very important for the measurement objectives concerned) in three levels of essentiality namely 'Essential', 'Useful but not essential', and 'Not required'. The Content Validity Ratio formula is formulated as:

\[
CVR = \frac{n_e}{N} \times 100
\]

Mardapi (2008) states that there are nine steps that need to be taken in developing test results or learning achievement, namely: (1) compiling test specifications, (2) writing test questions, (3) studying test questions, (4) conducting test trials, (5) analyze the items, (6) improve the test, (7) assemble the test, (8) carry out the test, (9) interpret the test results. Science process skills which are skills that examine natural phenomena in certain ways to acquire knowledge and further develop that knowledge. Science process skills are a very important aspect in science learning because it is through these process skills that an understanding of facts, concepts, laws and theories in science learning is obtained. Process skills involve cognitive or intellectual, manual and social skills. The product development concept used by researchers is the concept of research and development or Research and Development (R and D). The concept used is the development of Analysis, Design, Development, Implement and Evaluation (ADDIE) by Robert Maribe Branc, namely, analyze, design, develop, implement, and evaluate. The analyze phase includes collecting information consisting of the methods used, field observations, selection of science materials, qualification of materials developed, preparation of test instruments based on science process skills and product assessment literature studies. The design phase (planning) includes the design of test instruments based on science process skills. The develop stage includes making test instruments based on science process skills.

Procedures are the methods used by researchers in carrying out research to find, develop and test the truth of a study. The type of research used is Research and Development. Research and development is the process of developing and validating educational products. The stages of the research procedure are as follows. The material in the research is style material, the selection of material is chosen based on the needs of students who still rarely get questions based on science process skills, especially with style material. The qualifications of the materials used in the research are indicators obtained from the basic competencies of style materials.

3 Result and Discussion

The initial stage of planning is determining the purpose of the test and determining the form of the test that is in accordance with the analysis. The design analysis stage is completed, followed by making a grid of questions that refer to the indicators of achievement of learning competencies. The grid is a matrix table containing the specifications of the test items that will be made as a reference for the author, so that whoever writes it will produce test items with relatively the same content and level of difficulty. The items that have been reviewed by the validators are processed using an index CVR. Category of item analysis results qualitatively. Based on the analysis of the items above, the KPS-based test instrument on Style material at the SDN 101976 Bandar Kuala school through a logical validation process (construct) by experts using the CVR index shows that the results of the analysis have 33 items accepted, 7 items revised. Writing test items is a step to describe test indicators into test items whose characteristics are in accordance with the details on the grid that has been made.
Tabel 1. Item Quality Criteria

<table>
<thead>
<tr>
<th>Information</th>
<th>Received</th>
<th>Revised</th>
<th>Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validity</td>
<td>Valid</td>
<td>Valid / Invalid</td>
<td>Invalid</td>
</tr>
<tr>
<td>Reliability</td>
<td>Reliability 0.70 (reliable) / &lt; 0.70 (unreliable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Level</td>
<td>$p &lt; 0.3$</td>
<td>$p &lt; 0.3$</td>
<td>$p &lt; 0.3$ or $p &gt; 0.7$</td>
</tr>
<tr>
<td></td>
<td>$0.3 &lt; p &lt; 0.7$</td>
<td>$0.3 &lt; p &lt; 0.7$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$p &gt; 0.7$</td>
<td>$p &gt; 0.7$</td>
<td>$p &gt; 0.7$</td>
</tr>
<tr>
<td>Distinguishing Power</td>
<td>0.20 – 0.29</td>
<td>0.00 – 0.19</td>
<td>&lt; 0.00</td>
</tr>
<tr>
<td></td>
<td>0.3 – 0.49</td>
<td>0.20 – 0.29</td>
<td>0.00 – 0.19</td>
</tr>
<tr>
<td></td>
<td>0.5 – 1.00</td>
<td>0.3 – 0.49</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5 – 1.00</td>
<td>0.5 – 1.00</td>
<td></td>
</tr>
<tr>
<td>Deceptive Effectiveness</td>
<td>All distractors work (5% of N)</td>
<td>0–1 distractors not working</td>
<td>1-3 distractors don't work</td>
</tr>
</tbody>
</table>

The design of the test instrument assessment based on science process skills was carried out in the form of multiple choice questions. The relevance between test instruments and theory is to link test instruments based on science process skills based on indicators developed from basic competencies in style material. The instrument developed is a test instrument based on science process skills. The indicators developed are indicators of science process skills tests. The implementation stage of the science process skills-based test instrument that has been developed is then carried out using a trial to measure the science process skills of students at SDN 101976 Bandar Kuala Galang. The implementation of the test involved IV students of SDN 101976 Bandar Kuala Galang. Small group trials were conducted to test the limitations of the science process skills assessment instrument which was developed by testing field questions. The test design questions have two objectives, namely knowing the feasibility of the test items made and knowing the extent to which the test items can achieve the objectives. The small group test was conducted involving 30 fourth grade students at SDN 101976 Bandar Kuala Galang. The questions will be tested on 30 students in class IV, after the data is obtained and analyzed by testing the validity, reliability, discriminating power, level of difficulty, and effectiveness of distractors and revised again to obtain a better instrument. Extensive trials were carried out after revisions to the small group test questions. The trial implementation involved 60 fourth grade students at SDN 101976 Bandar Kuala Galang. The questions tested are questions that are already valid in the small group trial analysis, after the data is obtained, the results are analyzed by testing the validity, reliability, discriminating power, level of difficulty, and effectiveness of distractors, a really valid question data from the small group test results and the data from the large group test test on 60 fourth grade students at SDN 101976 Bandar Kuala Galang will be analyzed for items using classical theory, namely by conducting validity, reliability, difficulty level, and differentiating power of the questions. with revision. Evaluation of the test instrument developed was based on the suitability of the test instrument based on science process skills to measure students' science process skills, and the factors causing the discrepancy of the test instrument based on science process skills to the characteristics of the items obtained in the field. The evaluation aims to ensure that the science process skills-based test instrument is truly appropriate and can be used by science teachers to measure students' scientific process skills and compile valid items. The preparation of items that have become complex and then becomes a product of test instruments based on students' science process skills.

4 Conclusion

Conclusions that can be drawn on development research referring to the research objectives and discussion are as follows KPS - Based Test Instrument on the Style material at SDN 101976 Bandar Kuala was declared feasible and met the criteria as a valid and effective question with the content validation results having an average ideal score of 98.1% which was included in the very appropriate category. The validity of the small group trial obtained 35 valid items and 5 invalid items, while the validity of the large group trial obtained 34 valid items and 1 invalid item. KPS - Based Test Instrument on the Gaya material at SDN 101976 Bandar Kuala at the time of the small
group trial was obtained at 0.894 which was categorized as having "Very High" reliability, while at the time of the large group trial, it was obtained at 0.801 was categorized as having "Very High" reliability. 

KPS - Based Test Instruments on Style material at SDN 101976 Bandar Kuala In the small group trial, the questions with good categories totaled 29 questions (72.5%), questions with sufficient category amounted to 7 questions (17.5%), questions with the bad category is 4 questions (10%). Large group trials obtained questions with good categories totaling 34 items (97.1%).

References

Development Acid-Base Titration E-module Based on Blended Learning with Kvisoft Flipbook Maker Application to Improve Student Learning Outcomes

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ABSTRACT. This study aims to determine expert team's assessment acid-base titration e-module based on blended learning with the kvisoft flipbook maker application by BSNP and find out the differences improving student learning outcomes taught using acid-base titration e-module based on blended learning with kvisoft flipbook maker application and students taught using teacher's handbook. The research type utilized to modify development through study and development ADDIE model. The data sources in this research were 2 expert validators and class XI science students of MAN Batubara totaling 60 students using selective sampling for data collecting. The findings demonstrated that the expert team's evaluation of the acid-base titration e-module based on blended learning with the BSNP flipbook maker application on the aspect content feasibility average percentage value 86%, language feasibility 88%, and presentation feasibility analysis 85% and concluded that the media was extremely feasible to use and didn't need to be revised. Additionally, there are variations that improve the academic performance of students who are taught with acid-base titration e-module based on blended learning with kvisoft flipbook maker application and students who are taught using the teacher's handbook.

Keywords: E-module, acid-base titration, blended learning, kvisoft flipbook maker, learning outcomes

1. Introduction

Science is a significant science which talks about arrangement and design with specific properties around us [1]. Anyway, students often consider that chemistry is difficult subject [2], uninteresting and unimportant [3]. Chemistry contains many concepts that are abstract in nature. So to understand, it requires imagination with images or visuals helping. Students’ inability to understand the chemistry concepts will cause The perception that chemistry is a challenging topic to learn can be caused by larger issues with studying the chemical principles in general [4].

The weak interaction between teachers and students and the learning skills of students which are often considered the same are also obstacles in chemistry learning. Therefore, the initiatives to enhance the standard of chemistry instruction are currently being carried out, including improving the quality of teaching materials [5]. Teaching materials are learning materials which systematically designed by providing a number of information on knowledge, experience, and skills in the teaching and learning process [6].

innovations that can be used to improve the efficiency of learning and include students actions, such as learning media aid [7], can solve these issues. In order to raise the standard of...
learning, effective learning materials are also crucial. Information and communication technology is best suited for science advancement in educational activities. The use of information technology in learning is used to promote efficiency and effectiveness, and this is one of the ways that technology is developing in education based on Minister of Education and Culture of the Republic of Indonesia Number 65 of 2013. Today's standards for learning dictate that integrated learning is the best method [8].

Learning with blended learning is a form of learning that uses technology, namely the internet to improve the quality of student learning, in providing material enrichment and developing methods that will be used in learning [9]. One of the media that is suitable for use in blended learning is e-modules by using the Kvisoft application. E-module stands for Electronic Module. E-Module is a learning medium that contains only one learning material and self-instructional. E-module is also said to be a set of digital teaching media and systematically structured for self-study [10].

One of the applications that supports learning media to aid in the learning process is the Kvisoft Flipbook Maker. Since this application does not focus solely on written content but also allows for the inclusion of motion, music, and video animation, it may make interactive learning media more exciting and prevent learning from becoming repetitive. Therefore, since e-modules are available as soft files, they can be accessed without a computer and at a low cost using the Kvisoft Flipbook Maker application. Therefore, using this kvisoft flipbook maker application can foster a sense of creativity and be active in learning [11], so that students become more active and can achieve the learning goals that have been set.

2. Method

This research uses the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model. The research has been conducted at Madrasah Aliyah Negeri (MAN) Batubara, Jalan Perintis Kemerdekaan No. 76 Lima Puluh Cities, Batubara 21255, Sumatra's north. The research was carried out in March–April 2022.

All of the class XI IPA MAN Batubara pupils made up the study's population. With 30 students in each class, the research samples were drawn using purposive sampling data collection methods from students in classes XI IPA 1 and XI IPA 2.

Research tools include surveys based on the BSNP, reliable and valid objective tests, and surveys of students' preferred methods of learning. The Independent Sample T-Test, or two-party The T-test has a uniform and normal distribution, is the data analysis method employed.

3. Results and Discussion

The analysis portion of this study is where it all starts, with analyses of the curriculum, instructional resources, and learning media. The 2013 Curriculum (K–13) Revision at MAN Batubara is the subject of this curriculum analysis, which is shown in table 1. Two learning approaches are developed under the 2013 curriculum: both direct and indirect instruction. Where in the 2013 curriculum are the following learning facets: It should be engaging and motivating, enjoyable, challenging, and encourage active participation from the students. It should also be contextual and collaborative, leave enough room for the students' independence and innovation, and take into account their physical and psychological talents, interests, and developmental needs [12].
The curriculum lists Core Competencies (KI), Basic Competencies (KD) and learning indicators for acid-base titration material. From KI and KD are taken indicators in developing e-modules. The results of previous studies stated that the e-module is based on RPS and the results of textbook analysis, the advantages contained in each book will be used and added aspects necessary for the e-module to be innovative [13].

<table>
<thead>
<tr>
<th>Curriculum Analysis</th>
<th>Analysis Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Competencies</td>
<td>Able to analyze data on the results of various types of acid-base titration.</td>
</tr>
<tr>
<td>(KD)</td>
<td></td>
</tr>
<tr>
<td>Indicators in the</td>
<td>1) Determine the exact indicators on the acid-base titration and the equivalence point and the end point the titration.</td>
</tr>
<tr>
<td>development of</td>
<td>2) Analyzing the acid-base titration curve.</td>
</tr>
<tr>
<td>learning media</td>
<td>3) Calculating the concentration of acids or bases based on acid-base titration data.</td>
</tr>
<tr>
<td></td>
<td>4) Analyze acid-base levels.</td>
</tr>
</tbody>
</table>

After that, researchers interviewed students as part of the analysis of teaching materials and discovered that in chemistry learning on acid-base titration materials there was no handbook for students when participating in chemistry learning and the handbook was not electronically based. And at the stage of analyzing the educational tools utilized, researchers also spoke with students in-person and found that during the learning process, teachers who teach chemistry subjects only use the teacher's handbook, and the titration curves shown are only from the pictures contained in books and the internet without accurate explanations. Relevant to the results of this interview, previous research has stated the use of learning media in the classroom is still minimal due to the limited availability of media utilizing technology that can be used by teachers in the chemistry learning process. This indicates that the chemistry learning process that takes place in the classroom still uses conventional methods. Only basic Powerpoint is the teacher's only form of media [14]. A research or analysis of the demands of the e-module program must be done in order for it to evolve in accordance with needs in the field [15]. According to earlier study, including different forms of media into education is crucial for raising students' aptitudes and teachers' own teaching abilities [16], [17].

Furthermore, researchers carried out the design stage, namely e-module learning developed based on blended learning using the Kvisoft Flipbook Maker application. In any workflow or flow design an information processing is based on a draft e-module consisting of a cover, foreword, table of contents, glossary, concept map, introduction, learning activities, evaluation, scoring guidelines, bibliography and periodic system tables of elements. The Kvisoft Flipbook Maker application was selected as a result of this application's comprehensive features and can be used by anyone, anytime and anywhere via laptop / computer and android using links or barcodes that are spread.

Previous research According to the product creation stage, a desktop prezi application is used to build presentation media. Researchers split a variety of views when creating learning media presentations, including the opening presentation, integrated PBL model materials presentation, learning video presentation, and presentation of practice question examples [18].

The next step is a validation assessment using the BSNP-based Kvisoft flipbook creator program for the blended learning-based acid-base titration e-module. Expert validators do
validation when the developed e-module is finished. Figure 1’s average percentage of the validation findings allows us to draw the conclusion that the e-module is very useable and does not require revision. This is in accordance with previous research that shows the creation of chemistry e-modules with the aid of Flip Pdf Professional as learning resources and learning media that are appropriate for use in teaching nonmetallic chemistry on carbon and silicon materials is one of the efforts that educators can undertake [13].

According to additional study, Activities that mix active and cooperative learning methods with visualization tools may benefit pupils gain a deeper understanding of bond chemistry principles [19]. Additionally, using animated, interactive movies improves pupils' comprehension [20].

Additionally, there were disparities in this study's teaching methods for enhancing student learning outcomes using a blended learning-based acid-base titration e-module with the kvisoft flipbook maker application (experiment) and students who were taught using the teacher’s handbook (control). The average score of the student learning outcomes is shown in table II based on the findings of the treatment of experimental classes and control courses. Table III shows that the percentage improvement in learning outcomes was 65.88% and 45.76%.

Table 2. Data Pretest and Posttest

<table>
<thead>
<tr>
<th>Data</th>
<th>Control Class</th>
<th></th>
<th></th>
<th>Experiment Class</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Lowest Score</td>
<td>Highest Score</td>
<td>Average</td>
<td>Lowest Score</td>
<td>Highest Score</td>
<td>Average</td>
</tr>
<tr>
<td>Pretest</td>
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<td>60</td>
<td>26.67</td>
<td>5</td>
<td>75</td>
<td>46</td>
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<tr>
<td>Posttest</td>
<td>45</td>
<td>75</td>
<td>61.5</td>
<td>65</td>
<td>95</td>
<td>82.33</td>
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Table 3. Percentage Improvement in Learning Outcomes

<table>
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<tr>
<th>Class</th>
<th>Statistic</th>
<th>Std. Error</th>
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<tbody>
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<td>NGain_Score</td>
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<tr>
<td></td>
<td>Mean</td>
<td>.6754</td>
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<td></td>
<td>Std. Deviation</td>
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<td>Minimum</td>
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<tr>
<td></td>
<td>Maximum</td>
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<tr>
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<tr>
<td></td>
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<td></td>
<td>Skewness</td>
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<tr>
<td></td>
<td>Kurtosis</td>
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</tr>
<tr>
<td></td>
<td>95% Confidence Interval for Mean</td>
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</tr>
<tr>
<td></td>
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<td>.7155</td>
</tr>
<tr>
<td></td>
<td>Upper Bound</td>
<td>.6690</td>
</tr>
<tr>
<td></td>
<td>5% Trimmed Mean</td>
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</tr>
<tr>
<td></td>
<td>Median</td>
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<td>Variance</td>
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<td></td>
<td>Std. Deviation</td>
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<td>Interquartile</td>
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<td>Kurtosis</td>
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<td></td>
<td>Variance</td>
<td>.02835</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>.15529</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>.71</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>.61</td>
</tr>
<tr>
<td></td>
<td>Interquartile</td>
<td>.21</td>
</tr>
<tr>
<td></td>
<td>Skewness</td>
<td>-0.430</td>
</tr>
<tr>
<td></td>
<td>Kurtosis</td>
<td>-0.381</td>
</tr>
</tbody>
</table>

The experimental class had the best average gain in student learning outcomes (65.88%) out of the two classes. This demonstrates how the blended learning-based acid-base titration e-module with the kvisoft flipbook creator application can improve student learning results since it can assist students learn quickly and engagingly with the help of learning visuals and videos. This is consistent with earlier research that demonstrates how the created learning media can enhance learning results in molecular form materials [21].

According to a different study, using RPP in conjunction with a blended learning approach makes the learning process more convenient. With online learning techniques and behaviors more intensive conversation in face-to-face meetings, students have plenty of time to learn English whenever and wherever they choose [22]. When using technological learning tools, From the pretest to the posttest, students' scientific knowledge can increase, and they are enthusiastic and enjoy the process [23].

As shown in table IV, where the Sig (0.000) was less than 0.05, it was also found that the two classes that received treatment in this study had different improving student learning outcomes. So that there is a difference in the improvement of learning outcomes of students.
who are taught using an acid-base titration e-module based on blended learning with the kvisoft flipbook maker application and students who are taught using the teacher’s handbook. This developed e-module can be used as teaching material in chemistry learning. Previous research has that the percent value of the feasibility of teaching materials moodle web solubility and solubility product is 93.5%. Then it can be concluded that developed teaching materials are categorized as very feasible [24]. Teaching materials that are fully developed with engaging and sufficient illustrations will influence the learning environment so that students’ learning processes are more effective and will encourage students to use learning materials as learning materials [25].

<table>
<thead>
<tr>
<th>Nilai N-gain</th>
<th>Sig</th>
<th>A</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td>0.000</td>
<td>0.05</td>
<td>Ha Accepted</td>
</tr>
</tbody>
</table>

4. Conclusion

Based on core competencies, fundamental competencies, and learning indicators, the results of the curriculum analysis revealed that: From the analysis of instructional materials and teaching media whiteboards and other media were used, and that the only sources for the pictures were printed materials and the internet.

Expert validators standardized the development of a blended learning-based acid-base titration e-module using the Kvisoft flipbook maker application, and the results showed that the content feasibility percentage was 86% (very feasible and does not require revision), the language eligibility percentage was 88% (very feasible and does not require revision), and the serving eligibility percentage was 85% (very feasible and does not require revision).

Acknowledgment

The author appreciates the support of Dr. Ir. Nurfajriani, M.Si, Prof. Dr. Retno Dwi Suyanti, M.Si, and Khaidir Wijaya, M.Pd. who have agreed to become expert validators. The Principal of MAN Batubara is also thanked by the author for letting researchers to perform their studies there.

References


Improvement of Learning Model on Discovery Learning Assisted (PB-DLGA) by Geogebra Applet to Enhance the Creative Thinking Ability of the Students

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Abstract. This study is development research. The Improvement of Learning Model on Discovery Learning Assisted by Geogebra Applets (next called PB-DLGA) was setted out followed by the development stages of the result of the improvement from the model offered by Plump. It was conducted at Junior High School 1 Kutapanjang (SMP 1 Kutapanjang) in Gayo Lues, Aceh Province, Indonesia. The subject of this research were 25 students from VII graders. It used lesson plans, digital moduls, and creative thinking ability test (TKBK) as the tools during the research and gave the results as follows: 1) The discovery learning model assisted by the geogebra applet that was developed had met the rasionality (validity), feasibility (practicality), and efficacy (effectiveness) criteria in terms of their respective criteria; 2) There is an improvement in students’ creative thinking skills using a discovery learning model with the help of the GeoGebra applet which was developed in the first trial, obtaining an average pretest 57.12 and a posttest 74.72 and increased in the second trial with an average score 74.72; pretest 52.6 and posttest score 80.4. Based on the results, it is suggested that the use of Learning Model on Discovery Learning Assisted by Geogebra Applets (PB-DLGA) should be expanded in Mathematics classes to improve students’ creative thinking skills.

Keywords: improvement of learning, PB-DLGA, discovery learning assisted by geogebra applet, creative thinking ability

1 Introduction

Unusual learning activities happened in new normal era after pandemic covid-19 arose. Face-to-face learning activities were restricted everywhere to decrease the virus’s transmission. Through A Letter Number 4 Year 2020 regarding the Implementation of Education Policies in an Emergency Period
for the Spread of Corona Virus Disease, the minister of Education, Culture, Research, and Technology issued instructions. It told some main points. One of those is the learning activity should be done from home through online learning activities or distance learning. It should be done to give meaningful learning experiences for the students without any demands to finish the curriculum include the grade promotion or graduation.

In normal situation, we are used to conduct face-to-face learning activities. During the pandemic era, we had to conduct online or distance learning. live chat, WAG, state television channel (TVRI), etc. In fact, many teachers had not be able to use digital tools to help the learning process. Meanwhile teachers are ordered to make learning innovation and creativity. They are also demanded to adapt learning activities regarding to the process, skill, and the aesthetic of presentation during its process as mentioned by Dewi in her research (2020). Hence it is needed to make an innovation using a learning model.

There are many learning models which can be used to form scientific and social behaviors and improve students’ curiosity. One of those is discovery learning model. Riadi (2017) says that discovery learning model is a learning process which happens when the students were given indirect information. The students are demanded to organize their comprehension about any information by themselves. They are also trained to be a scientist. While Primary Education Section of Ministry of Education, Culture, Research and Technology (2020) mentions that learning through sharing is a form of discovery finding process which starte d by understanding concept, meaning, and relation through intuitive process to make a conclusion. Discovery happens if the students are involved in mental process so they can find some concepts and principal. Observation, classification, measurement, prediction, determination, and inference were used to carry out these tasks.

Meanwhile, Mukaramah (2020) tells that there are some lacks of discovery learning and it creates new assumption. Discovery learning gives difficulties for those who have academic barriers. It can be seen that they will get difficulties to relate relationship between written and oral concepts and make them were frustrated. Furthermore, this model is not efficient enough to be given in large classes with any students because it needs much time to help them finding the theory or coping the problems. That is why this learning model need to be advanced so the model can be used to improve students’ ability.

One of the efforts to advance discovery learning is by using ICT (Information and Communication Technology) in mathematics learning process. Actually, the use of ICT is one of six principles in mathematics learning as mentioned by NCTM (2000). It claims that technology is crucial to both the teaching and learning of mathematics since it affects the subject matter taught and improves student learning.

Additionally, the contemporary process of model building that incorporates ICT is inextricably linked. GeoGebra is a well-known ICT tool or feature for math education. According to Hohenwarter and Fuchs (2004), a new program called GeoGebra combines dynamic and interactive algebra and geometry instruction into a single tool. The software of GeoGebra can be downloaded in www.geogebra.org site and can be run and copied freely. It means that GeoGebra is a free and
dynamic mathematics application program which can support mathematics learning process in school.

Furthermore, Priatna et al. (2019) has created a discovery learning paradigm with assistance from GeoGebra to raise the level of professionalism among math teachers. They say that discovery learning model assisted by GeoGebra is a learning model which involves the students actively and optimally. Besides, it makes the students investigate the problems, improves problem solving ability which integrates creative thinking ability and understands the concepts. In fact, the use of GeoGebra in mathematics learning is still low. It is better to use it maximally to attract the students so they are interested in learning process.

Making digital modules for learning materials using the GeoGebra application is the first step in this exercise. The GeoGebra file is next submitted to the site and integrated into the activities that are scheduled. They are known as applets. According to Jane-jane Lo and Nina White (2020), the GeoGebra applet refers to an interactive online page that can be run straight from the GeoGebra website without being downloaded. Furthermore, this applet makes it simpler for teachers to keep an eye on their pupils' actions. They can ask pupils directly if they completed their assignments. It is suitable for the condition during the post pandemic era recently. In line with this view, according to Nafisa et al. (2019), the multimedia-assisted discovery learning model was capable of generating the students' activities throughout the learning process, allowing the students to keep working until they met the learning objectives.

The importance of developing of Discovery Learning Model Assisted by the GeoGebra Applet (PB-DLGA) can be explained that the learning model is one of the important components in learning process. Effective learning will require a learning model which is in line with the learning materials. If the learning model is appropriate then the implementation will be carried out effectively. Using the developed PB-DLGA will be more effective in helping the learning process to achieve the learning aims. Based on the previous explanations of the issues, it is required to construct or enhance the discovery-based learning model with the help of the GeoGebra Applet in order to be able to address students' capacity for original thought. Additionally, teachers can employ the paradigm in the teaching of mathematics. Therefore, the researcher developed a model entitled “Improvement of Learning Model on Discovery Learning Assisted by Geogebra Applets (PD-DLGA) to Enhance the Creative Thinking Ability of the Students”.

2 Methods of The Research

Developmental research is being conducted here. It creates the essential tools, models, and learning resources. Richey and Nelson (1996) assert that development research is focused on the creation of new products, describing the development process as accurately as possible and rating the results. The improvement or development of the PB-DLGA uses the modification of Plomp model by combining the stages of material (product) development by Nieveen which emphasizing three aspects of quality (rationality (validity), feasibility (practicality), and efficacy (effectiveness)). The stages include earlier investigation, planning, realization, testing, evaluation, and revision. This is
done because the Plomp model was considered too general to be applied in development of learning model. To measure the feasibility (practicality) and efficacy (effectiveness) of the PB-DLGA model, the required learning tools and instruments were developed. The product of this research is a valid, feasible, and effective Discovery Learning Model assisted by GeoGebra applets with the tools (lesson plans, digital modules, and a test of creative thinking) and required research instruments for the development or improvement of this model.

This research is conducted in State Junior High School 1 Kutapanjang, Regency of Gayo Lues, Aceh, Indonesia. Students from Classes VII-1 and VII-2, a total of 25 students, served as the study's subjects. It was conducted in the second semester in academic year of 2021/2022.

1.1. Data Analysis
   a. Data analysis of Rationality (validity) of the PB-DLGA Model and Learning Tools
      Researchers used descriptive statistical analysis based on the average score of each learning model, which was confirmed by experts in the field of mathematics education and amended in response to their corrections and suggestions, to determine the validity (rationality) of this learning model.

   b. Data analysis of Feasibility (Practicality) of Learning Tools
      Based on the findings of evaluations from several experts and practitioners, the viability (practicality) of the PB-DLGA model is determined (junior high school mathematics teachers). Experts and math teachers are chosen according to their knowledge of the ideas and their backgrounds. By taking into account the offered model and learning tool components, they must state whether or not the PB-DLGA may be applied. Next, the average value is calculated from the two. Its method makes use of offered learning resources known as intended-operational (IO) tools, and the tool employed is a sheet of observations on the use of a developed/improved model.

   c. Data Analysis of Learning tool Efficacy
      The criteria for judging the efficacy of a learning model are based on five indicators, namely: (1) the achievement of learning completeness if 85 percent of students who attend creative thinking ability get 75; (2) the achievement of learning goal completion (at least 75 percent of planned learning completion can be attained by at least 65 percent students); (3) students and teachers' activities; and (4) The management of learning by teachers; (5) Student and teacher responses to the elements of the learning model.

1.2. Instruments and Techniques of Data Collection
   a. Instruments of Rationality (Validity) Assessment
   b. Instrument of learning tools validation is learning tools validation sheets that used to get data about learning tools quality based on the assessments from the experts. These validation sheets includes the components of PB-DLGA model, lesson plans, digital modules, and creative thinking ability tests.
   c. Instruments of Feasibility (Practicality) Assessment
      A development product is a product that has some criteria, that are (1) the experts and teachers notice that the improved learning model can be used, (2) the assessments sheets on
the implementation of discovery learning model assisted by GeoGebra applets (PB-DLGA) shows the good result.

d. Instruments of Efficacy (Effectiveness) Assessment
The instrument for evaluating the effectiveness of the learning model consists of a test of creative thinking skills to determine the attainment of fundamental competencies, observation sheets for teacher and student activities, learning management observation sheets, and questionnaires with responses from teachers and students.

1.3. Development of Model, Tools, and Instruments
The improvement of learning Model based on Discovery Learning assisted by GeoGebra Applet (PB-DLGA) is done by following some phases of development as the result of a modification of Plomp model that emphasize on three aspects of Nieveen product.

a. Initial Research Phase
Considering the findings of previous observations made at the research site's school, it shown that mathematics learning process in State Junior High School 1 Kutapanjang has some lacks, both teacher and students. It can be seen that teacher only used the simple model which easier for her without considering students interaction with teacher and their friends. She hasn’t used various and suitable learning models. It made the students were less enthusiastic. On the other hand, in the post-pandemic age, instructors are now obliged to be competent to apply ICT-based learning techniques. The initial study of the PB-DLGA model began with the question of ICT integration in learning models that have not been used; one such ICT integration is GeoGebra Applet. At this point, work is being done to gather data on past or present problems with math learning and to formulate logical ideas on how to improve the PG-DLGA model. The next step is to categorize and research the ideas that have influenced the PB-DLGA model's development, especially those that support the discovery learning model's compatibility with learning models for mathematics.

In this stage, researcher analyzed the quality of used common learning tools which applied by mathematics teacher in the researched school, especially about the possibilities to improve learning tools which are assisted by GeoGebra applet. To do these step, pre-surveys and trials were needed. The next is to investigate theories of education tools improvement.

b. The Planning Phase
At this point, researchers developed a paradigm for teaching mathematics that relies on discovery learning using GeoGebra Applets (PB-DLGA). This stage's efforts included learning about future research and establishing the ideas underlying the PB-DLGA model's construction and content, building the learning model's component parts based on those theories, and selecting the format for the modeling book.

Researcher planned the learning tools which were suitable with the design of PB-DLGA model in this phase. The existing learning tools (the students and teacher hand books of 2013 Curriculum were sufficient to be used in learning process. Therefore, the researcher designed
lesson plans, digital modules, and creative thinking ability test. The lesson plans were made based on the designs and syntaxes of the PB-DLGA model.

c. Realization
This 3rd stage produced the early prototype draft of the PB-DLGA model as the result of the designing realization. Learning model is realized in the form of a modelling book. The main of its component consisted of Chapter I as Introduction of PB-DLGA model, Chapter II as Theoretical Review of PB-DLGA, Chapter III as Characteristics and components of PB-DLGA model, and Chapter IV as Conclusion
This stage produced learning tools included lesson plans, digital modules and the Test of Creative Thinking.

d. Testing, Evaluating, and Revising stage
The research was divided into four main activities: (1) conducting field trials; (2) validating the PB-DLGA model's activities and all associated learning; (3) asking experts and practitioners to evaluate the implementation and effectiveness of the learning model based on their theoretical mastery and experiences; and (4) conducting feasibility tests of all instruments used by some experts and practitioners. Testing, evaluating, and modifying the learning model using all of its learning tools were done in order during the four tasks.

3 Research Results

3.1 Result of designing learning model based on discovery learning assisted by GeoGebra Applet (PB-DLGA)

a. Syntaxes
Table 1. Syntaxes learning model based on discovery learning assisted by GeoGebra applet (PB-DLGA)

<table>
<thead>
<tr>
<th>Steps</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulus of Creative</td>
<td>In this step, teacher asked students to understand the basic concepts so that they have an idea about the learning material that will be studied.</td>
</tr>
<tr>
<td>Thinking</td>
<td>These activities are asking some questions, reading related books and other learning process which leads to creative thinking. This stimulation</td>
</tr>
<tr>
<td></td>
<td>is used to give interactive situation that help students to be more active in exploring the materials. In this step, teacher used GeoGebra application.</td>
</tr>
<tr>
<td>Identifying and</td>
<td>Teacher gave the chance for students to identify some problems. Most of them chose the most interesting and flexible to be solved. The chosen problem</td>
</tr>
<tr>
<td>Formulating Problems</td>
<td>must then be formulated in the form of questions and or statements as the temporary answers of previous question asked. These activities aim to improve</td>
</tr>
<tr>
<td></td>
<td>students’ analytical skill.</td>
</tr>
<tr>
<td>Designing and Planning</td>
<td>In this step, teacher designed and planned the procedures or steps of experiments using GeoGebra applet. This step helps the students know</td>
</tr>
</tbody>
</table>
what to do with GeoGebra applet then they knew how to get and open the given link.

**Experimenting Using GeoGebra Applet**

To answer the questions or proving whether true or false of this hypothesis, teacher gives the students opportunities to make experiments, observing the objects, doing own trials using GeoGebra applet etc. They then tried provided digital modules assisted by GeoGebra applet.

**Analysing**

This step is aimed to improve students’ analytical skill by answering the given questions in the experiments using GeoGebra. By using it, teacher knew the results of students’ works. Then, the data that has been obtained can be analyzed using descriptive analysis methods. After that, summary of the results is obtained and it will be interpreted.

**Presenting the results.**

This activity aims to give the opportunities for students to do meticulous activity of their results. These activities were done by presenting and re-explaining about what they got through GeoGebra applet. When students hearing the ideas and explanation from others, they got better comprehension. It can also be used as indicator how far students comprehend their own concepts and ideas. In this phase, teacher guide the students about the process how to do the tasks using GeoGebra applet. Teacher then responded the students’ results.

**Conclusion**

After exploring the concepts from each previous steps, students and teacher made the final conclusions and gave some exercises related to critical thinking ability. This principle aims to invite students make conclusion together. It can be used as general principle by considering the results presentation.

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**b. Social System Design**

The design of a social system or learning environment is a situation or atmosphere and norms that apply in a model based on discovery learning assisted by GeoGebra applets (PB-DLGA). It emphasize on teacher’s role and activities that students must perform during the learning process following the patterns and rules in interaction’s patterns and social contributions.

Students used computers that were connected to the internet during this learning process. Students must be able to use a computer independently and at the very least understand how the mouse and keyboard work.

**c. Design of Reaction Principle**

The design of management reaction principle is to give teachers an idea how to accommodate all students learning activities and how to perceive and respond to each behavior shown by students during the learning. In development or improvement of PB-DLGA model, teacher guide students in discovering. From this, it can be concluded that teacher’s role in learning process as follows: 1) As a motivator, a teacher must inspire students to think critically and work diligently so that they can learn well; 2) As a facilitator, a teacher must provide the learning resources students need to complete their research; 3) As a learning manager, a teacher must oversee the relationship between students and the lesson plans that will be used, such as in pairs, group discussions, or individual
learning; and 4) As a consultant, a teacher must provide advice to students on how to improve their learning. For instance, when the mouse and keyboard need to be operationalized. Teacher will go around observing the students and gives them opportunities to ask questions. Therefore, teacher guides, manages, and motivates the students when needed.

d. Support System Design
The design of support system is requirements or conditions needed to be able to apply a learning model based on discovery learning assisted by GeoGebra applets (PB-DLGA) designed such as classroom settings, learning tools, learning facilities, and media needed in learning. The support system needed in this model is digital modules using GeoGebra applets. Modules are arranged as learning materials and independent worksheet for students. Modules is used to guide students in improving creative thinking process. This model needs a computer laboratory or mobile phones.

e. Instructional Impacts and Additional Impacts
A learning model based on discovery learning assisted by GeoGebra applets is developed to gain the instructional and additional impacts as follows:
1. Students become actively involved in learning. They are trained to explore the information through the data obtained.
2. Students learn to discover concrete and abstract situation in each process.
3. Students strengthen their teamwork and information-sharing skills, which expands their capacity for creative thought.
4. By teaching students how to ask questions to get relevant data for assembling the findings, students can develop their capacity to think creatively.

Additionally, the model's extra effects include:
1. Teachers are eager to implement creative learning to encourage pupils to think creatively all the time.
2. In certain cases, skills acquired in discovery scenarios are more easily transferrable to new learning activities and circumstances.
3. Teachers are encouraged to use ICT to provide dynamic and varied learning.

3.2 Validation Results of learning model based on discovery learning assisted by GeoGebra applets (PB-DLGA)
Based on the previously mentioned research findings, it has been demonstrated that the GeoGebra applet-assisted discovery learning paradigm has good degree of validity. This model's validity was examined by fib experts. They observe impacts on syntax, the social system, the reaction principle, the support system, the educational system, and other factors.

Lesson plans with indicators, learning objectives, time allotment, materials, and learning activities are among the elements shown in this paradigm. Then, digital modules comprise material that is competent, high-quality, and appropriate for the PB-DLGA model. Tests of creative thinking capacity should reveal whether the applicant can think clearly, flexibly, creatively, and in detail. This constructed learning model has met the requirements for validity, according to the results of the expert validation. This finding is consistent with Nieveen's (1999) assertions that reliable components must be based on reliable material and that all components must be reliably connected to one another (construct validity).
Additionally, the validation of the lesson plans yielded 4.6 of the valid categories as the total average validation value from the aspects of developing indicators. The total average of validity from the competence aspect for the modules' validation results is 4.27 valid categories.

And the content category received a valid category as a result of the creative thinking ability test results. This indicates that the test is appropriate for the learning objectives and measurement indicators. The validation results for the test of creative thinking capacity, meantime, show that it can be understood sufficiently and only requires modest change. It is stated in the experts' suggestions.

The modelling book, lesson plans, and digital modules that were built have satisfied legitimate criteria from each aspect, according to the results of all the analyses previously mentioned. Additionally, the test of creative thinking capacity met the requirements for validity in terms of both content and language.

3.3 Practicality Results of Learning model based on Discovery Learning assisted by GeoGebra applets (PB-DLGA)

Based on research findings, a discovery-based learning methodology GeoGebra applet-assisted learning has met the practicality requirement. It is evident from expert assessments and the outcomes of learning process observations. From the experts' evaluation, it is clear that realistic and usable models and learning resources, such as modeling books, lesson plans, digital modules, and tests of creative thinking, are available. In the meantime, 4,38 people scored highly in the learning model's implementation results. It works well with Nieven (1999). If experts and practitioners indicate that the learning model and its tools can be applied and that the implementation outcomes fell into the high or very high category, he claims that the learning model is practical.

If the implementation outcomes of the created learning model fall within the high category, that is normal. It is brought on by the development of a better learning approach based on discovery learning using GeoGebra applets (PB-DLGA), which aids in, facilitates, and promotes student comprehension of the quadrilateral materials. Students are encouraged to use the provided digital modules to think creatively as part of the learning process. Teachers created several activities for those modules that encourage pupils to think more imaginatively.

Based on these findings, the enhanced discovery learning model with GeoGebra (PB-DLGA) has met the requirements for expert evaluations and learning implementation outcomes. Using observation sheets from the PB-DLGA model's implementation, it is possible to determine the viability (practicality) of this model.

3.4 Results of The Efficacy (Effectiveness) of Discovery Learning Model Assisted by GeoGebra Applets (PB-DLGA)

The following are a discussion for each indicator in measuring or searching the efficacy (effectiveness) of DLGA learning model.

a. Classical Students Learning Completion

Based on the findings of the data analysis previously mentioned, test I's percentage of students that completed their creative thinking tasks in a traditional manner was 80.56 percent. In test II, 91.67
percent of the students' creative thinking abilities was completed in the traditional manner. If the findings of students' classical learning completion are considered, along with their capacity for creative thought, the completeness found in the I test result does not meet the standards of classical completion. In test II, meantime, it has satisfied the requirements for conventional completion. According to Vygotsky, Trianto (2011: 39), the teacher provides assistance to pupils at the start of the learning process and gradually reduces it as they complete the tasks. The learning process will be more successful and have an impact on how thoroughly kids learn traditional lessons the more actively the students engage in the work.

b. Achievement of Learning Objectives
According to analytical results, the teacher-to-student relationship and the success of learning objectives in Test I have not been attained, however Test II revealed that the attainment of learning objectives has been achieved for each question item. As a result, while learning objectives from the post test of creative thinking ability in test II have been met, those from the post test of creative thinking ability in test I have not been met for every question item.

This perspective is in line with the findings of a study by Yuliani and Saragih (2015), according to which "the results of learning purpose achievement are utilized to seeing the predicted achievement of learning objectives." This outcome indicates that finding the anticipated attainment of learning completeness is to determine the learning objectives.

It can be said that the accomplishment of the learning objectives demonstrated that the developed learning model met the criteria for efficacy (effectiveness).

c. Students' and Teacher's Activities
In test I, the average percentage of time used by students fell within the range of 30.22, 55.33, and 2.17. The typical amount of time spent by students on tasks like listening to explanations from teachers or peers is 30.22% of the total time allotted for each meeting. At test II, it rises to 32.06 percent. Tests I and II took up a percentage of the total time allotted, which is acceptable. It demonstrates how the PB-DLGA model can limit the teacher's control over the actions of the students.

38.89% of each meeting's time is typically spent by teachers on activities that include explaining material or disseminating information. These activities' time percentages exceed the applicable ideal time tolerance interval's top limit. It demonstrates that some instructor explanations or material are not required by or taken into account by students. Overall, the learning process activities of the students and teachers have met the highest standards. Theoretically, the efficacy (effectiveness) requirements have been met by student and teacher activities during the learning process. This outcome is consistent with Sinaga's (2008) assertion that an effective learning model is only possible if both student and teacher activities occur at the appropriate moment.

d. Teacher's Ability to Manage Learning
This teacher's ability can be seen from three aspects observed that are teacher’s ability to manage syntaxes, time, and class situation. In Test I, aspect of teacher’s ability in managing syntax was quite good for 3.39. Then, in Test II it increases to 3.43. teacher’s ability to manage syntax was quite
good. It identifies that teacher was able to teach using syntax of PB-DLGA model started from stimulus to conclusion.

The three observable aspects—the instructor's ability to control learning syntax, manage time, and manage the classroom environment—show how well the teacher can manage learning. In the first trial, the teacher's proficiency in controlling the acquisition of syntax was pretty strong, scoring 3.39. Then, it went up to 3.43 in the second experiment. The instructor does an excellent job of overseeing the category's learning of syntax. This shows that instructors may instruct students using the stimulus-to-conclusions PB-DLGA model syntax. This is due to the low number of students who inquire about using the geogebra applet to gather data. At the data collecting step, using the geogebra applet, the majority of the students were able to complete it independently.

e. Student and teacher reactions

The learning component was regarded as extremely beneficial in the learning process on average in 88.9 percent of teacher replies and helpful in the learning process in 33.3 percent of teacher responses. Additionally, 33.3 percent of the results of the assessment came into the good category, and 77.78 percent of the teacher's conclusions about the learning component fell into the very good category. The two comments make it evident that the instructor has a favorable opinion of the PB-DLGA model's components.

Daryanto (2010) argues that learning is a process of change, specifically a step taken by a person to bring about a broad change in behavior as a result of interaction with the environment. This is due to the complexity of learning and students' free will to learn or not.

Additionally, the teacher's stimulus—feedback and reinforcement—was tailored to the characteristics of the students after analyzing the context of the class, which contributed to the students' positive response. The instructor creates a lesson plan based on the characteristics of the students that includes student-led activities, allotted time, and assessments tailored to the created model. Teaching programs are also included in learning resources like digital modules in order to assist students in resolving problems and accomplishing learning objectives. As a result, it can be said that the learning model created improves students' learning processes.

3.5 Improving Students' Creative Thinking Ability Through Geogebra Applet-Assisted Discovery Learning-Based Learning Model (PB - DLGA).

Students' understanding of creative thinking will significantly grow when the PB-DLGA model is used, provided the learning model is of high quality, valid, applicable, and efficient. The pretest and posttest results of the trials' creative thinking assessments, known as N-Gains, will demonstrate the improvement.

The entire gain in creative thinking obtained falls into the "medium" category if the categorization stated in Chapter III is applied to the average value of N-Gain, which is 0.7. According to the created PB-DLGA model, creative thinking abilities have grown with a significant increase with an N-Gain value of 0.7, or a Gain percentage of 70%, falls into the "mid" group.
According to the table above, 8 students either achieved a Gain score in the range of $g > 0.7$ or saw an improvement in their creative thinking abilities that fell into the "High" category. There were 17 students who saw an improvement in their critical mathematical thinking abilities in the "Medium" group or who had a gain score of $0.3$ to $g 0.7$, but no one who did so in the "Low" category or who received a gain score of $g 0.3$.

Fluency, Flexibility, Elaboration, and Authenticity were the components of creative thinking talents examined in this study. Creative thinking abilities are evaluated according to each component as well as on an average or overall basis. The average pretest percentage on the fluency indicator is 63 percent, and the average posttest percentage is 79.67 percent, which reflects the worth of creative thinking abilities based on the ability element in each trial. The flexibility indicator's pre-test score is 60.67 percent, while the post-test average is 78.67 percent. The elaboration indicator's pre-test score is 49%, whereas the post-test average is 87.5 percent. Additionally, although the average posttest reaches 77 percent, the pretest on the authenticity indication is only 28.5%.

When using the PB-DLGA model to the provided open problems, students are required to exercise their creative thinking skills. This is because, if students' capacity for original thought is not fostered, mathematics will just become a topic that adheres to a set of procedures and imitates examples without grasping their meaning. The constructivism learning theory (Trianto, 2010) contends that for learning to take place, students must make their own discoveries, understand difficult material, compare new information to prior knowledge, and make changes to prior knowledge if it is no longer accurate. The application of pertinent learning will improve students' capacity for creative thought.

The ability to think creatively is a mental activity connected to sensitivity to issues, information, and fresh ideas, activities that are often not conducted with an open mind, according to Nehe, Surya, and Syahputra's (2017) research.

Thus, it can be concluded that the tried-and-true PB-DLGA paradigm helps pupils become more capable of thinking creatively.

### 4 Conclusion

The RPP, digital module, and TKBK are all recognized as appropriate learning resources by the Geogebra Applet-Assisted Discovery Learning-Based Learning Model (PB-DLGA). The Geogebra Applet-Assisted Discovery Instruction-Based Learning Model (PB-DLGA) and related tools (RPP, digital module, and TKBK) are very beneficial for implementing classroom learning. Learning has been achieved using the Geogebra Applet-Assisted Discovery Learning-Based Learning Model (PB-DLGA). These words have a source. The proportion of completed classical learning is above 85%, the proportion of learning goals met is above 75%, the proportion of time spent on teacher and
student activities is ideal, the proportion of learning that is managed effectively by the teacher is above 80%, and the proportion of positive feedback from both teachers and students is above 80%. When applied to rectangular flat form material, the PB-DLGA model can improve students' capacity for creative thought.

References


The Development Of Higher Order Thinking Skills Test Of Geometry Based On Realistic Mathematics Education For Fifth Grade Elementary School At Tanjung Pura

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Abstract. This study aims to: produce a HOTS test of geometry that is valid, effective and practical to use in fifth grade elementary school. This research is a development research of Tessmer's formative evaluation type which has been adapted which consists of two stages, namely; (1) preliminary stage, and (2) formative evaluation stage which includes self-evaluation and prototyping. The results showed that the HOTS test of geometry based on realistic mathematics education that had quality from the aspects of validity, effectiveness and practicality had 15 questions consisting of 11 multiple choice questions and 4 essay questions. The test validity coefficient is 0.69 (high validity) and the test reliability coefficient is 0.81 (very high reliability). Effective based on the achievement of learning objectives reaches 80%, 88% classical completeness, 85% positive response from students and efficient learning time. Practically based on the assessment of experts who stated that the questions were feasible and could be used and, the teacher's response obtained an average score of 88.89% (practical).

Keywords: HOTS Test, Formative Evaluation, Test Quality

1. Introduction

The achievement of primary and secondary education in Indonesia is still below average. Based on the PISA publication released by the OECD on December 3, 2019, in the field of mathematics, Indonesia won a score of 379 with an average PISA score of 489. Indonesia shares rank 70 with Argentina out of 79 countries that participate in the program. Indonesia is only better than the Philippines in Southeast Asia but is far below neighboring Malaysia which scored 440 and was ranked 46th. Even Indonesia's other neighboring country, Singapore, managed to rank second with a score of 569 under China, which won PISA 2018 with a score of 591[1].

The low achievement of Indonesian students in PISA is because in general learning in Indonesia is still not based on HOTS [2]. This can be seen from a study which states "at the elementary school level it can be concluded that the learning media, teaching materials, learning materials, student worksheets, and learning evaluations used are not all HOTS-based"[3]. Even though the
PISA questions are HOTS questions, it makes it difficult for students to answer PISA questions.[2]. In addition to PISA, other studies also show the low ability of students to answer HOTS questions. A study conducted in the city of Semarang concluded that the Pilot Project Elementary School students' HOTS skills were still at a low level with an average score of 40. Students' abilities in decision making, experience, problem solving and discovery were still at a low level [4].

Similar results were also obtained from a study of elementary school students in Jakarta which showed that HOTS skills were not evenly distributed, an increase was needed by increasing the number of HOTS questions at levels C5 and C6 [5]. One of the causes is the inability of teachers to implement HOTS-based assessments properly. This can be seen from the research conducted on elementary school teachers in East Java which showed the results that teachers had difficulty developing HOTS-based math problems at the level of analysis (C4), evaluation (C5) and creation (C6) [6].

Another study showed that 50% of the research sample on elementary school teachers in the city of Medan had not been able to implement HOTS-based authentic assessments properly [7]. This result is corroborated by another study which states that the formulation of an authentic HOTS-based assessment in Medan City Elementary School has an average success rate that has not reached the 75% threshold because it is only 74.65% in the Enough category [8].

In a study, it was stated that most of the HOTS questions made by the teacher were only limited to the level of analysis (C4) in the form of multiple choice. Teachers still have difficulty making HOTS questions at the evaluation (C5) and creation (C6) levels as well as HOTS questions in the form of entries and descriptions. The teachers think that the HOTS questions are difficult questions. So if you want to make HOTS questions, then make very difficult questions with language that is difficult to understand which makes it difficult for students to answer them [9]. Meanwhile, Brookhart said that difficult questions do not automatically measure HOTS.

The low achievement of Indonesian students in PISA (Program for International Student Assessment) is due to the fact that learning in Indonesia is generally not HOTS-based [2]. The reason is the weak mathematical ability of students in answering non-routine or high-level questions. In PISA, the questions tested are contextual questions which are problems in students' daily lives which consist of 6 levels. Meanwhile, students in Indonesia are only used to routine questions at level 1 and 2 [10].

In addition, the causative factor is that students are only accustomed to solving conventional problems with standard settlement procedures, with abstract properties, and not related to students' daily lives. So that questions that require mathematical reasoning such as PISA questions will be difficult for Indonesian students to solve [11]. In addition, the lack of realistic math problems specifically designed according to the potential and character of students and using contexts that are relevant to students' lives is also the cause of the low achievement of Indonesian students in PISA [12].

Based on preliminary observations made by researchers, learning outcomes in the field of mathematics for fifth grade elementary school in cluster III, Tanjung Pura sub-district are still low. The low learning outcomes of mathematics can be seen when the mid-semester assessment (PTS) and end-semester assessment (PAS) are odd. Most students have difficulty in solving these math problems and get poor grades. After being investigated, it turns out that one of the causes is that so far students have only been given routine practice questions with low cognitive levels so that students have difficulty answering math questions in the mid-semester assessment.
(PTS) and HOTS-based end-of-semester assessments. Viewed from the teacher's side, in the implementation of learning the teacher always presents mathematical material only focused on formulas with abstract questions so that students feel bored when learning takes place, and this affects learning outcomes.

Several studies have shown that a realistic mathematical approach can be used in learning mathematics in elementary schools. According to Fauzan, learning mathematics with a realistic mathematics approach is better which makes students active and creative and teachers leave the lecture method and change themselves from learning centers to mentors and resource persons [13]. Meanwhile, Armanto's research shows that elementary school students in the cities of Medan and Yogyakarta with a realistic mathematics approach in learning can build their own understanding of multiplication and division with the concept of repeated addition and subtraction with a rediscovery strategy. Students become more active both individually and in groups and students are encouraged to reformulate their learning process due to learning opportunities in different situations. Students also make significant progress in learning multiplication and division [14].

In another study, it was stated that learning with realistic mathematics makes students more motivated, active and creative because of interesting material equipped with pictures and stories. Students' understanding of mathematical concepts increased, followed by an increase in scores from pretest to posttest even with conventional tests [15]. Meanwhile, research conducted in Bandung showed that students experienced positive changes in attitudes towards mathematics [16]. Several other studies have obtained similar results. Reasoning, achievement and interest in learning mathematics students are better than ordinary learning [17], [18], [19].

In addition to the selection and application of appropriate learning methods, students must also be given appropriate practice questions and assignments that can improve students' mastery of the material and train students to learn independently. The questions must be contextual and realistic and well designed according to the level of students' cognitive development. In addition, a good question must be valid, and reliable.

Realistic mathematics learning uses real math problems that are close to students' lives. Therefore, the development of realistic mathematical problems is needed. The development of realistic math problems that refer to the PISA standard can be used as an alternative to train students to solve PISA questions [11]. This can be seen from several research results that show the PISA model questions are effective in improving students' mathematics learning achievement [20].

Taking into account the background that has been stated above, the researcher feels the need to conduct research that aims to develop HOTS (Higher Order Thinking Skills) questions based on good quality realistic mathematics learning in the construction material for the fifth grade elementary school in cluster III, Tanjung Pura sub-district.

2. Method

This research is a research and development research, with the product of this development research is the HOTS questions on building materials based on realistic mathematics learning. The purpose of this development research is to produce HOTS questions based on realistic mathematics learning materials that are valid, effective and practical. To answer the research questions, data analysis was carried out on the research results following the stages of the
formative evaluation type development model Tesmer y which has been adapted consisting of two stages namely; (1) preliminary stage, and (2) prototyping stage. The preliminary stage includes analysis, design and self-evaluation. The prototyping stage consisted of expert reviews, trial I, trial II, trial III and trial IV. Sequentially these steps can be made as shown below.

![Diagram of Tessmer's formative evaluation design flow adaptation](image)

**Figure 1.** Tessmer's formative evaluation design flow adaptation

### 3. Results and Discussion

#### 3.1. Preliminary Stage

**Design Analysis.** The design analysis begins by collecting various references related to this research, namely about test development research, HOTS, and realistic mathematics education. From these various references, several theories put forward by experts related to this study were used by researchers to determine indicators of test quality, namely (1) Test Validity, (2) Test Effectiveness and (3) Test Practicality. After determining the indicators used in this study, the researcher then determined the population and research sample. The population in this study were all fifth grade students in cluster III Tanjung Pura, totaling 312 students covering 16 elementary schools. Meanwhile, the number of samples determined was 92 students. The sample in the research trial was divided into high ability students.

**Self Evaluation.** The self-evaluation stage aims to design HOTS questions of geometry based on realistic mathematics education. At the Self Evaluation stage, it is divided into four parts, namely:

- **a). Curriculum Analysis**
  At this stage the researcher analyzes the curriculum on the material of geometry. In the 2013 curriculum, for the fifth grade of elementary school, materials of geometry are in the even semester. As for the material included in the material of geometry in fifth grade elementary
school in the even semester, namely cubes, blocks, prisms, pyramids, tubes, cones and spheres. However, due to limited time and energy, the researcher only took cubes and blocks with basic competencies. Besides being used to design HOTS questions, curriculum analysis is also needed by researchers to design lesson plans (RPP). The RPP designed by the researcher is based on realistic mathematics education. Therefore, the HOTS questions of geometry developed are based on realistic mathematics learning. This means that before testing the questions, students must first get realistic mathematics education about cubes and blocks.

b). Student Analysis
Characteristics of students studied include cognitive development, academic ability and socio-economic background. Fifth grade elementary school students are in the age range of 10 – 11 years. According to Piaget students at the age of 7 - 11 years are at the stage of concrete operational development. This means that in general, the cognitive development of fifth grade students in the four schools entered the concrete operational stage. The concrete operational period means that students need concrete things to learn something. Students at that age have not been able to imagine abstract things to be digested into new knowledge for themselves. Therefore, realistic mathematics education is very suitable to be applied in elementary schools because it can make abstract mathematics material realistic so that it is easier for students to understand.

The results of the analysis of the academic ability of Tanjung Pura fifth grade students for the 2021/2022 academic year showed varied results consisting of students with low, medium and high abilities so that students' abilities in mathematics also varied.

The results of the analysis of the socio-economic background of students' parents are various, including farmers, entrepreneurs, traders and others. In addition, the school's relationship with parents/guardians and the community around the school has been well established.

c). Analysis of HOTS Questions for Building Space Based on Realistic Mathematics Learning
At this stage, the researcher reviewed the HOTS questions of geometry based on learning. The learning base chosen in this study is realistic mathematics education of geometry, especially cubes and blocks.

d). Design
In this study, the researchers designed HOTS questions with 20 items consisting of 15 multiple choice questions and 5 essay questions with reference to Bloom's taxonomy revised at level 4 (analysis), level 5 (evaluation) and level 6 (creating). These questions contain contextual material and are related to students' daily lives according to the characteristics of realistic mathematics education. The questions are also designed in simple language to make it easy for students to understand and in standard language according to the Enhanced Spelling (EYD). Question design HOT of geometry based on realistic mathematics learning that are made include:
1. The HOTS question grid of geometry based on realistic mathematics education is based on the researcher's analysis.
2. The HOTS questions of geometry based on realistic mathematics education.
The instrument set produced at the self-evaluation stage is called prototype I, which is a HOTS question of realistic mathematics learning-based space-building material, which consists of 15 multiple choice questions and 5 essay questions.

3.2. Prototyping Stage

Expert Reviews. At this stage, a qualitative test of the validity of the test was conducted by material experts, constructivists and linguists. In addition, the researcher also asked for opinions, suggestions and input from two experienced teachers. As for comments and suggestions from the validator for the development of questions HOT of geometry based on realistic mathematics education can be seen in table 1. below:

<table>
<thead>
<tr>
<th>Validator</th>
<th>Comments/Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validator 1</td>
<td>Adjust all the questions with the indicator. Use operational verbs that match the HOTS cognitive level. Correct the sentence in the description of number 2 by adding “Can all the Rubik's cubes fit in a box?”</td>
</tr>
<tr>
<td>Validator 2</td>
<td>Give instructions in doing the questions. Set time to solve the problem.</td>
</tr>
<tr>
<td>Validator 3</td>
<td>Pay attention to the use of punctuation and EYD.</td>
</tr>
<tr>
<td>Teacher 1</td>
<td>It's better not to ask questions too long. Pay attention to the use of punctuation and EYD.</td>
</tr>
<tr>
<td>Teacher 2</td>
<td>Adjust the level of difficulty of the questions with the cognitive level of elementary school students. Pay attention to the use of punctuation and EYD.</td>
</tr>
</tbody>
</table>

Based on the results of the validator's assessment, in general, the HOTS questions of geometry based on realistic mathematics education that were developed were classified as good and could be used with a few revisions.

Realistic Mathematics Learning. This study develops HOTS questions of geometry based on realistic mathematics education in fifth grade elementary school in Tanjung Pura sub-district. Therefore, before carrying out the test phase of the questions that have been developed in prototype I, a realistic mathematics learning is carried out on the material about cubes and blocks. Learning tools used in realistic mathematics learning such as lesson plans (RPP), student activity sheets (LKS) and question instruments have also been validated by experts and teachers at the previous stage.

Realistic mathematics education of cubes and blocks is carried out in class V for three meetings each with a duration of 2 x 35 minutes each. Realistic mathematics education is carried out in four different schools with the exact same steps of learning activities. This is done because the focus of this research is the development of HOTS tests/questions, not on realistic mathematics education. Realistic mathematics education acts as the basis for research on the development of the HOTS test on spatial material. Therefore, realistic mathematics education that is carried out in class V in four different elementary schools must be in exactly the same way as the learning activities so that the HOTS questions of geometry developed start from the same basis.

Trial I. Prototype was then tested on trial I in class V with a sample of 21 students. Before conducting the first trial, fifth grade students were given realistic mathematics lessons of
geometry for three meetings. The results of the first trial were then analyzed for validity using
the Anates V.09 application for multiple choice questions and Anates V.04 for description
questions. The results of the analysis showed that the test validity was 0.55 (medium), the test
reliability was 0.71 (high). The results of the analysis of the descriptions showed that the test
validity was 0.50 (medium), the test reliability was 0.67 (high).
Based on the results of the analysis of the results of the first trial as well as comments and
suggestions from students, a revision was made to prototype I on questions that were declared
invalid and needed improvement. The result of the revision of prototype I is called prototype II.
Against Prototype II, trial II was then carried out because the validity of the test in trial I had
not reached the target specified in this study.

**Trial II. Prototype II** was then tested in the second trial in class V with a sample of 20 students.
Before conducting the second trial, the fifth grade students were given realistic mathematics
lessons of geometry for three meetings. The results of the analysis showed that the test validity
was 0.59 (medium), the test reliability was 0.74 (high). The results of the analysis of the
descriptions showed that the test validity was 0.49 (medium), the test reliability was 0.66 (high).
Based on the results of the analysis of the results of the second trial as well as comments and
suggestions from students, a revision was made to prototype II on questions that were declared
invalid and needed improvement. The result of the revision of prototype II is called prototype
III. Against Prototype III then trial III was carried out because the validity of the test in trial II
had not reached the target specified in this study.

**Trial III. Prototype III** was then tested in the third trial in class V with a sample of 26 students.
Before conducting the third trial, fifth grade students were given realistic mathematics lessons
of geometry for three meetings. The results of the third trial were also analyzed using the Anates
application. The results of the analysis showed that the test validity was 0.61 (high), the test
reliability was 0.76 (high). The results of the analysis of the descriptions show that the test
validity is 0.72 (high), the test reliability is 0.84 (very high).
Based on the results of the analysis of the results of the third trial, it can be concluded that the
HOTS test of geometry based on realistic mathematics education has reached the value of
validity and reliability that has been determined in this study, namely the good category.
However, because the other test quality indicators have not been met, namely the effectiveness
of the test, it is necessary to revise the prototype III. Prototype III was revised based on the
results of the analysis of test results III as well as comments and suggestions from students. The
result of the revised prototype III is called prototype IV. Against Prototype IV, then conducted
a trial IV.
Trial IV. Prototype V was then tested on trial IV in class V with a sample of 25 students. Before conducting the IV trial, the fifth grade students were given realistic mathematics lessons of geometry for three meetings. The results of the IV trial were also analyzed using the Anates application. The results of the analysis showed that the test validity was 0.69 (high), the test reliability was 0.81 (very high). Of the 15 multiple choice questions tested, 11 of them were declared valid, namely questions number 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. Judging from the distinguishing power of the questions, from 11 items multiple choice questions which are declared valid, questions number 5 and 11 have differentiating power for questions in the low category. While questions number 3, 4, 6, 9, and 13 have different power in the medium category and questions number 7 and 10 have high distinguishing power and questions number 8 and 12 have very high distinguishing power. Judging from the level of difficulty, questions number 5 and 11 have a very easy level of difficulty. While questions number 3 and 10 have an easy level of difficulty.

The results of the analysis of the descriptions show that the test validity is 0.69 (high), the test reliability is 0.82 (very high). Of the 5 essay questions tested, 4 of them were declared valid, namely questions number 1, 2, 3 and 5. Judging from the discriminating power of the questions, of the 4 essay questions which were declared valid, questions numbered 1, 2 and 3 had differentiating power in the low category. While question number 5 has a differentiating power with a very low category. Judging from the level of difficulty, questions number 1, 2 and 3 are categorized as moderate. While question number 5 has a very easy level of difficulty.

a. The Validity and Reliability of the HOTS Test of Geometry Based on Realistic Mathematics Education

The following is a recap of the validity and reliability of the tests from trials I – IV in the table below:

<table>
<thead>
<tr>
<th></th>
<th>Trial I</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>0.55</td>
<td>0.59</td>
<td>0.74</td>
<td>0.61</td>
</tr>
<tr>
<td>R</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Currently</td>
<td>High</td>
<td>Very high</td>
<td>Very high</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>0.67</td>
<td>0.49</td>
<td>0.66</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>High</td>
<td>Tall</td>
<td>Tall</td>
</tr>
<tr>
<td>Currently</td>
<td></td>
<td>Very high</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In table 2. above, it can be seen that the target validity of the test on multiple choice questions has been achieved in the third trial, which is 0.61 while the test reliability target has been achieved from the first trial.

<table>
<thead>
<tr>
<th></th>
<th>Trial I</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>0.50</td>
<td>0.30</td>
<td>0.49</td>
<td>0.66</td>
</tr>
<tr>
<td>R</td>
<td>High</td>
<td>High</td>
<td>Tall</td>
<td>Tall</td>
</tr>
<tr>
<td>Currently</td>
<td>High</td>
<td>Very high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>0.84</td>
<td>0.72</td>
<td>0.84</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>High</td>
<td>High</td>
<td>Very high</td>
</tr>
<tr>
<td>Currently</td>
<td></td>
<td></td>
<td>Tall</td>
<td></td>
</tr>
</tbody>
</table>

In table 3. above, it can be seen that the target validity of the test on the description questions has been achieved in the third trial, which is 0.72 while the test reliability target has been achieved from the first trial.
b. The Effectiveness of the HOTS Test of Geometry Based on Realistic Mathematics Education

The HOTS test of geometry based on realistic mathematics education is appropriate if it can have a positive impact on learning. For this reason, the HOTS test developed must meet the effectiveness criteria, namely: (1) a minimum of 75% of the achievement of learning objectives by a minimum of 65% of students; (2) students’ mastery of classical learning, namely at least 80% of students who take part in learning are able to achieve a score of 70; (3) a minimum of 80% positive student responses; (4) efficient learning time or not exceeding ordinary learning [17].

Table 4. Recap of achieving learning objectives from trials I – IV

<table>
<thead>
<tr>
<th>Trial</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>62%</td>
<td>55%</td>
<td>62%</td>
<td>72%</td>
</tr>
<tr>
<td>Not Reached</td>
<td>Not Reached</td>
<td>Not Reached</td>
<td>Achieved</td>
</tr>
</tbody>
</table>

The achievement of learning objectives is calculated based on the number of learning objectives achieved by students. The learning objectives are achieved if at least 65% of the number of students achieve the learning objectives set at least 75%. From table 4. above, it can be seen that the learning objectives have been achieved in the IV trial with the achievement of learning objectives reaching 72% where the target to be achieved is 65%.

Table 5. Classical Completeness Recap from Trials I – IV

<table>
<thead>
<tr>
<th>Trial</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>71%</td>
<td>75%</td>
<td>69%</td>
<td>88%</td>
</tr>
<tr>
<td>Not Reached</td>
<td>Not Reached</td>
<td>Not Reached</td>
<td>Achieved</td>
</tr>
</tbody>
</table>

Classical completeness is achieved if at least 80% of the number of students reach the KKM, which is 70. In other words, classical completeness is achieved if at least 80% of the number of students achieve individual completeness. From table 5. above, it can be seen that classical completeness has been achieved in trial IV of 88%.

Table 6. Recap of Data Analysis Results of Student Response Tests I – IV

<table>
<thead>
<tr>
<th>Trial</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>79%</td>
<td>81%</td>
<td>83%</td>
<td>85%</td>
</tr>
<tr>
<td>Not Reached</td>
<td>Achieved</td>
<td>Achieved</td>
<td>Achieved</td>
</tr>
</tbody>
</table>

From table 6. above, it can be seen that the target of positive student responses of 80% has been achieved in the second trial.

Table 7. Recap Learning Time and Time to Work on HOTS Questions of Geometry Test Room I – IV

<table>
<thead>
<tr>
<th>PB</th>
<th>Trial I</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>3 x 70 minutes</td>
<td>3 x 70 minutes</td>
<td>3 x 70 minutes</td>
<td>3 x 70 minutes</td>
</tr>
<tr>
<td>Not Exceeding Normal Time</td>
<td>Not Exceeding Normal Time</td>
<td>Not Exceeding Normal Time</td>
<td>Not Exceeding Normal Time</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>60 minutes</td>
<td>60 minutes</td>
<td>60 minutes</td>
<td>60 minutes</td>
</tr>
<tr>
<td>Not Exceeding Normal Time</td>
<td>Not Exceeding Normal Time</td>
<td>Not Exceeding Normal Time</td>
<td>Not Exceeding Normal Time</td>
<td></td>
</tr>
</tbody>
</table>
Based on table 7. above it is clear that since the first trial the learning time and the time to do the test did not exceed the normal time.

c. Practicality of the HOTS Test of Geometry Based on Realistic Mathematics Education

Practicality data were obtained from the opinions of material experts, constructivists and linguists who stated that the HOTS test of geometry based realistic mathematics education was feasible and could be used in elementary schools. Practicality data from experts was obtained at the time of validation. After conducting each trial, the teacher's response questionnaire was also used to analyze the practicality of the developed test. The teacher's response questionnaire was used to determine the readability of the HOTS test questions for the given of geometry based realistic mathematics education.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Trial II</th>
<th>Trial III</th>
<th>Trial IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved</td>
<td>Achieved</td>
<td>Achieved</td>
<td>Achieved</td>
</tr>
</tbody>
</table>

Based on table 8. above, it is clear that since the first trial the teacher's response has been positive and has even reached the target set in this study, which is the teacher's positive response of 80%.

4. Conclusion

The HOTS test of geometry based on realistic mathematics education has been successfully developed, which consists of 15 questions consisting of 11 multiple choice questions and 4 essay questions. The multiple choice questions have a test validity value of 0.69 (high validity) and 0.81 reliability (very high reliability). While the validity of the description test is 0.69 (high validity) and 0.82 reliability (very high reliability).

The HOTS test of geometry based on realistic mathematics education has been successfully developed based on the effectiveness of the test, namely the learning objectives achieved 72% (minimum 65%), classical completeness reached 88% (minimum 80%), positive student responses reached 85% (minimum 80%), efficient learning time (at least not exceeding normal learning time).

The HOTS test of geometry based on realistic mathematics education has been successfully developed which is practical to use. Practically based on the opinions of material experts, constructivists and linguists who stated that the HOTS test for realistic mathematics learning-based building materials was feasible and could be used in elementary schools. In addition, it is practical based on the positive response of teachers which reaches 89% (at least 80%).

Suggestion. For teachers, to use HOTS type questions both in learning and in formative and summative exams to train students' higher-order thinking skills. In addition, it increases the portion of C4 questions (analyses) which are students' weaknesses. For students, to continue to improve higher-order thinking skills by thinking critically, solving problems and being creative in solving the problems given. For other researchers, to conduct research on the development of HOTS questions with an assessment model or based on other learning approaches in order to enrich the repertoire of knowledge, especially about HOTS questions.
References

The Types of Lichenes in the University Area of North Sumatra

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Abstract. Lichenes is a symbiosis between fungi (mycobionts) from Ascomycetes and Basidiomycetes, and algae (phycobionts) from Cyanobacteria or Chlorophyceae so that morphology and physiology are one unit. Lichenes corticolous live as epiphytes in the substrate of tree bark branches. Lichenes grow in the university area of North Sumatra where many shade trees are found as the substrate. This research used survey method and morphometric method was used to identify the morphology of licheness. Sampling was found in 4 areas of North Sumatran Higher Education: 1. Universitas Negeri Medan, 2. Universitas Sumatera Utara, 3. Universitas Medan Area, 4. Institut Teknologi Sawit Indonesia. This study found 23 species of lichenes from 11 families: Cryptothecia striata, Cryptothecia scripta, Arthonia radiata, Cryptothecia granulatus, Arthonia patellulata (Family Athoniaceae), Xanthoparmelia conspersa, Pectenia plumbea, Flavopuctelia soredica (Family Parmeliaceae), Hypogymnia physodes (Family Hypogymniaceae), Dirinaria applanata (Family Caliciaceae), Lepraria incana, Lepraria lobbyficans (Family Streocyataceae), Ochrolechia subviridis (Family Persariaceae), Lecanora symmica, Lecanora strobilina, Lecidella elachoroma (Family Lecanoraceae), Ochrolealy tartarea (Family Pertusariaceae), Viridothelium virens (Family Trypeteliaceae), Rinodina roboris (Family Physciaceae). The types of licheness found included crustose and foliose thallu types.

Keywords: Lichenesis, Fungi, Ascomycetes, Basidiomycetes, and Algae

1 Introduction

North Sumatra is a province in Indonesia which is located in the northern part of the island of Sumatra. The capital city of this province is Medan City, with an area of 72,981.23 km2. The North Sumatra area certainly has many buildings and public facilities provided by the government for the benefit of the community. One example of public facilities is educational facilities. Education is inseparable from the academic field, namely teaching and learning. The current education level is the highest, namely the tertiary level. The university is the highest education place in higher education after the high school period has been completed. Lichens material is
studied in depth at the college level, because the material is contained in the Taxonomy of Low-Level Organisms course which studies lichens specifically. Therefore, researchers use the environment around students to collect data about lichens to find out the types of lichens that exist in universities in the North Sumatra region.

Lichenes (lichen crust) is often confused with moss or other plants that live in rocks, rotten wood and roofs. Though licheness does not include mosses or other types of plants. Lichenes are also not part of living things or individual sensitivity. Organisms are a collection of millions of photosynthetic microorganisms connected in a network of fungal hyphae (1). Algae and fungi are symbiotic to form new lichens when they meet the same species. Lichenes are an association of fungi and photosynthetic symbionts forming a stable and specific thallus. Corticolous licheness is a type of lichen found living as epiphytes on the bark substrate. Corticolous licheness is an important component of forest ecosystems as sensitive autotrophs contributing to biomass in the ecosystem and sensitive to environmental changes due to air pollution and climate change. The existence of a type of lichen is highly dependent on the host tree (its phorophyte) because some types of lichens choose certain types of trees as hosts (2).

The morphological structure of lichens does not have a cuticle layer, stomata and sensitive organs, thus forcing lichens to survive under the stress of pollutants in the air. Tolerant types of lichens can survive in areas with polluted environmental conditions. Meanwhile, sensitive types of lichens usually cannot be found in areas with poor air quality. The difference in sensitivity of lichens to air pollution is closely related to their ability to accumulate pollutants. The sensitivity of lichens to air pollution can be seen through changes in their diversity and accumulation of pollutants in their thallus (3). The environment greatly influences the presence of lichens in nature, so lichens have a role as environmental bioindicators (4).

Based on the form of lichens, they are classified into four forms, namely: a. Crustose: Thallus crustose has a thallus with a small size, thin, flat and often attached to the bark of trees, rock surfaces or on the ground. l sticking lichens in this habitat makes sampling difficult, making it difficult to take it without destroying the substrate. b. Foliose: The foliose thallus is shaped like a leaf. The upper cortex is the upper part that is protected and covered with gelatin and looks like pseudoparenchymatous. The thallus structure of foliose crustaceans is almost the same as the leaf structure, in the lower and upper cortex representing the epidermal layer of the leaf, then the algae and medulla representing the mesophyll. c. Fruticose: Tallus fruticose has a thallus shape in the form of a bush, like hair, ribbon, with many branches. It has lobes, which can be either flat or cylindrical. Fruticose thallus grows upright or hanging on a substrate that is often found on rocks, leaves, and tree branches. and D. Squamulose: The squamulose thallus consists of lobes like scales (5).

2 Research methods

This study aims to determine the types of lichens in universities in North Sumatra. This research took place from January 2021 to April 2022. Lichen data collection was carried out at four universities, namely Medan State University, North Sumatra University, Medan Area University
and the Indonesian Palm Oil Institute by directly determining the sample area first, the tree stands were explored to obtain lichen homogeneity, to obtain areas that will be blocked as habitat areas for lichens. Lichen samples were taken from tree trunks growing along the green line at each observation location. Lichen sampling at each location was carried out to determine the plot area and 1 meter length of each plot from the ground surface, recording the number of lichen species found in each plot using both individual and colony counting techniques, taking documentation of samples with a digital camera, and recording all important data related to lichens. Furthermore, the data is organized into tabular form and details of lichens.

3 Results and Discussion

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Amount</th>
<th>Thallus Type</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptothecia striata</td>
<td>290</td>
<td>Crustose</td>
<td>Arthoniaceae</td>
</tr>
<tr>
<td>Graphic script</td>
<td>192</td>
<td>Crustose</td>
<td>Graphidaceae</td>
</tr>
<tr>
<td>Parmelia caperata</td>
<td>99</td>
<td>Foliose</td>
<td>Parmeliaceae</td>
</tr>
<tr>
<td>Dirinaria applanata</td>
<td>561</td>
<td>Foliose</td>
<td>Caliciaceae</td>
</tr>
<tr>
<td>Parmeliopsis ambigua</td>
<td>70</td>
<td>Foliose</td>
<td>Parmeliaceae</td>
</tr>
<tr>
<td>Cryptothecia scripta</td>
<td>21</td>
<td>Crustose</td>
<td>Arthoniaceae</td>
</tr>
<tr>
<td>Arthonia radiata</td>
<td>13</td>
<td>Crustose</td>
<td>Arthoniaceae</td>
</tr>
<tr>
<td>Lepraria incana</td>
<td>32</td>
<td>Crustose</td>
<td>Streocaulaceae</td>
</tr>
<tr>
<td>Pectenia plumbea</td>
<td>5</td>
<td>Foliose</td>
<td>Parmeliaceae</td>
</tr>
<tr>
<td>Ochrolechia subviridis</td>
<td>3</td>
<td>Crustose</td>
<td>Pertusariaceae</td>
</tr>
<tr>
<td>Cryptothecia granulatus</td>
<td>4</td>
<td>Crustose</td>
<td>Arthoniaceae</td>
</tr>
<tr>
<td>Lecanora symmicta</td>
<td>56</td>
<td>Crustose</td>
<td>Lecanoraceae</td>
</tr>
<tr>
<td>Lepraria lobarifilcans</td>
<td>29</td>
<td>Crustose</td>
<td>Streocaulaceae</td>
</tr>
<tr>
<td>Flavoparmelia baltimorensis</td>
<td>125</td>
<td>Foliose</td>
<td>Parmeliaceae</td>
</tr>
<tr>
<td>Arthonia patellata</td>
<td>94</td>
<td>Foliose</td>
<td>Arthoniaceae</td>
</tr>
<tr>
<td>Ochrolechia tartarea</td>
<td>3</td>
<td>Crustose</td>
<td>Ochrolechiaceae</td>
</tr>
<tr>
<td>Lecanora sroblina</td>
<td>73</td>
<td>Crustose</td>
<td>Lecanoraceae</td>
</tr>
<tr>
<td>Viridithelium virens</td>
<td>21</td>
<td>Crustose</td>
<td>Trypeteliales</td>
</tr>
<tr>
<td>Flavopuctelia soredica</td>
<td>7</td>
<td>Foliose</td>
<td>Parmeliaceae</td>
</tr>
<tr>
<td>Lecidella elegans</td>
<td>4</td>
<td>Crustose</td>
<td>Lecanoraceae</td>
</tr>
<tr>
<td>Hypogymnia Physodes</td>
<td>8</td>
<td>Foliose</td>
<td>Hypogymniaceae</td>
</tr>
<tr>
<td>Rinodina roboris</td>
<td>15</td>
<td>Crustose</td>
<td>Physciaceae</td>
</tr>
<tr>
<td>Xanthoparmelia conspersa</td>
<td>6</td>
<td>Foliose</td>
<td>Parmeliaceae</td>
</tr>
</tbody>
</table>
Foliose type

Cryptothecia striata

Arthonia radiata

Cryptothecia granulatus

Ochrolechia tartarea

Lecidella elachroma

Graphic script

Lepraria incana

Lecanora symmicta

Lecanora strobilina

Rinodina roboris

Cryptothecia scripta

Ochrolechia subviridis

Lepraria lobbyficans

Viridothelium virens

Parmeliopsis ambigua
Based on Table 1, it is found that the types of lichens carried out at the University of North Sumatra Region obtained 23 species consisting of 2 different types of thallus, namely Crustose and Foliose. Of the 23 species of lichens in universities in North Sumatra, there are 11 families consisting of Arthoniaceae, Graphidaceae, Parmeliaceae, Caliciaceae, Streocaulaceae, Hypogymniaceae, Pertusariaceae, Lecanoraceae, Ochrolechiaceae, Trypeteliaceae and Physciaceae. This type of crustose is a species that is very much (dominant) compared to other types. This is predicted because the average lichen environment found in universities in the North Sumatra area is a tree. Where this type of crustose is a type that is attached to the substrate through medullary hyphae so that it will become more stable and have stronger attachments compared to other types. (5) Lichens crustose has a thallus that is small, thin, and flat, and is always attached closely to the substrate. For this type of thallus Foliose is not tightly attached to the substrate. This makes it difficult for this type of lichen to be removed from the substrate without destroying the substrate. (6) This type of crustose thallus is very efficient compared to other types of thallus. This species has a homoimerus thallus tissue type, namely the condition of phycobion (algae) located

**Fig. 1. Crustose Type**

- Parmelia caperata
- Dirinaria applanata
- Arthonia patellata
- Pectenia plumbea
- Flavoparmelia baltimorensis
- Xanthoparmelia conspersa
- Flavopuctelia soredica
- Hypogymnia Physodes

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near its hyphae. This type of crustose thallus can be safe from potential water shortages by surviving on its substrate.

The distribution pattern of lichens is caused by supportive ecological aspects. Such as aspects of temperature, humidity, light intensity and relationships with other aspects where there are still no measurable parameters that also affect the spread of lichens. For example, rainfall, the density of the parent plant canopy, wind direction and so on. Environmental factors are strongly influenced by the state of species diversity, one of which can affect the growth of lichens. (2) There are several factors that can affect an environment such as temperature, humidity, light intensity, and topography. Most often, lichen sticks to the bark of trees, so the bark becomes a substrate for the moss. The nature and condition of the plant directly affects the shape and condition of the growing thallus lichenes.

4 Conclusion

Based on the results of the study, it can be concluded that the types of lichens in universities in the North Sumatra region obtained species consisting of 2 different types of thallus, namely Crustose and Foliose. Of the 23 species of lichens in universities in North Sumatra, there are 11 families consisting of Arthoniaceae, Graphidiaceae, Parmeliaceae, Caliciaceae, Streocaulaceae, Pertusariaceae, Lecanoraceae, Hypogymniaceae Ochrolechiaceae, Trypettheliaceae and Physciaceae.

Acknowledgments. The author would like to thank Wasis Wuyung Wisnu Brata, S.Pd., M.Pd at the Department of Biology, State University of Medan and Taufik Akbar Tanjung, S.Pd from the State University of Medan for the assistance in identifying specimens and all the University Area North Sumatra (Medan State University, North Sumatra University, Medan Area University and the Indonesian Palm Oil Institute).

References

Analysis Of Mathematic Communication Difficulties And Student Mathematics Problem-Solving In The Application Of Realistic Mathematics Education Approach In 10th Grade Sultan Iskandar Muda Senior High School

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Abstract. This study aims to describe: (1) student’s mathematics communication skills in the application of Realistic Mathematics Education (RME), (2) student’s mathematics problem-solving abilities in the application of RME, (3) student’s difficulties in mathematics communication, and mathematics problem-solving in solving mathematics problems. with the RME approach. This research is qualitative research with a descriptive approach. Based on the research data, it was obtained that: (1) The level of student’s mathematics communication skills in the trigonometric comparison material in a right triangle, student’s who had the ability of the medium category had the highest proportion, while for the ability of the low and high categories had the same proportion, (2) The level of student’s mathematics problem-solving ability in trigonometric comparison material in right triangles, student’s who have the ability in the low category have the highest proportion followed by the proportion in the medium category, and the ability in the high category has the lowest proportion, (3) Difficulty in mathematics communication and solving student’s mathematics problems in the material of trigonometric comparisons on right triangles in the application of Realistic Mathematics Education are the difficulties of facts, concepts, operations, and principles.

Keywords: Mathematics Communication Ability, Mathematics Problem-Solving Ability, Realistic Mathematics Education.

1. Introduction

Mathematics need to be taught to student’s because: (1) It is always used in all aspect’s of life, (2) All field of study require appropriate mathematics skills, (3) It is a mean of strong, concise, and clear communication, (4) Can be used to present information in various ways, (5) Improve logical thinking skills, accuracy, and spatial awareness, (6) Give satisfaction to next problem-solving efforts [1]. In learning mathematics, a student who already can understand mathematics is also required to be able to communicate it, so that his understanding can be understood by others.

According to Wahid, communication ability is a mathematics skill that includes the ability to represent, listen, read, discuss, and write, as well as the ability to express mathematics ideas coherently to friends, teachers, and others, solve problems or do reasoning and express
Mathematics ideas well, in writing or orally [2]. Furthermore, Harianja added that mathematics communication is the ability of student’s to convey something they know through events in the form of dialogue or mutual relationships that occur in the classroom environment, there is a transfer of message. The message sent contains the mathematics material that student’s learn, for example in the form of concepts, formulas or strategies for solving a problem. The parties involved in communication events in the classroom are teachers and student’s. How transfer the message can be orally or in writing [3].

Mathematics communication skills are very important in learning mathematics because one of the functions of mathematics lessons is as a way of communicating ideas practically, systematically, and efficiently [4]. With good communication skills, a problem can be represented more quickly and this will support problem-solving [5]. In addition, communication can support student’s in learning new mathematics concepts, which can be seen in real situations, pictures, use of objects, explanations, use of diagrams, writing, and use of mathematics symbols. Misunderstandings can be found and resolved. Another advantage is that it reminds student’s that they share responsibility with the teacher in learning [6].

However, the reality on the ground shows that the majority of student’s have not mastered mathematics communication skills, both oral and written mathematics abilities. Student’s find it difficult to distinguish the use of mathematics symbols and symbols, change real problems into mathematics language, and transfer mathematics forms into real problems, student’s rarely ask questions or give their opinions in the mathematics learning process [4]. In addition, Puspita explained that student’s communication skills in interpreting story problems into mathematics symbols were still low and there were still many student’s who were confused in interpreting questions [7].

In addition to mathematics communication skills, another ability that is considered important in learning mathematics is problem-solving ability. Problem-solving ability is a skill or skill that a person has in himself in finding solutions to solve a problem or problem at hand. Solving a problem involves knowledge and skills to reach the correct and appropriate solution.

Problem-solving is seen as process to find combination of many rule that can be applied to overcome a new situation. Problem-solving is not just a form of the ability to apply the rules that have been mastered through previous learning activity, but a process to get rules at a higher level.

Problem-solving ability is one of the important components of developing student’s thinking skills because in the teaching and learning process mathematics is basically problem-solving and it is very necessary to link the material being studied with problems that exist in everyday life to explore the potential and ideas of student’s. in determining solutions to problems given by educators.

Through mathematics problem-solving, student’s are guided to develop their ability to build new mathematics knowledge, solve problems in various contexts related to mathematics, apply the necessary strategies, and reflect on the mathematics problem-solving process. All these abilities can be obtained if student’s are accustomed to carrying out problem-solving according to appropriate procedures, so that the knowledge gained by student’s is not limited
to one problem being solved, but can cover various other problems as well as broader aspects of knowledge.

Many factors cause the low mathematics communication skills and problem-solving of student’s in the learning process. One of them is teacher-centered learning (conventional) which does not provide opportunities for student’s to develop their opinions [8]. Student’s find it difficult to use mathematics symbols/notations correctly, describe information from a discourse, provide conclusions at the end of answers, present contextual problems in the form of mathematics models and are less able to convey mathematics ideas with algebra and solve problems coherently.

The above is also supported by the results of the initial observations that the researchers found on student’s at SMA Sultan Iskandar Muda class X on the material for the System of Two Variable Linear Equations (SPLDV) as basic knowledge for the material for the Three Variable Linear Equation System (SPLTV). Based on the test results, information was obtained that student’s were still unable to explain or state problems in language or mathematics symbols. The process of determining the answers to questions is also not following clear steps. This shows mathematics communication skills and problem-solving skills are very low.

Based on this, in overcoming the problem of student’s lack of ability in mathematics communication and problem-solving, educators who in this case are subject teachers are required to understand and be able to place appropriate learning approaches for the material to be taught to student’s. One of them is the Realistic Mathematics Education (RME) approach. The realistic mathematics Education approach begins with contextual problems that apply student-centered learning so that student’s are more active while the teacher acts as a facilitator. In this learning approach student’s can express and communicate their ideas with their classmates and the teacher can help support to compare ideas from student’s and make decisions from the ideas given by student’s [9]. Furthermore, Tarigan & Sinaga explained that realistic mathematics education is an approach to learning mathematics that focuses on contextual problems as its main aspect in introducing mathematics concepts and procedures [10].

Some of the advantages of the Realistic Mathematics Education approach are that this learning emphasizes the importance of real contexts that are known to student’s and the process of constructing mathematics knowledge by the student’s themselves, this learning emphasizes the activities of student’s to seek, find and build their knowledge that they need so that learning becomes student-centered. [11]. Not much different, Wangge said that this learning emphasizes more on "student-oriented" or "problem-oriented" so that it will reduce a lot of teacher domination [12].

However, this theory is inversely proportional to reality, where the use of learning approaches in learning mathematics has not been carried out optimally. The learning process carried out by the teacher is that student’s do not participate in finding extensive information about the learning topic being studied so when learning takes place student’s are just silent because they are afraid to give their answers [13]. The lecture model commonly used by teachers in teaching is one-way learning, so it tends to make student’s passive in learning.
This also happened in 10th grade at Sultan Iskandar Muda Senior High School, in learning mathematics in the class, the participation of student’s who are contributive and initiative in learning is still very lacking. Student’s are less involved in learning. When learning takes place student’s often do not pay attention to the teacher's teaching and student’s often do not complete assignments in class. In doing homework, many student’s do not do it. Teachers delivering mathematics learning always use lectures and assignments. Giving exercises or assignments to student’s can hone their abilities. However, if it's only lectures and assignments, student’s will get bored and they don't like math because the learning is the same.

2. Research Method

This research uses descriptive qualitative research. This type of qualitative research means a type of research that aims to describe how the mathematics communication skills and mathematics problem-solving abilities of student’s in the application of the Realistic Mathematics Education (RME) approach in class X SMA Sultan Iskandar Muda Medan. The resulting data will be in the form of words or utterances obtained from interviews and writings or numbers obtained from interviews. Based on the qualitative approach in this study, facts, written and oral, from observed human data source and other related document that were described as they were, were then reviewed as briefly as possible as to answer the problem. This research will be carried out with the implementation schedule coordinated with school activities. The subjects in the study involved student’s of class X IPA 1 SMA Sultan Iskandar Muda, who were treated through a Realistic Mathematics Education approach in first semester of the 2021/2022 academic year, totaling 30 student’s. While the subject matter given is a comparison of trigonometry.

Analysis data in this study uses qualitative data analysis where data analysis is carried out after giving learning action. According to Trianto [14] that qualitative data analysis is the process of systematic searching and compiling data obtained from interview, field note, and other material so that they are easy to understand that they can be informed to others. The data analysis is carried out by organizing the data, breaking it down into units, synthesizing, compiling it into patterns, and choosing which ones are important and which will be studied so that conclusions can be made and conveyed to others. Activities in data analyse use the Miles and Huberman model which includes data reduction, data display, and conclusion drawing/verification data.

3. Results and Discussion.

3.1. Description of Student’s Mathematics Communication Ability Data

After the Realistic Mathematics Education with Trigonometry Comparison material, a test was carried out on the student’s who had been selected as samples and a score was carried out on the student answer sheets. From the results of the scoring, the results of the student's mathematics communication skills are shown in table 1 below.
Table 1. Student’s Mathematics Communication Ability Test Results

<table>
<thead>
<tr>
<th>Interval SKKM</th>
<th>Total students</th>
<th>%</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ SKKM &lt; 75</td>
<td>9</td>
<td>30%</td>
<td>Low</td>
</tr>
<tr>
<td>75 ≤ SKKM &lt; 84</td>
<td>12</td>
<td>40%</td>
<td>Currently</td>
</tr>
<tr>
<td>84 ≤ SKKM &lt; 100</td>
<td>9</td>
<td>30%</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 1 above represents the composition of student’s according to the level of test results, from 30 student’s who took the test it turned out that student’s with low levels of mathematics communication skills were 9 student’s (30%), student’s who had moderate levels of mathematics communication skills were 12 student’s (40%) and student’s who have a high level of mathematics communication skills are 9 student’s (30%). Because there are still many student’s who have low and moderate levels of mathematics communication skills, this shows that there are still many student’s who make mistakes in solving problems related to student’s mathematics communication skills. So it is necessary to investigate the difficulties experienced by student’s in solving mathematics problems related to student’s mathematics communication skills and see the mistakes made by student’s when solving mathematics communication problems.

3.2. Data Description of Student’s Mathematics Problem-Solving Ability

After testing the student’s mathematics problem-solving abilities, then scoring is done on the student's work on the student worksheets. The score of the student’s mathematics problem-solving ability test is given based on the scoring guidelines that have been prepared previously, thus the results of the student's mathematics problem-solving ability tests are obtained after applying Realistic Mathematics Education in table 2.

Table 2. Results of Student’s Mathematics Problem-Solving Ability Test

<table>
<thead>
<tr>
<th>Interval SKPM</th>
<th>Total students</th>
<th>%</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ SKPM &lt; 75</td>
<td>20</td>
<td>67%</td>
<td>Low</td>
</tr>
<tr>
<td>75 ≤ SKPM &lt; 84</td>
<td>6</td>
<td>20%</td>
<td>Currently</td>
</tr>
<tr>
<td>84 ≤ SKPM &lt; 100</td>
<td>4</td>
<td>13%</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 2 above shows that of the 30 student’s who took the mathematics problem-solving ability test, student’s obtained a low level of mathematics problem-solving ability 20 student’s (67%), student’s had a moderate level of mathematics problem-solving ability 6 student’s (20%) and student’s who have mathematics problem-solving skills with a high category are 4 student’s (13%). Because there are still many student’s who have low levels of student’s mathematics problem-solving abilities, this shows that there are still many student’s who make mistakes in the process of solving problems in the questions given. For this reason, it is necessary to explore the difficulties experienced by student’s who make these mistakes.

3.3. Data Analysis of Student’s Mathematics Communication Difficulties

After taking the test, the results of student work are assessed according to the alternative answers that have been prepared. P-1 scored 35 or included in the low category in mathematics communication skills. Based on the results of P-1’s work to answer all points in question number 1, there is an inaccurate use of the formula in point a, then to determine the
value of the trigonometric ratio at points b and c, P-1 does not show in the sketch the location of angle and angle, as well as at point d in determining the conclusion from the results of his work, P-1 still does not understand to determine the conclusion.

In question number 2, P-1 can sketch the problems given in the problem but it is not neat and not precise. Points b and c can be answered well but cannot draw conclusions from the results of their work. In question number 3, P-1 can sketch the problem, answer point b, and make trigonometric comparisons of one of the angles of the triangle but does not make trigonometric comparisons of other angles and cannot make the right conclusions on his work.

After analyzing the results of the student's mathematics communication ability test and analysis of answers during interviews, the results obtained that in problem 1, problem 2, and problem 3, P-1 had difficulty in sketching out a fairly complex problem and difficulty in determining the position of the student or the location of an angle in a right triangle and difficulty in expressing statements in mathematics problems into mathematics models. In addition, in problem 4 and problem 5, P-1 cannot solve the problem correctly, where P-1 is not able to get the information in the problem and cannot determine ways to solve the problem. So in this case it can be concluded that P-1 has difficulties at the level of facts, concepts, operations, and principles.

3.4. Data Analysis of Student Mathematics Problem-Solving

The purpose of analyzing student’s difficulties in completing math problem-solving tests is to describe the criteria for difficulty experienced by research subjects in the form of a core summary of the difficulty experienced by the research subjects. Below is a description of the mathematics problem-solving difficulties experienced by the research at each level of student’s mathematics problem-solving abilities, as follows.

After being assessed according to the alternative answers that have been prepared previously, P-1 gets a value of 31.25 or belongs to the level of mathematics problem-solving ability with a low category.

In problem number 1, P-1 is able to present known information and sketches, but in making a mathematics model the solution is still incomplete and unclear and does not provide conclusions from solving the problem. In question number 2, P-1 is able to sketch and make known information and calculations. However, the sketch has not stated the angle and some of the information that is known is written down. The plan for completion and the conclusion were not made by P-1. Furthermore, for question number 3, P-1 has not been able to provide an answer.

After analyzing the result of the student's mathematics problem-solving ability test and interview analysis, the results obtained that P-1 had difficulties with facts, concepts, and principles in problem 1, experienced difficulties in facts, concepts, operations, and principles in problem 2 while in problem 3, P-1 has not been able to provide an answer. With this, it is concluded that P-1 has difficulties in facts, concepts, operations, and principles.
4. Conclusion

a. The level of student’s mathematics communication skills in trigonometric comparison material in right triangles, student’s who have the ability of the medium category have the highest proportion, while the ability of the low and high categories have the same proportion.

b. The level of student’s mathematics problem-solving ability in trigonometric comparison material in right triangles, student’s with low category abilities have the highest proportion followed by moderate proportions, and high category abilities have the lowest proportions.

c. The 6 research subjects for student’s mathematics communication skills, P-1 has difficulties in facts, concepts, operations, and principles. The P-2 has difficulties in facts, concepts, operations, and principles. The P-3 has conceptual, operating, and principle difficulties. The P-4 had concept, operation, and principle difficulties. The P-5 had concept, operation, and principle difficulties. The P-6 had operating and principle difficulties.

d. The 6 research subjects for student’s mathematics problem-solving abilities, P-1 had difficulty with facts, concepts, operations, and principles. The P-2 had difficulty with facts, concepts, operations, and principles. P-3 has difficulty with facts and principles. P-4 is having a hard time with facts. The P-5 had fact and concept difficulties. P-6 is having fact difficulties

Reference


Fine Growth on Explants of Manggisa Leaf (*Garcinia mangostana* L.) Planted by In Vitro

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{ hafizah.bintang96@gmail.com }

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**Abstract.** This study was conducted to determine the effect of growth regulators (ZPT) on callus induction of mangosteen (*Garcinia mangostana* l.) from leaf sources grown in vitro. The study was carried out from February 2022 to June 2022. This study used a completely randomized design (CRD) with 2 treatment factors, namely: (a) the first factor concentration of 2,4D consisted of 4 levels, namely: 0 ppm, 1, 5 ppm, 3 ppm and 4.5 ppm. (b) the second factor of vitamin concentration consists of 3 levels, namely: 0 ppm, 1 ppm and 2 ppm. Callus appears first begins with the warping of the explant. Explants that grow are characterized by the appearance of white spots on one or several parts of the explants. The data from the observation of the fastest callus formation in the MediaV2+D3 treatment was the 2nd week. Meanwhile, the time for callus to appear was at the latest in the V2+D1,5 media treatment, which was the 12th week. The height of the callus pile observed at week 12 after planting was carried out by calculating the callus height that grew from all explants. The results of data analysis showed that the V1+D0 media treatment resulted in the highest number of Callus Pile Height 0.60 at 12 WAP observations. The lowest callus heap height yield was obtained from treatment with an average number of callus 0.33 roots. The average growth of the Callus Pile Height responded to an increase in the number of roots. The results of data analysis showed that the V2+D0 media treatment resulted in the highest number of callus widths of 1.36 at 12 WAP observations. The results of the lowest number of callus widths were obtained from the treatment of Media V0+D1,5 and V2+D1,5 with an average number of callus widths of 0.06. The average growth of callus width gave a response to an increase in the number of leaves. Callus color is influenced by growth regulators. The addition of hormones with increasing concentrations tends to show a light green color on longer-lasting callus. Explants that do not form callus will change color from green to brown and then die.

**Keywords:** In vitro, ZPT, Vitamin, 2.4 D

1. Introduction

Mangosteen is a fruit plant native to Indonesia which has a very high economic value. The mangosteen fruit has been dubbed because of the features and delicacy it has (Balai Research on Fruit Crops, 2006). In addition, it contains xanthones (alpha mangostin and gamma mangostin), anthocyanins and other phenolic compounds in the mangosteen rind which play an important role in the pharmaceutical and health fields (Permana et al., 2012). The
development of mangosteen production in Indonesia in the period 2012 to 2017 continues to increase. The average growth is 2.49%. In 2016 the number of mangosteen production was 162,862 tons, then in 2017 it increased by 210,000 tons which was the highest production during the 2012-2017 period (Pusdatin, 2017).

As one of the leading horticultural commodities, the mangosteen fruit also has an important role in the agricultural sector, both in terms of the contribution to the national economy, farmers' income, employment and various aspects of people's lives. Mangosteen fruit is also much favored by consumers, both from within and outside the country and is able to penetrate the international market. The mangosteen fruit in recent years has become the mainstay of Indonesia's mainstay export in increasing the country's foreign exchange earnings and also has high economic value (Purwanto, 2008).

The vegetative propagation of mangosteen can be done both conventionally and in vitro. However, conventional propagation has a very low success rate. In vitro propagation is expected to provide mangosteen seeds en masse, uniformly, quickly, not to damage the parent tree and can be propagated throughout the year (Juanda and Cahyono, 2000). The tissue culture method requires growth regulators that function to control organogenesis and morphogenesis in the formation of shoots, roots and callus so as to accelerate the growth of plant explants. One type of growth regulator is cytokinin which plays a role in cell division and for shoot growth. The most active type of cytokinin is BAP, because it is not easily degraded and is inexpensive (Wattimena, 1992).

2. Research Methods

This research was conducted from February to June 2022, at the Yahdi tissue culture laboratory, Jl. Ambung, Tanah Six Hundred, Kec. Medan Marelan, Medan City, North Sumatra 20221. The tools used in this study were culture bottles, autoclave, rubber, plastic, beaker glass, aluminum foil spatula, Bunsen lamp, petri dish, tweezers, volume pipette, Laminar Air Flow Cabinet (LAFC), PH meter, handsprayer, heater (stove), measuring cup, measuring kettle, scalpel, analytical balance, refrigerator, funnel, heating pan, stir bar, label paper, tissue, pen, ruler and culture rack. The materials used in this study were mangosteen seed ekaplan from the field, shoot explants obtained from mangosteen seeds grown in vitro, 98% alcohol, 70% alcohol, 5% chlorox, 10% chlorox, 15% aquadest, sterile distilled water, detergent, fungicide (benlate/dithanae 45), bactericide (agrept), antiseptic/antibiotic (anoxylin 500 grams/tablet), 0.1N HCL, 0.1N KOH, MS medium, 2.4 D (0; 1.5; 3 ; 4.5 ppm) Vitamins (0; 1; 2 ppm). The research implementation includes the preparation and sterilization of tools, media making, preparation of explants, planting, and maintenance. Observation parameters consisted of shoot formation time (DAT), shoot percentage (%), number of shoots, number of leaves, callus formation time (DAT) and callus percentage (%).
3. Results and Discussion

3.1 Mangosteen Callus Propagation

**Callus Formation Time.** Callus appears first begins with the warping of the explant. Explants that grow are characterized by the appearance of white spots on one or several parts of the explants. The data from the observation of the fastest callus formation in the MediaV2+D3 treatment was the 2nd week. Meanwhile, the time for callus to appear was at the latest in the V2+D1,5 media treatment, which was the 12th week. The time of callus emergence can be seen in Table 1. below this:

**Table 1.** Time of callus emergence of mangosteen (Garcinia mangostana L) leaves

<table>
<thead>
<tr>
<th>No</th>
<th>handling</th>
<th>Callus Appearing Time/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Media V0, D0</td>
<td>Week-2</td>
</tr>
<tr>
<td>2</td>
<td>Media V0+D1,5</td>
<td>Week-5</td>
</tr>
<tr>
<td>3</td>
<td>Media V0, D3</td>
<td>Week-4</td>
</tr>
<tr>
<td>4</td>
<td>Media V0, D4,5</td>
<td>Week-2</td>
</tr>
<tr>
<td>5</td>
<td>Media V1, D0</td>
<td>Week-6</td>
</tr>
<tr>
<td>6</td>
<td>Media V1, D1,5</td>
<td>Week-4</td>
</tr>
<tr>
<td>7</td>
<td>Media V1, D3</td>
<td>Week-4</td>
</tr>
<tr>
<td>8</td>
<td>Media V1, D4,5</td>
<td>Week-3</td>
</tr>
<tr>
<td>9</td>
<td>Media V2, D0</td>
<td>Week-3</td>
</tr>
<tr>
<td>10</td>
<td>Media V2, D1,5</td>
<td>Week-5</td>
</tr>
<tr>
<td>11</td>
<td>Media V2, D3</td>
<td>Minggu ke-5</td>
</tr>
<tr>
<td>12</td>
<td>Media V2, D4,5</td>
<td>Minggu ke-5</td>
</tr>
</tbody>
</table>

**Callus Height.** The height of the callus pile observed at week 12 after planting was carried out by calculating the callus height that grew from all explants.
Table 2. Average Number and Total Height of Callus Piles of Mangosteen Plants (Garcinia mangostana L)

<table>
<thead>
<tr>
<th>Vitamin (ppm)</th>
<th>0</th>
<th>1.5</th>
<th>3</th>
<th>4.5</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4D (ppm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.13</td>
<td>0.1</td>
<td>0.13</td>
<td>0.23</td>
<td>0.14</td>
</tr>
<tr>
<td>1</td>
<td>0.1</td>
<td>0.46</td>
<td>0.46</td>
<td>0.16</td>
<td>0.29</td>
</tr>
<tr>
<td>2</td>
<td>0.16</td>
<td>0.23</td>
<td>0.2</td>
<td>0.1</td>
<td>0.17</td>
</tr>
<tr>
<td>Average</td>
<td>0.13</td>
<td>0.26</td>
<td>0.26</td>
<td>0.16</td>
<td>0.2</td>
</tr>
</tbody>
</table>

The results of analysis of variance in the number of callus callus of mangosteen (Garcinia mangostana L) can be seen in Table 2 and the average yield of callus heap height of mangosteen (Garcinia mangostana L) can be seen in Table 3.

Table 3. Average Height of Mangosteen Leaf Callus (Garcinia mangostana L) at 12 Weeks After Planting Observation (MST)

<table>
<thead>
<tr>
<th>No</th>
<th>Handling</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V0D0</td>
<td>0.13a</td>
</tr>
<tr>
<td>2</td>
<td>V0D1.5</td>
<td>0.1a</td>
</tr>
<tr>
<td>3</td>
<td>V0D3</td>
<td>0.13a</td>
</tr>
<tr>
<td>4</td>
<td>V0D4.5</td>
<td>0.23a</td>
</tr>
<tr>
<td>5</td>
<td>V1D0</td>
<td>0.1a</td>
</tr>
<tr>
<td>6</td>
<td>V1D1.5</td>
<td>0.46a</td>
</tr>
<tr>
<td>7</td>
<td>V1D3</td>
<td>0.46a</td>
</tr>
<tr>
<td>8</td>
<td>V1D4.5</td>
<td>0.16a</td>
</tr>
<tr>
<td>9</td>
<td>V2D0</td>
<td>0.16a</td>
</tr>
<tr>
<td>10</td>
<td>V2D1.5</td>
<td>0.23a</td>
</tr>
<tr>
<td>11</td>
<td>V2D3</td>
<td>0.2b</td>
</tr>
<tr>
<td>12</td>
<td>V2D4.5</td>
<td>0.1b</td>
</tr>
</tbody>
</table>

The results of data analysis showed that the V1+D0 media treatment resulted in the highest number of Callus Pile Height 0.60 at 12 WAP observations. The lowest callus heap height yield was obtained from treatment with an average number of callus 0.33 roots. The average growth of the Callus Pile Height responded to an increase in the number of roots (Figure 1).
Figure 1: Histogram of Average Callus Height formed on callus leaves of the mangosteen plant (Garcinia mangostana L).

Source: Personally Documented at YAHDI Tissue Culture Laboratory, 2019

Figure 2: Callus observations of mangosteen (Garcinia mangostana L).
Callus Width. Callus width observed at week 12 after planting was done by calculating the callus width that grew from all explants.

Table 4. Average Number and Total Callus Width of Mangosteen Plants (Garcinia mangostana, L)

<table>
<thead>
<tr>
<th>Vitamin (ppm)</th>
<th>0</th>
<th>1.5</th>
<th>3</th>
<th>4.5</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4D(ppm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1.1</td>
<td>1.6</td>
<td>3.06</td>
<td>3.16</td>
<td>2.23</td>
</tr>
<tr>
<td>1</td>
<td>3.36</td>
<td>2.1</td>
<td>3.1</td>
<td>1.06</td>
<td>2.40</td>
</tr>
<tr>
<td>2</td>
<td>1.63</td>
<td>4.76</td>
<td>3.33</td>
<td>3.33</td>
<td>3.26</td>
</tr>
<tr>
<td>Average</td>
<td>2.03</td>
<td>2.82</td>
<td>3.16</td>
<td>2.5</td>
<td>2.63</td>
</tr>
</tbody>
</table>

The results of the analysis of variance in callus width for mangosteen (Garcinia mangostana L) can be seen in Table 4 and the average callus width for mangosteen (Garcinia mangostana L) can be seen in Table 5

Table 5. Average Number of Callus Width (Garcinia mangostana L) at 12 Weeks After Planting Observation (MST)

<table>
<thead>
<tr>
<th>No</th>
<th>Handling</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Media V0+D0</td>
<td>1.13a</td>
</tr>
<tr>
<td>2</td>
<td>Media V0+D1.5</td>
<td>0.56a</td>
</tr>
<tr>
<td>3</td>
<td>Media V0+D3</td>
<td>0.73ab</td>
</tr>
<tr>
<td>4</td>
<td>Media V0+D4.5</td>
<td>0.73ab</td>
</tr>
<tr>
<td>5</td>
<td>Media V1+D0</td>
<td>0.66bc</td>
</tr>
<tr>
<td>6</td>
<td>Media V1+D1.5</td>
<td>1.3bc</td>
</tr>
<tr>
<td>7</td>
<td>Media V1+D3</td>
<td>0.6cd</td>
</tr>
<tr>
<td>8</td>
<td>Media V1+D4.5</td>
<td>0.83cd</td>
</tr>
<tr>
<td>9</td>
<td>Media V2+D0</td>
<td>1.36cd</td>
</tr>
<tr>
<td>10</td>
<td>Media V2+D1.5</td>
<td>0.5d</td>
</tr>
<tr>
<td>11</td>
<td>Media V2+D3</td>
<td>1.26d</td>
</tr>
<tr>
<td>12</td>
<td>Media V2+D4.5</td>
<td>1.23cd</td>
</tr>
</tbody>
</table>

The results of data analysis showed that the V2+D0 media treatment resulted in the highest number of callus widths of 1.36 at 12 WAP observations. The results of the lowest number of callus widths were obtained from the treatment of Media V0+D1.5 and V2+D1.5 with an average number of callus widths of 0.06. The average growth of callus width gave a response to an increase in the number of leaves (Figure 3)
Callus Biomass. The callus biomass observed at week 12 after planting was carried out by calculating the callus biomass that grew from all leaf explants.

Table 6. Average and Total Callus Biomass of Mangosteen (Garcinia mangostana L) Plants

<table>
<thead>
<tr>
<th>Vitamin (ppm)</th>
<th>0</th>
<th>1.5</th>
<th>3</th>
<th>4.5</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4D(ppm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.18</td>
<td>0.12</td>
<td>0.07</td>
<td>0.04</td>
<td>0.10</td>
</tr>
<tr>
<td>1</td>
<td>0.19</td>
<td>0.18</td>
<td>0.10</td>
<td>0.10</td>
<td>0.14</td>
</tr>
<tr>
<td>2</td>
<td>0.26</td>
<td>0.1</td>
<td>0.09</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td>Average</td>
<td>0.21</td>
<td>0.13</td>
<td>0.08</td>
<td>0.1</td>
<td>0.13</td>
</tr>
</tbody>
</table>

The results of analysis of variance of callus biomass of mangosteen (Garcinia mangostana L) can be seen in Table 6 and the average yield of callus biomass on mangosteen (Garcinia mangostana L) can be seen in Table 7.
Table 7. Average Amount of Callus Biomass (Garcinia mangostana L) at 12 Weeks After Planting Observation (MST)

<table>
<thead>
<tr>
<th>No</th>
<th>Handling</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Media V0+D0</td>
<td>0.18a</td>
</tr>
<tr>
<td>2</td>
<td>Media V0+D1.5</td>
<td>0.12ab</td>
</tr>
<tr>
<td>3</td>
<td>Media V0+D3</td>
<td>0.07bc</td>
</tr>
<tr>
<td>4</td>
<td>Media V0+D4.5</td>
<td>0.04bc</td>
</tr>
<tr>
<td>5</td>
<td>Media V1+D0</td>
<td>0.19bc</td>
</tr>
<tr>
<td>6</td>
<td>Media V1+D1.5</td>
<td>0.18bc</td>
</tr>
<tr>
<td>7</td>
<td>Media V1+D3</td>
<td>0.10bc</td>
</tr>
<tr>
<td>8</td>
<td>Media V1+D4.5</td>
<td>0.10cd</td>
</tr>
<tr>
<td>9</td>
<td>Media V2+D0</td>
<td>0.26cd</td>
</tr>
<tr>
<td>10</td>
<td>Media V2+D1.5</td>
<td>0.1cd</td>
</tr>
<tr>
<td>11</td>
<td>Media V2+D3</td>
<td>0.09cd</td>
</tr>
<tr>
<td>12</td>
<td>Media V2+D4.5</td>
<td>0.16d</td>
</tr>
</tbody>
</table>

The results of data analysis showed that the V2+D0 media treatment resulted in an increase in callus biomass of mangosteen plants (Garcinia mangostana L) was highest with an average of 0.26 at 12 WAP observations. The lowest callus biomass addition of mangosteen plants (Garcinia mangostana L) was obtained from the V0 medium treatment. +D4.5 with an average callus biomass of 0.040. The average growth of callus biomass for mangosteen (Garcinia mangostana L) is presented in (Figure 4).

Figure 4. Histogram Average amount of callus biomass formed on explants of mangosteen leaves (Garcinia mangostana L)

**Callus Color and Texture.** Based on the results of research on callus color, various callus colors were obtained. The callus that is formed also produces a callus that is compact in texture and crumbs.
Table 8 Callus Color and Texture

<table>
<thead>
<tr>
<th>No</th>
<th>Handling</th>
<th>Callus Color</th>
<th>Callus texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Media V₀⁺D₀</td>
<td>Dark green</td>
<td>Unified</td>
</tr>
<tr>
<td>2</td>
<td>Media V₀⁺D₁,₅</td>
<td>Green orange</td>
<td>Crumb</td>
</tr>
<tr>
<td>3</td>
<td>Media V₀⁺D₁</td>
<td>Light green</td>
<td>Crumb</td>
</tr>
<tr>
<td>4</td>
<td>Media V₀⁺D₄,₅</td>
<td>Light green</td>
<td>Crumb</td>
</tr>
<tr>
<td>5</td>
<td>Media V₁⁺D₀</td>
<td>Brown</td>
<td>Crumb</td>
</tr>
<tr>
<td>6</td>
<td>Media V₁⁺D₁,₅</td>
<td>Light green</td>
<td>Crumb</td>
</tr>
<tr>
<td>7</td>
<td>Media V₁⁺D₁</td>
<td>Dark green</td>
<td>Unified</td>
</tr>
<tr>
<td>8</td>
<td>Media V₁⁺D₄,₅</td>
<td>Dark green</td>
<td>Unified</td>
</tr>
<tr>
<td>9</td>
<td>Media V₂⁺D₀</td>
<td>Light brown</td>
<td>Crumb</td>
</tr>
<tr>
<td>10</td>
<td>Media V₂⁺D₁,₅</td>
<td>Light green</td>
<td>Crumb</td>
</tr>
<tr>
<td>11</td>
<td>Media V₂⁺D₁</td>
<td>Brown</td>
<td>Unified</td>
</tr>
<tr>
<td>12</td>
<td>Media V₂⁺D₄,₅</td>
<td>Dark green</td>
<td>Unified</td>
</tr>
</tbody>
</table>

Callus color is influenced by growth regulators. The addition of hormones with increasing concentrations tends to show a light green color on the callus that lasts longer. Explants that do not form callus will change color from green to brown and then die. Based on observations of callus in the form of compact texture and crumbs. The treatment with media 2,3,4,5,6, and 10 resulted in crumb callus. This shows that optimal hormone administration produces crumb callus.

4. Conclusion

The results showed that the data from the observation of callus formation was the fastest in the Media V²⁺D₃ treatment, which was the 2nd week. Meanwhile, the time for callus to appear was at the latest in the V²⁺D₁,₅ media treatment, which was the 12th week. The results of data analysis showed that the V¹⁺D₀ media treatment resulted in the highest number of Callus Pile Height 0.60 at 12 WAP observations. The lowest callus heap height yield was obtained from treatment with an average number of callus 0.33 roots. The results of data analysis showed that the V₂⁺D₀ media treatment resulted in the highest number of callus widths of 1.36 at 12 WAP observations. The results of the lowest number of callus widths were obtained from the treatment of Media V⁰⁺D₁,₅ and V²⁺D₁,₅ with an average number of callus widths of 0.06. The results of data analysis showed that the V²⁺D₀ media treatment resulted in an increase in callus biomass of mangosteen plants (Garcinia mangostana L) was highest with an average of 0.26 at 12 WAP observations. The lowest callus biomass addition of mangosteen plants (Garcinia mangostana L) was obtained from the V⁰ medium treatment. +D₄,₅ with an average number of Callus Biomass 0.040. Callus color was influenced by growth regulators.
The addition of hormones with increasing concentrations, callus in the form of compact and crumby textures indicated that optimal hormone administration resulted in crumb callus.

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Interpretation of the *Amaedola* Text of the Nias Diaspora Community as an Effort to Preserve Nias Culture and Its Utilization as Cultural Reading Material

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**Abstract.** This research for exploring the oral tradition of the *amaedola* (Nias parable) which shows the richness of Nias culture, but it is feared that this oral tradition will become extinct because most of the younger generation do not understand it and are unable to use it. Another phenomenon is the research that has been done and the reference sources related to this topic are also minimal. This Study Aims to explain: (1) the interpretation of the *amaedola* text of the Nias diaspora community according to Paul Ricoeur's theory, (2) the maxim of the *amaedola* text. *Amaedola Niha Khöda* and Interpretation of the Parable of the Nias Diaspora Society” which can be used as cultural reading material and literacy material for Oral Literature courses.

**Keywords:** interpretation, *amaedola*, cultural reading

1 Introduction

Oral traditions in Indonesia are very diverse, one of them is *amaedola* or usually called “parable” in Nias language. The parable is conveyed in an indirect form of language. Delivery of oral traditions is generally packaged in indirect or implied language. In order to understand language in parables or *amaedola*, it is necessary to use certain theories to interpret the meanings implied in them. The Hermeneutic theory is a hermeneutical school inspired by Betty’s opinion which works by interpreting the symbols contained in the text, revealing the critical events contained in it with critical questions, the interpreter is influenced by all aspects of his intellectual and psychological experience, when interpreting a text he is liberated from the previous author’s intent and is not hindered by the standard text. This is what is meant as an imaginary world formulated by the text itself. The text independently or relation to other texts is not bound to the initial audience, as spoken language is bound to the listener. Interpretation
is an attempt to reveal the metaphorical meaning of literary works so as to successfully unlock the plurality of meanings, ambiguities, and mysteries in symbols (Ricoeur, 2006:223).

Meaning at the level of linguistic semantics and reflective understanding at a higher level approach ontologically. Furthermore, existential or ontological understanding is an understanding at the level of the existence of meaning itself. The Referential meaning of literary and philosophical works cannot be carried out in ordinary speech texts but is conveyed symbolically through implied meanings that can be captured by the senses. Non-literary language keeps the language of ambiguous meaning away while literary language emphasizes aesthetic elements in suggestive symbolic language and fictional experiences that describe the expression of life.

The oral tradition of the Nias people, known as amaedola, contains social and cultural values that govern the lifestyle of the Nias people. Amaedola is passed down from generation to generation in various forms of poetry, parables of expressions that indicate the identity of the Nias tribe, both those who still live in their area of origin and those who have migrated out of the Nias area (Gea 2014). Amaedola is usually in the form of parables, proverbs, stories, or short sentences that serve as advice and principles of life that are commonly used in daily conversations, it can be in traditional events, giving advice and in the form of a story.

Amaedola is a form of politeness in language as the formation of the character of the Nias tribe. With its uniqueness that conveys messages, criticisms, and values metaphorically with the aim of maintaining language politeness and maintaining the relationship between the speaker and listener. The speaker and listener are in polite harmony as well as arranged in an aesthetic language, and the message is conveyed appropriately. The principles of language politeness are based on the conversational thimble introduced by Grice, namely the principle of language politeness based on maxims. Leech (1993) divided the principles of politeness on the conversational maxims introduced by Grice, namely: (1) tact maxim, "reduce expressions that harm others and increase expressions that benefit others," (2) generosity maxim, is done by reducing expressions that benefit oneself, and maximizing expressions that are detrimental or

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1 The concept of Ricoeur's interpretation was inspired by Betti's opinion, namely; (1) events in the study of texts become effective in understanding the symbols in the text, numbers and others as a coherent, grammatical and logistical reconstruction of speech and text; (2) critical events revealed in cases that require a questioning attitude such as incongruence, illogicality (elements) and including their authenticity; (3) psychological events become active when the author/writer plays an objective role in his intellectual position; (4) technical-morphological moment events that aim to understand the content of meaning in relation to particular logic and its formative principles. Ricoeur who represents methodological hermeneutics, interpretation is seen as a study to reveal the rational meaning of texts determined by distance, space, and time from the reader. Ricoeur also has the opinion that in the course of time, the original intention of the author will no longer be used as the main reference in understanding the text. This means that with Ricoeur's hermeneutics, the initial text written by the author has been liberated autonomously (fired himself from the subjectivity of the original intention of the author/author). The autonomy of the text referred to by Ricoeur in its application as a written text is a text that no longer speaks to the speaker. When the written text is interpreted it is no longer related to what the author intended.

2 Amaedola is one of Nias oral literature in the form of proverbs and short stories or sentences with figures that have certain meanings. This parable is known as a form of advice and life principles that are commonly used in daily conversations, conversations in traditional events, giving advice, in the form of a short story by making several objects as illustrations containing the message and advice implicitly.
burdensome to oneself, (3) approbation maxim, namely the principle of politeness by reducing expressions of demeaning others and increasing expressions of giving praise to others, (4) modesty maxim, namely the principle of politeness by reducing expressions of praising oneself and increasing self-deprecating expressions, (5) agreement maxim, reducing expressions of disapproval to others, increasing expressions of approval to others. (6) sympathy maxim, namely the principle of politeness by reducing antipathy to others and increasing sympathy for others.

2 Research Methods

This chapter discusses the methodology which used collection of data. This research is a type of research that is combined with naturalistic qualitative and development research. Qualitative and naturalistic are carried out in interpreting the amaedola text in natural conditions with observation, interview, and documentation techniques, taking notes, being involved, capable Naturalistic descriptive qualitative research methods are carried out based on existing facts and in accordance with natural phenomena so that the recording and presentation are also carried out as they are.

This research was conducted in Sibolga City at the Nias diaspora community association under the auspices of the Nias Sibolga Charitas group. Technique of Collecting data were carried out through interviews, observations, and library searches. Furthermore, the researchers documented, classified, described, and systematically analyzed the interpretation of amaedola originating from respondents and informants.

3 Research Result

The amaedola text contains cultural meanings which include anthropological views which contain the meaning to be conveyed in the form of maxims of wisdom, generosity, praise, humility, approval, and sympathy. By finding the maxim of the function of the use of amaedola, the classification can be determined. The following are the functions of using amaedola: advice, criticism, philosophy, consolation, raising awareness, invitation, life guidance, gratitude, affirmation, and motivation. The following table contains the results of the research.

<table>
<thead>
<tr>
<th>No</th>
<th>Functions</th>
<th>Data</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>advice (mene-mene/möli-möli)</td>
<td>135</td>
<td>32.29</td>
</tr>
<tr>
<td>2</td>
<td>criticism (degü-degu)</td>
<td>75</td>
<td>17.94</td>
</tr>
<tr>
<td>3</td>
<td>philosophy (lala wa aurí)</td>
<td>69</td>
<td>16.50</td>
</tr>
<tr>
<td>4</td>
<td>consolidation (fondara dödö)</td>
<td>29</td>
<td>6.93</td>
</tr>
<tr>
<td>5</td>
<td>raising awareness (famasugi fa’aboto ba dödö)</td>
<td>26</td>
<td>6.22</td>
</tr>
<tr>
<td>6</td>
<td>invitation (fondröningaö)</td>
<td>25</td>
<td>5.98</td>
</tr>
<tr>
<td>7</td>
<td>life guidance (fanuturu lala wa’auri)</td>
<td>24</td>
<td>5.74</td>
</tr>
<tr>
<td>8</td>
<td>gratitude (fangandró saohagöölö)</td>
<td>16</td>
<td>3.82</td>
</tr>
<tr>
<td>9</td>
<td>affirmation (fangaro’ö)</td>
<td>16</td>
<td>3.82</td>
</tr>
<tr>
<td>10</td>
<td>motivation (famarou dödö)</td>
<td>3</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>418</td>
<td>100</td>
</tr>
</tbody>
</table>
3.1 Interpretation of the Amaedola Text of the Nias Diaspora Community

Based on the results of research and interpretation of the amaedola text of the Nias diaspora community, data was found according to the results of classification and categorization in the function of using amaedola in the functions of (1) affirmation (fangaro’ö), (2) consolidation (fondara dödö), (3) raising awareness (famasugi fa 'aboto ba dödö) , (4) life guidance (fanuturu lala wa‘auri), (5) advice (mene-mene/möli-möli), (6) motivation (famarou dödö), (7) gratitude (fangandrö saohagölö ), (8) criticism (degu-degu), (9) philosophy (lala wa auri), translation of functions number 8 and number 9 obtained from the results of interviews with informant P. Samuel Gulö interview on 18 April 2022, while the translation of function number 1 up to 10 was obtained through an interview with an amaedola user informant, P. Aloysius Telaumbanua on April 13, 2022. This informant in his daily life is a humanist who lives in Gunung Sitoli and has served in Sibolga (10) invitations (fondröniaö).

Affirmation (Fangaro’ö). Affirmation (Fangaro’ö) is an attempt to strengthen others. The affirmation is needed by everyone in the family. The family is a human community as a homogeneous being who lives together for a relatively long period of time, this alliance is considered a forum that plays a very important role in facilitating the various needs of the lives of individuals who live in it (Wonmut, 2019:50). The Nias people's traditions have a family goal, namely: (1) to be more aware of and live their identity as an autonomous human being in a family (sambua fongambatö), to continue the lineage, to obtain male descendants as the successor to the lineage, to maintain inheritance. (2) obtaining social status as a family (ngambatö) an unmarried boy is not counted in the traditional banquet. Amaedola used in family life as a form of affirmation was found in as many as 16 items with a percentage of 3.76% of all data.

The following is an example of amaedola analysis. Hulö=like, gana’a=gold, sinolalömbu=which has been gilded. Meaning is based on the structure in English: Like gold that has been plated. The gold that has been plated looks beautiful and gives off a luxurious glow. Thus this proverb is used to praise the beauty of the bride who is beautiful, white, clean, and charming. In family life, this proverb is used to praise the beauty of the bride who is beautiful, white, clean, and charming. The golden symbol used to represent the precious and brilliant self-esteem of a Nias girl is also followed by the consequence of always maintaining the nobility and chastity of a Nias girl as something that must be maintained.

Consolation (Fondara Dödö). The use of amaedola as a form of consolation for the people of Nias (Ono Niha) especially in situations of grief and misfortune, death. The people of Nias refer to death with the words: aetu noso (end of life) mondroi ulidanö (died), mofanö (go), ahuwa (a situation towards the end), alele (without power). Death is something that is absolutely experienced by all living things, including humans. Death can not be predicted when it will happen, no one knows when death will pick him up. Some died when they were children, teenagers, and adults and some died when they were old. When the time of death comes no one can escape it.

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3 The family is a community that accommodates various life interests, both for individuals as well as a community. This is marked by getting to know each other personally to strengthen each other (Wonmut, 2019:50)
The following is an example of *amaedola* analysis, *no abasō* = already wet, *ba ihawui* = overwritten, *na sa teu* = also raining. Meaning based on structure in English. It's wet and it's raining again. Wet is an uncomfortable situation, disturbing as well as when it rains, it will certainly multiply the discomfort and difficulty he experiences. *Amaedola* is described as people who experience successive misfortunes. People who experience this fate need to be given empathy. This proverb is generally used to provide comfort and empathy for fellow human beings who experience misfortune, or death that causes grief for those left behind. Nias people believe that humans have something eternal *noso* (spiritual element), *lumölumö* when *mondrói ulidanö* (passes away) Death separates the place and nature between the dead and the living, but the relationship between the two continues as usual. Parents who died were respected, remembered, made an example and a source of inspiration by their descendants. According to the belief, it is believed that it is those who do good and practice the teachings and laws of *Lowalangi* (God) who will come to the 'upper world' where *Lowalangi* is (Telambanua, 2021:7-17).

**Raising Awareness (Famasugi Fa'Aboto Ba Dödö)** Raising awareness is meant to arouse, stimulate, and increase responsiveness and adaptive power to actual situations and issues as well as respond to and try to solve the problems that exist in it consciously. One of the areas that accommodate this activity is the world of politics (Sutrisno Nanang et al, 2019:iii). Aristotle defines humans as *zoon politicians* where humans become more human when they live together with other humans. The first humans lived together with their partners, namely husband and wife in a family with their children. A family is formed by each individual with the intention of meeting the needs and welfare of all family members. Based on the statement above, it can be concluded that the awareness that needs to be raised starts from the middle of the family and then enters a wider scope. *Amaedola* from (No. 49)

The following is an example of *amaedola* analysis, *Lölö nafo* = betel pulp, *moroi* = from, *yomo* = house, *irugi* = until *daro'o nete* = across the bridge, *tobali* = to be like, *henu-henu gae* = banana pistil. Meaning is based on structure in English The betel pulp from the house after arriving across the bridge becomes much like the pistil of a banana heart. The betel pulp of a person who eats betel is much less than the pistil of a banana heart. Through this parable, it is illustrated that news or small problems when they get out of the house are widely spread and will be exaggerated more than they are. This is what is called fake news, news that has been added with "spices". This parable is conveyed with the intention to raising awareness so that everyone respects the good name of each other by avoiding hoaxes or telling lies.

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4 The last supper for parents who want to death has the meaning as preparation to meet the ancestors. In activities around death, symbols of the world above and the world below used. The symbols of the upper world between others: silk, gold, a collection of statues ancestor, yellow color, golden color, bird, eagle, golden umbrella, sun, chicken, upstream, east and others. World symbol below include: snakes, crocodiles, red, dark color, moon, downstream, west, etc. (Telambanua, 2021:7-17)

5 Critical ideas need to be stimulated to increase power response and adaptive intellectuals to actual issues in order to have capacity to respond on the basis of data, ethics and empirical facts. (Sutrisno Nanang et al, 2019:iii)
Life Guidance (Fanuturu Lala Wa’Auri). The guidance of human life is the teachings of faith conveyed by religion as a way of life for its adherents (Ridwan Lubis, 2017: 3-4). The Nias Diaspora group who are members of the “Charitas” community have a Catholic background. In conveying reflections at worship celebrations, both led by the Imam as well as by catechists and meditation leaders from the common people, in conveying the meaning in the sermon it is usually delivered in the form of amaedola. The delivery of benevolent values, advice and so on is relevant to catholic values. Although there are many oral traditions of Nias that are no longer relevant to religious teachings, those related to amaedola are still very relevant to be used as a means to inculcate values in religious events. The following is amaedola data that is included in the life guidance function.

The following is an example of amaedola analysis, Hulö-like abo'a hakhi reziwala=falling/dropping off a coconut frond, möi fondro'ö belalagania = beautifying one's appearance. Meaning is based on structure in English. If the coconut frond falls, it appears to increase in height. Coconut trees have midribs that hang down and partially cover the coconut trunk. When the dangling coconut fronds are cleaned and the coconut stalks look more neat and beautiful in appearance. So that is why a person who generously allows part of his property to be given to others becomes seen as more "great". This parable is intended as a life guide that in life it is necessary to give charity and do charity according to their respective beliefs.

Advice (Mene-Mene/Möli-Möli). Advice is a cultural tool that contains noble cultural values that have scientific, artistic, spiritual, and local wisdom elements. The representation of advice is usually in the form of sayings and parables, proverbs, and others. The advice contains cultural content, teachings that are used as guidelines for life as excellence and traditions that are lived by the community concerned (Nurlina, 2019:34).

The following is an example of amaedola analysis, Na = if, adölö = straight, geu = wood, ba labe'e = made into, dela = bridge, ba na abila = if bent, ba labe'e = made into, famaoöö, the side of a traditional house. Meaning based on structure in English: if the wood is straight it is made into a tita, and if it is bent it is made into a famaoöö (the side of a traditional house). Titian is a kind of emergency bridge that is usually used to cross the river. This footbridge is usually chosen from straight wood and has a sturdy texture so that the footbridge becomes sturdy, does not shake, and is safe for use by those who cross it. Meanwhile, crooked (not straight) wood can still be used as famaoöö on the side of the traditional house. The message that amaedola mini wants to convey is that a person's strengths, talents, and talents are different, if used according to each person's skills and needs, it will be very useful. This parable is an exhortation to appreciate the uniqueness and talents of each person.

6 Therefore, religion is concerned with living guidance for humans in their life (Ridwan Lubis, 2017: 4)

7 The parable of having function as a container or cultural facility which contains high values in the form of scientific, artistic, spiritual, and excellence for the Teaching community what is meant is everything that is taught to humans which can be in the form of advice, advice, or instruction. Usually, in teachings containing prohibitions, procedures, and science (Nurlina, 2019:34).
Motivation (Famarou Dödö). Motivation is the power that moves a person behavior. The power is within the person concerned in the form of power that comes from within and from outside the self to achieve a goal. Thus, it can be concluded that motivation is a psychological impulse, both targeted at personal and group. With motivation, a person can influence the people he leads to do the work in accordance with expectations. Furthermore, Marjaya et al (2019:130) say that motivation is a movement and stimulus given by a person, leader, or anyone to encourage a person or group to be more enthusiastic about achieving goals. The following is amaedola that serves as motivation:

The following is an example of amaedola analysis, Ha malimali = Only malimali (small fish) mbôrôta gi’â = fish start. Meaning based on structure in English: Only malimali (small fish) fish starters. Malimali is small fish that people usually don’t take into account. This small fish is considered trivial because it is considered worthless. One thing that cannot be forgotten is that this small mali mali fish will slowly but surely develop into a big fish. Thus, any business generally starts from small to large and then proceeds to become established and large. Motivate to reward businesses that start small because they have the opportunity to become big and established.

Gratitude (Fangandrö Saohagölö). Etymologically the word gratitude comes from two basic words "thank you and thank you". According to the KBBI, gratitude means giving thanks; giving birth to gratitude, or returning the favor after receiving kindness and so on, while obeying. The gratitude is a form of non-financial appreciation or reward that can increase the motivation and pleasure of a person or a group. The following are the functions of amaedola to thank

The following is an example of amaedola analysis, Hulö=like, ahani=drift wondrahimba’ola=percussion, iwalinga=dikira, ahani yöu=float downstream, no so i raya=turns out to be drifting upstream. This parable is meant to describe a situation where someone who is thought to be stupid is actually a smart person. Businesses that were thought to be losing money actually turned out to be profitable. So sometimes things are not always what we see. Not what we think. Thank you with humility to give thanks for the sustenance. Meaning is based on structure B. Ind. It's like the ba’ola’s little percussion drifting away, thought to have drifted downstream, apparently already upstream.

Criticism (Degu-Degu). According to the Big Indonesian Dictionary (KBBI) criticism is a criticism, assessment, or review of the good or bad considerations of work, opinion, and so on. Criticism is a form of communication in a society that functions as social control or as a form of resistance individually or in community groups to the phenomena that occur (Qusairi, 2017:203)\textsuperscript{8}, so the criticism is the delivery of opinions regarding a matter. The truth includes the relationship between individuals and society and the events that occur in it, although it cannot be used as absolute truth. The following is a function of the amaedola as a critical

The following is an example of amaedola analysis, Hulö=like, zi lô who doesn't aboto ba dôdô nia=understood in his heart, isofu nasa=asked again. Meaning is based on structure in English: As he didn't understand, he asked again. People who ask are usually humble people. But if

\textsuperscript{8} Social criticism is, "One of the forms"communication in society that aims or works as a control against a social system or social process or as a form of resistance to the reality that occurs in a community group (Qusairi, 2017:203)
someone wants to try someone's intelligence to test this is a sign of the need for the person to practice humility. As a form of criticism to people who like to try, and test others by asking things they already know, the motivation is just to test other people's abilities. This proverb is intended for them to be more humble

Philosophy (Lala Wa Auri). Philosophy comes from the Greek philosophy which consists of the basic words philein which means love, and sophia which means wisdom literally meaning that philosophy is to love or seek wisdom (Tung Khoe Yao, 2013: 1). According to the KBBI, philosophy is knowledge and investigation. with reason related to the nature of everything that exists, causes, origins, theories that underlie the nature of the mind or activity, and science with the core of logic, aesthetics, metaphysics, and epistemology.

The following is an example of amaedola analysis, Hulo=like, zanondro akhe=making stairs so you can climb them, ilo=bearing dontro=the ladder. Meaning based on structure in English: Like a person climbing a palm tree, (with a dontro) he carries a tondroria dontro=a ladder of a bamboo stick. A person who climbs a fig tree requires a lot of struggle, one of which he has to carry a ladder made of bamboo to get to the location of the palm tree. Without a ladder, this worker will not be able to complete his task of harvesting sugar palms. Thus a person must be willing to accept the consequences of his decisions and actions. This parable has a function as a philosophy that in life one must be willing to accept the consequences of decisions and actions.

Invitation (Fondronia). According to the KBBI the meaning of the word invitation /invitation/ n suggestion (request, etc.) to act; is an invitation, an invitation to carry out or follow. According to Ariana (2020:12) said that the interlocutor together with the speaker carries out the activities that are spoken, usually marked with the words "come on", "let's go", but sometimes this invitation is in the form of a metaphor in which the meaning to be conveyed is implied. So the invitation is an imperative sentence that has intent and hope/expects a response in the form of action. Here is amaedola with a call-to-action:

The following is an example of amaedola analysis, boi=don't, hoto=break, hogou=your head, wanguma=say, maifu=a little, lno=no, monaha=thank you. Meaning based in English: Ind. Don't break your head saying, because in the least it's not acceptable. The human head contains brain cells used for thinking. To advise one needs to think of a suitable strategy for approaching him. In everyday life, there are certain people who are not approachable in any way because the person concerned is already very ignorant. Thus this parable is conveyed, "Don't break your head saying, for it is not acceptable in the least. An invitation to empathize when in everyday life there are certain people who are not approachable in any way because the person concerned is already very ignorant.

Based on the results of the percentage of the amount of amaedola that is included in each function of its use

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9 Philosophy is wisdom in a society in the form of things that are moral in nature that can be used as a guide in speaking, acting and behaving. The following is an amaedola with a function as a philosophy (Tung Khoe Yao, 2013: 1)

10 Imperative an invitation to invite the interlocutor together with the speaker to do an activity spoken. Invitation utterances are generally marked with 'come on', 'let' Ariana (2020:12)
The high percentage of amaedola's function as advice is related to the "firm" customary rules in the Nias tradition. According to Gulö: 2015:30, it is stated that in the tradition of the Nias people, a man who has a "couting" with a woman is considered a violation of adat (tradition) so it needs to be punished according to adat. Those who do the "couting" are forced to marry. A woman and a man caught alone, flirting with the opposite sex who are not bound by marriage, will be punished by customary fines (fogau) in the form of pigs and gold. This rule aims to protect the weak (women) from the domination of men.

In the context of the traditional Nias community, such regulations are very effective. This tradition, which has been passed down from generation to generation, has also been carried away and has not disappeared from the traditions of the Nias diaspora community even though they have migrated.

The results of research related to the use of maxims with the highest percentage level of wisdom maxim with a percentage of wisdom (tact maxim) with a percentage of 25.41%. The high percentage of wisdom maxim is related to the high percentage of the amaedola function as advice. People from Nias culture have very high self-esteem, this is illustrated by the amaedola they use as a philosophy, “abölö sökhi mate moroi aila” which lexically translates to: “it is better to die than to be ashamed”. This philosophy is one of the things that encourages the Nias diaspora community to always try to instill advice in the form of amaedola which leads them to be wiser so that they have authority, and wisdom and are considered as respected and honorable human beings.

4 Conclusion

Based on the results of research and interpretation of the amaedola text of the Nias diaspora community, data was found according to the results of classification and categorization in the function of using amaedola in the functions of (1) affirmation (fangaro’ö), (2) consolidation (fondara dödö), (3) raising awareness (famasugi fa ’aboto ba dödö) , (4) life guidance (fanuturu lala wa’auri), (5) advice (mene-mene/mőli-mőli), (6) motivation (famarou dödö), (7) gratitude (fangandrö saohagölö), (8) criticism (degu-degu), (9) philosophy (lala wa auri),

References

Development of Listening Teaching Materials based on Literature “Love Animal And Plants”

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Abstract. The research method used is a research and development method that refers to the 4-D model which includes four stages, namely the definition, design, development and dissemination stages. The results showed that 1) The results of the needs questionnaire that had been distributed showed that the respondents had never used teaching materials for listening skills based on literacy in the sub-theme of loving animals and plants. 2) material expert validation includes, audio learning media validation, and learning design expert validation. The validation of the learning design got an average score of 88.33% with the criteria of "very good" and the results of the validation by material experts got an average score of 92.96% and the validation of the audio learning media got the results of 93.26% in the "very good" category. 3) Trial of learning products in the form of developing listening skills teaching materials based on the sub-theme of loving animals and plants to respondents of 32 students consisting of 3 class teachers who got an average result of 80.59% in the "good" category.

Keywords: teaching materials, conference skills, literacy

1 Introduction

Talking about the quality of education cannot be separated from the role of literacy. Literacy cannot be separated from the world of education. Literacy is a means for students to understand, recognize, and apply the knowledge gained in school. Without literacy, students cannot acquire the knowledge taught at school. Literacy is simply defined as the ability to read and write, recognize them by being literate or literate. In Law No. 3 of 2017 concerning the literacy bookkeeping system, it is defined as the ability to interpret information critically so that every human being can access science and technology as an effort to improve the quality of his life. Unfortunately, the literacy culture in Indonesia is still relatively low. Lack of interest in reading, technology literacy, media literacy, information literacy are still less favored by the Indonesian people, especially for students.

The Ministry of Education and Culture (2006) stated that the reading literacy test in PISA (The Program for International Student Assessment) showed the results of a survey in 2015 on science competence, from 382 points in 2012 to 403 points in 2015. In mathematics competence increased by 275 points in 2012 to 386 points in 2015, while reading competence has not shown a significant increase, from 396 years in 2012 to 297 points in 2015. Therefore, the Ministry of
Education and Culture has developed a school literacy movement that involves all stakeholders in the field of education. This education, starting from the provincial level to the education unit.

In fact, literacy-based listening skills in State Elementary Schools 105270 Puji Mulyo Kec. Sunggal Kab. Deli Serdang has not yet reached its maximum goal. Researchers see that the literacy ability of students in schools is still relatively low. The lack of motivation of students in listening and the lack of teaching materials for listening skills are the main triggers and tend to rely on government books.

Responding to this problem, researchers are encouraged to develop existing teaching materials with the theme of loving animals and plants as supporting literacy for students to be more innovative and increase the enthusiasm of students in literacy. Learning Indonesian language material in elementary schools is inseparable from social values, therefore researchers develop teaching materials with the sub-theme of loving animals and plants so that students can protect and preserve nature and love fellow living creatures for the common good.

Researchers will design an existing teaching material with the theme "loving animals and plants" as a support for literacy-based listening skills in schools to improve the listening quality of students at State Elementary School (SD) 105270 Puji Mulyo Kec. Sunggal Kab. Deli Serdang Mulyo Keb. Deli Serdang. Researchers designed teaching materials with the subtheme "Love Animals and Plants" as literacy support to produce teaching materials that are suitable for use by teachers and students in learning that are in accordance with the needs and level of reasoning of students in thinking and developing students' reading skills as early as possible.

Based on the above background, the formulation of the problem in this development research is: (1) How is the development of teaching materials “Love Animals and Plants”? (2) How is the feasibility as a teaching material for "Love Animals and Plants"? (3) How is the effectiveness of using teaching materials “Love Animals and Plants”?

The operational in this study is as follows:

1.1 Definition of Development

According to Seels & Richey (Suman 2012: 12) development means the process of translating or presenting design specifications into the form of special features. Specific development means the process of producing learning materials. Meanwhile, according to Tessmer and Richey (2012: 23) development is a focus not only on needs analysis, but also on broad issues of contextual early and final analysis. Development aims to produce products based on various field test findings.

1.2 Understanding Teaching Materials

According to the National Center for Competency Based Learning (2015:16), teaching materials are all forms of materials used to assist teachers or instructors in carrying out the learning process in the classroom. Another opinion was also expressed by Gafur (2015: 17) that teaching materials are cognitive, affective and psychomotor which must be taught by teachers and learned by students. The teaching materials contain subject matter that must be mastered by the teacher and delivered to students.
1.3 Understanding Listening

Listening is a process of listening to oral symbols with full attention, understanding, appreciation, and interpretation to obtain information, capture the content or message and understand the meaning of communication that has been conveyed by the speaker through speech or spoken language (Tarigan, 2008: 31).

1.4 Definition of Literacy

In simple terms, literacy or literacry is another term for functional literacy is a person's ability to read, write, count, speak, identify and examine and understand a problem. According to the KBBI (2019: 123), literacy is something related to writing. In today's context, literacy has a very broad definition. Literacy means being literate in technology, politics, data, critical thinking and being sensitive to the environment. In the modern thinking paradigm, literacy can be interpreted as the ability to reason to articulate all phenomena through letters by reading and writing.

1.5 The theme of Loving Animals and Plants

This 3rd grade student's book Theme-2 Loving Plants and Animals describes a learning process that will help students achieve each competency in learning. Through integrated thematic books, active, creative and challenging learning is created and encourages students to think critically based on noble values.

2 Methods

The type of research applied in this research is R&D (research and development) or the type of research and development, namely research methods in the form of development of teaching materials/materials. This development research was carried out at the State Elementary School (SD) 105270 Puji Mulyo, located in Srigunting Village, Sunggal District, Deli Serdang Regency. The population in this study were all third grade students at SDN 105270 Puji Mulyo. Students are divided into one study group of 32 students. Regarding the sample used in this study, a group of students, namely class III, amounted to 32 students. The data collection instrument in this development is a tool to assess the product being developed. The main instrument used when collecting data in development is a questionnaire instrument, the data analysis technique in this development is to explain all the opinions, inputs, and responses of respondents obtained from the previous questionnaire.

2.1 Product Effectiveness Analysis

The effectiveness of the developed module is based on the learning outcomes of students. This analysis is based on the KKM. The KKM for listening skills on the theme of loving animals and plants is 73. The module is considered valid if 75% of students' learning outcomes reach the specified criteria.

\[
\text{Effective score} = \frac{\text{Total score}}{\text{Maximum score}} \times 100
\]  

(1)
b) Grouping students' mastery of listening skills on the theme of loving animals and plants according to the following 4 scale conversion.

c) Determine the average value of listening skills on the theme of loving animals and plants. Nurgiyantoro (2001: 301) determined the formula used to calculate the following average:

The assessment qualification criteria serve as a guideline and basis for determining the level of validity and the basis for making decisions regarding the revision of media and teaching materials.

If it reaches the criterion value of 75 out of all the indicators in the validation evaluation questionnaire from media experts, material experts, language studies teachers and third grade students in this development, then it is declared valid. If it still doesn't reach the validity criteria, it will be corrected/revised.

3 Results And Discussion

The research carried out is research and development by applying the 4-D method which undergoes four stages of research, namely definition, design, development, and dissemination. The product produced by this research is a Literacy-based Loving Animals and Plants Module. The development of literacy-based listening skills modules is carried out by developing existing modules but modified and innovated with literacy-based renewals according to the needs and demands of the curriculum.

3.1 The Process of Developing Listening Ability Based Literacy Module Subtheme Love Animals and Plants

**Define.** The results of the initial analysis in the development of the literacy-based listening ability module for the sub-theme of loving animals and plants at the State Elementary School 105270 Puji Mulyo obtained the fact that learning to listen to the sub-theme of loving animals and plants does not meet literacy so that the listening ability of students is not optimal. Therefore, literacy-based listening skills are needed that can increase students' motivation in listening and student learning outcomes. Based on these facts, it is expected that students will obtain literacy-based listening skills teaching materials that can improve students' listening skills through literacy-based teaching materials for the sub-theme of loving animals and plants.

**Design.** After getting the problem from the definition stage, the next stage is the design stage. This design stage aims to design a product in the form of a literacy-based listening skill module to love animals and plants which contains the development of reading materials related to animals and plants as creatures and plants that must be maintained and cared for. This design stage is the initial design.
Fig. 1. Display cover of the Literature

Fig. 2. Display of Mind Map of the Literature
**Develop.** This development stage aims to produce products in the form of modules that have been revised based on expert input and trials to students. Validation is the process of requesting approval or validation of the conformity of the module with the need to obtain recognition of the conformity, so validation needs to be carried out by involving experts who are experts in the relevant fields in the module. Module validation aims to obtain acknowledgment or validation of the suitability of the module to the needs so that the module is feasible and suitable for use in learning. Validators are selected according to their respective expertise, for example, substance experts from industry for module content or material, linguists for language use, instructional method experts for instructional use in order to get comprehensive and objective input and media experts for attractiveness.

**Dissemination.** After a limited trial and the instrument has been revised, the next stage is the dissemination stage. The purpose of this stage is to disseminate the product in the form of a module. In this study, only limited dissemination was carried out, namely by disseminating and promoting the final module product in a limited way to class III State Elementary School 105270 Puji Mulyo.
3.2 Feasibility Implementation of Literacy-Based Listening Ability Module Validation

Material Expert Validation Results. The results of the questionnaire showed that the aspect of the feasibility of presenting teaching materials for listening skills based on literacy, loving animals and plants was declared "Very Good" with an average percentage of 96.15%. This means that the presentation of the material in the teaching materials is declared feasible because it is above 75%. The presentation of the material is declared inappropriate if the average score is below 75%.

<table>
<thead>
<tr>
<th>No</th>
<th>Answer</th>
<th>Score</th>
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<tbody>
<tr>
<td>A</td>
<td>Very good</td>
<td>81% ≤ X ≤ 100%</td>
</tr>
<tr>
<td>B</td>
<td>Well</td>
<td>61% ≤ X ≤ 80%</td>
</tr>
<tr>
<td>C</td>
<td>Currently</td>
<td>41% ≤ X ≤ 60%</td>
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<tr>
<td>D</td>
<td>Not good</td>
<td>21% ≤ X ≤ 40%</td>
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<tr>
<td>E</td>
<td>Very Not Good</td>
<td>0% ≤ X ≤ 20%</td>
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Design Expert Validation Results. Design expert validation was carried out by a lecturer at the State University of Medan. The assessment of this design is carried out to improve the quality of the display of literacy-based listening skills teaching materials to love animals and plants. The results of the validation by design experts showed that listening skills teaching materials based on aterial literacy sub-theme love animals and plants were in the "Very Good" category with an average percentage of 88.33%.

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</tbody>
</table>

The Effectiveness of Literacy-Based Listening Skills. That the learning outcomes of students before using literacy-based listening skills obtained an average score of 70.81 with the category "Good Enough" meaning that the scores achieved by students needed to be further improved, meanwhile, student learning outcomes after using literacy-based listening skills teaching materials obtained an average score of 80.59 with the "Good" category, meaning that the students' scores were better than before.

After receiving learning by using teaching materials for literacy-based listening skills, student learning outcomes before and after using these teaching materials experienced a significant increase, namely 9.53. It is known that the average score of students before (pretest) using
teaching materials is 70.68 and the average score after (posttest) is 80.21. The following is the average value of the pretest and posttest.

<table>
<thead>
<tr>
<th>No</th>
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<th>Average</th>
<th>Value Difference</th>
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<tbody>
<tr>
<td>1</td>
<td>Pretest</td>
<td>70.81</td>
<td>9.78</td>
</tr>
<tr>
<td>2</td>
<td>Posttest</td>
<td>80.59</td>
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The table above shows the difference in the difference between the pretest and posttest scores obtained, namely 9.78 with an average pretest of 70.81 on the "good enough" criteria and the posttest average of 80.59 on the "good" criteria. It can be concluded that learning using teaching materials for listening skills based on literacy loving animals and plants can improve student learning outcomes in Indonesian subjects. To be clearer, the results of obtaining empirical graph data can be seen in the following figure.

![Fig 4. Diagram of Pretest and Posttest](image)

4 Conclusion

Based on the formulation of the problem, research objectives, results and discussion of research and development of literacy-based listening skills teaching materials for the sub-theme of loving animals and plants by class III SDN 105270 Puji Mulyo that this research and development is effectively used and can improve student learning outcomes based on student learning outcomes educate. The results of the validation of design experts, material experts, and learning media experts are suitable for use. In addition, a questionnaire analysis of the needs of teachers and students was also conducted to meet the development needs of literacy-based listening skills teaching materials.
References


Cross-Faith Dialogue Education in The City of Medan in Creating Harmony Between Religions

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Abstract. This article discusses interfaith dialogue education in Medan City, in this article discusses: (1) The purpose of establishing the Young Interfaith Peacemaker Community (YIPC) in Medan City, (2) Programs from YIPC Medan in increasing interfaith dialogue between people religion in Medan City and (3) What has been achieved by YIPC Medan so far in increasing interfaith dialogue between religious communities in Medan City. The research method used in this study is a qualitative method with an ethnographic approach, data collection techniques using observation and interviews. The results of this study explain the establishment of YIPC in Medan City is to provide interfaith dialogue education for students to become agents of peace in the midst of society, the importance of the role of students in maintaining inter-religious harmony is to create a harmonious community life in peace, in this is the way and role of YIPC Medan to maintain harmony is by holding inter-religious dialogues that discuss inter-religious relations such as holding Student Interfaith Peace Camp, Scriptural Reasoning, World Interfaith Harmony Week, commemoration of religious holidays, and others.

Keywords: YIPC Medan, Interfaith Dialogue, Religious People

1 Introduction

Medan is the first largest city as well as the capital of North Sumatra Province, known as a plural and multicultural society. The complexity of the diversity of the city of Medan is marked by the existence of 16 different ethnic and cultural groups such as Malay, Karo, Chinese, Javanese, Toba, Pakpak, Simalungun, Mandailing, Angkola, Arabic, Acehnese, Minangkabau, Banjar, Indian, Sundanese, Gayo, Alas, Ambon, and Pakistan. Based on the origin of the settlers in Medan City, it is stated that this city was formed by a confederation of nomads, namely a city formed and composed of migrants. Then, in this city found 6 religious groups such as Islam, Protestantism, Catholicism, Hinduism, Buddhism, and Confucianism. Apart from this “official state religion” group, another religious group was found, namely “Malim”. Different cultural attributes such as ornaments, distinctive colors, special greetings, snacks, and others are found in the city of Medan. Another difference is seen in the status or social class based on the economy as well as the contrasting orientation of political parties.

In other studies, it is stated that Medan City does not have a dominant culture. Although this fact deserves to be corrected today, the situation of the absence of a dominant culture has contributed to the low level of SARA conflicts. However, in the current era of decentralization,
ethnicity and religion have experienced significant strengthening in the concept of politicizing the identity of the general election. In fact, although the dominant culture is not found in Medan City, the seeds of contention, conflict, and even polarization are starting to show their fangs. In the last ten years, for example, several general phenomena that disrupt social harmony have begun to occur in the city of Medan. In general, the explosions that occurred, although not violent, were sufficient to injure social cohesion in the city of Medan. Ironically, the disturbances have the theme of religion or belief that are forced by one group of parties on another group. For example, the CIMB Niaga robbery on Jalan Aksara was met with the shooting and burning of the Police Office in Hamparan Perak. After the incident in Hamparan Perak, the Special Detachment (Densus) 88 carried out raids on groups suspected of being terrorists in Tanjung Balai and Deli Serdang.

In the city of Medan, six years ago, there was a suicide bombing attack at the St. Catholic Church. Yosef Jalan Dr. Mansyur Medan. This incident occurred on a Sunday at the start of worship. Another incident was the demolition of a house of worship in connection with optimizing the land into an office or business center. Then there were several incidents of moving houses of worship, such as the Nurul Hidayah Mosque in the MMTC Jalan Pancing Complex, but after several deliberation and negotiations, the mosque was finally not moved and the Nurul Hidayah Mosque was only renovated and expanded. Then the incident of moving the Silaturrahim Charity Mosque in the Sukaramai area to a new location prepared by state officials.

Several subsequent incidents that occurred in the city of Medan, such as the Indonesian Bethel Church (GBI) Philadelpia Medan congregation were blocked and prohibited from worshiping. Then, the disbandment of the lumping horse show in Medan by the Islamic Community Forum (FUI) was deemed to be an act of shirk. Then, Arifinsyah (2018: 2) stated that another incident was that the Indonesian Air Force in Polonia Medan and the community were fighting over land, resulting in the loss of housing for thousands of residents because their houses or dwellings were evicted and their houses of worship were also torn down. Furthermore, in 2016 in the City of Tanjung Balai, a number of temples and temples were burned due to misunderstandings between the community. At least, in the city of Medan there are many phenomena like this found.

Another phenomenon is the increase in religious sentiments which can be seen in discriminatory behavior such as the sale or rental of houses, land, dormitories, employee recruitment, mate selection, and others. Social reality shows the formation of behavior that sells or rents out land, houses, including dormitories to other people who share a certain belief. This kind of behavior shows that there are restrictions that are born from individuals with different beliefs that provide social distance to other people of different beliefs. The stigmatization of religious figures in certain religions and beliefs often becomes a painful joke for other communities which sometimes triggers social divisions and conflicts.

The phenomenon as mentioned above arises from two things; (1) limitations of interfaith dialogue. This assumption is reinforced that the more frequent interfaith dialogues, the more open and open-minded people are to accept other groups with different beliefs. Interfaith dialogue brings each different belief to be accepted and understood contextually. This understanding is not at all related to the textual understanding of communities of different beliefs, and (2) the emergence of discriminatory, polarized, disharmony or segmentative behavior. The limitations of interfaith dialogue have implications for the limitations of other communities' faiths. This limitation causes each human being to only understand his beliefs textually without considering the contextual context which causes egocentricity. His own beliefs are considered the most correct while those outside of that belief are considered infidels, idols, going to hell, and so on.
2 Theoretical Framework

Anthropologically, religion or belief is one of the elements of universal culture. As described by Koentjaraningrat (2009: 144), culture is the whole system of ideas, actions and human creations in the life of society that are made into human beings by learning. Then, Koentjaraningrat (2009: 150-151) suggests three forms of culture; (1) the complexity of ideas, ideas, values, norms, regulations, and so on, (2) the complexity of the patterned activities and actions of humans in society, and (3) the complexity of human-made objects. Based on this definition of culture, the YIPC community is related to a religious system and social organization.

According to Galtung (2003), negative peace is the absence of all negative things that can pose a threat to efforts to realize peace, such as conflict or war. In conflict resolution, negative peace is peacemaking which has the aim of eliminating tension between parties who are in conflict tension. On the contrary, positive peace is the absence of conflict tension and the creation of social conditions that are just, safe, comfortable, peaceful, and harmonious. Positive peace is not only focused on the absence of war or conflict but the presence of conditions and situations that are peaceful, warm and full of love, as well as a number of social and moral values that place emphasis on aspects related to fulfilling the needs of human life. Positive peace directly offers a comprehensive approach that requires to build peace through various channels such as education, social, economic, and environmental which aims to minimize all types of violence. In this study, the strategies and mechanisms carried out by YIPC through interfaith dialogue are included in the category of positive peace as explained by Galtung. According to Galtung (2003), there are three models of violence (conflict) resolution; (1) peacemaking, namely in the initial stages of creating peace or when the conflict has not yet expanded, (2) peacekeeping, namely implementing peace promises to maintain and create peace, and (3) peacebuilding, namely reconstructing the basis of peace and preparing various tools in the context of building on something more than non-violence.

According to Knight (2004), peacebuilding strategies have time stages, including; (1) short-term, from 2 months to 2 years, (2) mid-term, from 2 years to 5 years, and (3) long-term, from 5 years to 10 years covering all social, political, economy, and internationally. Peacebuilding is usually played by domestic players, such as citizens or ordinary people, NGOs, the government, or the state. However, it cannot be denied that peacebuilding often also collaborates with international players such as international organizations, donor countries, international NGOs, to provide facilities and provide peacebuilding support.

3 Research Methods

This research is descriptive qualitative. This descriptive approach was developed by researchers by collecting data from photographs, personal documents, notes and official documents to describe the research subject.

This method is applied to see and understand the subject and object of research which includes people, institutions based on facts that appear as they are. Through this approach, a description of the actualization, social reality, and perceptions of the research target will be revealed. Qualitative research is intended to understand human behavior from the perpetrator's own frame
of reference, namely how the actor views and interprets activities from the point of view of his stance. This research was conducted in Medan City, North Sumatra Province.

The data obtained comes from institutional reports, by following the activities carried out by YIPC Medan to collect data that is considered important to complete the author's writing about the research location in Medan City. Related to this research are data obtained from reports from related institutions, such as books, journals, internet, mass media, and others.

In qualitative research, the researcher also functions as the main instrument that goes directly to the field and tries to collect data. So according to qualitative research, data collection techniques were carried out in three ways, namely: (1) Observation, (2) Interview, and (3) Document Study.

4 Results and Discussion

4.1 Overview of the Research Area

Medan is the capital of the province of North Sumatra, Indonesia. Medan is also the third largest city in Indonesia after Jakarta and Surabaya. Medan is the largest city outside Java Island. The city of Medan is the gateway to the western part of Indonesia with the Belawan Port and Kualanamu International Airport, which are the second largest airports in Indonesia. Access from the city center to the port and airport is equipped with toll roads and trains. Bordering the Straits of Malacca, Medan is a very important trade, industry and business city in Indonesia. According to Population Data, Ministry of Home Affairs (2020), Medan City has a population of 2,435,252 people with a density of 9,522.22 people/km².

The history of Medan begins with a village founded by Guru Patimpus at the confluence of the Deli River and Babura River. The anniversary of the city of Medan was set to be July 1, 1590. Then in 1632, Medan became the seat of government of the Deli Sultanate, a Malay Kingdom. Europeans began to discover Medan since the arrival of John Anderson from England in 1823 (Damanik, 2015). Civilization in Medan continued to develop until the Dutch East Indies government granted city status (gemeente) on April 1, 1909 and made it the administrative center of the East Sumatra Residency (Damanik, 2015). In the 20th century, Medan then became an important area outside Java, especially after having a large plantation company.

According to data from Bappenas (2009), Medan is one of four centers of economic growth, along with Jakarta, Surabaya and Makassar. Medan is a multicultural city that has residents with various cultures and religions. Apart from the Malays and Karo as the initial inhabitants, Medan is dominated by ethnic Javanese, Toba, Chinese, Minangkabau, Mandailing, Simalungun, Pakpak, Indian, and others. The majority of the residents of Medan City have daily activities as traders, therefore in Medan there are many shop houses (ruko) in the corners of the city.

According to the Medan City BPS (2020), the majority of Medan City residents are from the 0-19 age group as much as 41% and 20-39 years old as much as 37.8% of the total population. The city of Medan is inhabited by approximately 1,377,751 people with productive age, namely at the age of 15-59 years. Then in terms of education level, the average length of schooling of the population has reached 10.5 years. According to North Sumatra BPS data (2020), historically, in 1918 it was recorded that Medan was inhabited by 43,826 people. Of that number, 409 people are of European descent, 35,009 are Indonesian, 8,269 are of Chinese descent, and 139 people are from other Eastern races. Besides being multi-ethnic, Medan is known for its adherents of various religions. Even so, the residents of Medan City still try to
maintain a sense of peace and a sense of community among religious people even though they have various religions and beliefs. In 2016, 64.35% of the population embraced Islam, 20.99% Protestants, 8.27% Buddhists, 5.11% Catholics, 1.04% Hindus and 0.06% Confucians.

Based on ethnicity, the majority religions in Medan City are: (1) Islam, mainly embraced by Coastal Malays, Minangkabau, Javanese, Acehnese, Arabic, Mandailing, Angkola, and some ethnic Karo, Simalungun, Pakpak, and Chinese, (2) Christianity, Protestants and Catholics are mainly embraced by the Toba, Karo, Simalungun, Pakpak, Nias, and some Angkola and Chinese ethnicities, (3) Hinduism, mainly by Indians, (4) Buddhists, especially by the Chinese, and (5) Confucianism, especially embraced ethnic Chinese.

4.2 Background and Dynamics of Interfaith Institutions in Indonesia

Inter-religious dialogue, especially Muslims and Christians, has been started since 1969, and this dialogue movement was first initiated by Mukti Ali. In his paper, "Dialogue between Muslims and Christians in Indonesia and its problem" presented at the World Council of Churches in 1970, he said that in November 1969 there was a meeting between Mukti Ali representing Muslims, two Catholics and three Protestants at a Catholic College. Then it was continued at the next meeting in December of the same year. The meeting discussed the Vatican's attitude towards non-Christians (Daya, 2004: 3-4).

In academic space, IAIN Sunan Kalijaga Yogyakarta in 1961 has supported the urgency of dialogue between religious believers by establishing a Department of Comparative Religion at the Ushuluddin Faculty. There are a number of courses related to the study of religions such as comparative study of religion, history of religion, and science of religion, all of which cannot be separated from the role of Mukti Ali. In 2002, Gadjah Mada University created a study program that focuses on inter-religious and cultural issues which was named CRCS (Center for Religious and Cross-Cultural Studies), followed by the establishment of ICRS (Indonesian Consortium for Religious Studies) in 2002. 2007. This educational institution opened a doctoral program in collaboration with three campuses, namely UGM, UIIN Sunan Kalijaga, and Duta Wacana Christian University.

The term religious harmony was formally used for the first time when an inter-religious meeting was held by the government on November 30, 1967 at the Jakarta Supreme Advisory Council building. The meeting was held not without reason. The meeting was held because at that time the country was experiencing a peace crisis and the people who belonged to different religions were in a state of tension, thus threatening the integrity of the country. (Mantu, 2016:57).

Then in the reform era, the seeds of the birth of PKUB in 2001 had actually begun to be planted since the leadership of the minister Tarmizi Taher who was responsible for the birth of the Institute for the Study of Religious Harmony (LPKUB) in Yogyakarta at the end of the heyday of the New Order era. This is because LPKUB was not established as a functional institution in inter-religious relations activities, but rather as a research institution to find factors causing conflict and post-conflict adhesives that are not directly related to religious and social institutions (Syafullah, 2007: 175).

With the establishment of PKUB, the Ministry of Religion functional role in dealing with interreligious conflict and its prevention programs has become more explicit. PKUB is the backbone of the Ministry of Religion in carrying out reconciliation programs in various regions, conflict mapping, workshops, orientations, and dialogues on harmony, also most importantly facilitating the birth of the Religious Harmony Forum (FKUB) which disseminates ideas for
inter-religious harmony at the community level. Broadly speaking, FKUB programs can be divided into three, namely: (1) interreligious conflict prevention activities, (2) reconciliation and post-conflict recovery activities, and (3) strengthening interfaith cooperation. Until now, FKUB has been formed in almost all provinces and districts in Indonesia (Banawiratma and Bagir, 2010: 79).

4.3 Life of Inter-religious Youth in Medan City

Harmony and peace between religious communities in the city of Medan is very important. Because the city of Medan is a metropolitan city (metropolitan urban) and its people consist of various ethnicities, religions, races, and groups. This can result in conflict occurring in the community, not only vertical conflict but also horizontal conflict. Harmony between religious communities is very important in the city of Medan because of its diverse and multicultural area, so it is very important to maintain its diversity and convey a message of peace to the community, especially young people and women. They must be aware of the differences that have been created by God Almighty so that all human beings should be grateful.

In realizing inter-religious harmony in the city of Medan, the youth can become the foremost pioneers. When today's youth can understand differences in religious beliefs and then they establish good relations with each other and unite on the basis of religious differences, religious harmony and interfaith relations are well established. Efforts that can be taken are to unite all components of society, then the youth are aware of each other for different religions, build good interfaith relations with each other, and unite against provocations that cause chaos, and together in making activities that make people to be with each other, respect in all forms of difference. Therefore, the Young Interfaith Peacemaker Community (YIPC) was born in Medan City as an organization or community engaged in the field of harmony and peace. The background for the establishment of YIPC was because the majority of the dialogue that took place between religious communities was provided by the government and only religious figures attended it. Meanwhile, inter-religious dialogue that occurs at the grassroots level or at the grassroots level is very rare. In this context, students as agents of change should be involved and contribute to create a dialogue space for inter-religious people at the grassroots, so that in the lower community there is true religious harmony.

According to Sumardi (2013: 36), Indonesian youth are those who are expected to play a positive role in many areas of the life of the nation and state in the future. As part of Indonesia's young generation, young people face a big challenge to be able to play an active role in managing religious pluralism so that it is not a threat that can disintegrate the nation and state, but rather a socio-cultural wealth that functions integratively and inspires the progress of the nation in the future. To be able to play an active role, young people need to prioritize nationalism as Indonesian citizens and patriots of the nation. Indonesian nationalism must be above any religious primordialism, it must even act as a controller and brake for religious primordial and other primordial impulses.

According to Sirot (2013: 5), youth is a period of change. During youth, there are rapid changes, both physically and psychologically. The emotional upheaval that occurs rapidly in early youth is known as the storm and stress period. This emotional increase is the result of physical changes, especially hormones that occur in youth. In terms of social conditions, this increased emotion is a sign that youth are in a new condition that is different from the previous period. At
this time many demands and pressures are placed on youth, for example they are expected to no longer act like children, they must be more independent and responsible. Independence and responsibility are formed over time, and are evident in late adolescence, which is in the early days of college.

According to Judhariksawan (2010: 25), to maintain religious harmony in a sustainable manner, it is necessary in several fields, including; (1) the religious sector, namely by holding inter-religious deliberations to understand their respective religions, working together to create a sense of security, (2) the education sector, namely by increasing education, increasing the potential of the community, and (3) the social sector, namely by holding social services, cleaning houses of worship at the same time, working together to make events organized by the community successful.

4.4 Young Interfaith Peacemaker Community (YIPC) in Medan City

Rationale. YIPC values are derived from the statement Loving God, Loving Others (love God, love others), and take from the 12 values of peace. According to Lincoln and Amalee (2007:5), the 12 values of peace are: self-acceptance, prejudice, ethnic differences, religious differences, gender differences, economic status differences, group or gang differences, diversity, conflict, rejecting violence, recognizing mistakes, and apologize. The 12 scores reach 4 peace points; namely: (1) making peace with God, acknowledging God Almighty as the Creator and the only one to be worshiped, loving God with all your heart, with all your mind, with all your strength, (2) making peace with yourself, accepting yourself as God's unique creation. uniquely gratefully, (3) making peace with others, loving others as oneself, accepting and respecting differences and diversity of ethnicity, religion, gender, economic conditions, etc., rejecting all forms of violence, resolving conflicts directly such as apologizing and forgiving, and (4) impacting the environment, providing a transformative impact on the environment and society. In the future, YIPC members can apply these values in their lives, namely loving God and others, and always trying to spread and apply the 12 values of peace that they have learned to themselves, their families, and their environment.

There are many conflicts because there are prejudices and misunderstandings. Therefore, to create an interfaith community that knows, respects and trusts each other, dialogue is vital. As Hans Kung (2010:47) said, "there is no interreligious peace without interreligious dialogue," so dialogue is very vital in interreligious relations. Banawiratma (2010: 9), suggests 7 areas in the interfaith dialogue that were carried out together to open the perspective of each religious group, although they still have a strong religious identity but are able to accept and respect different groups. The 7 areas are: (1) life dialogue, (2) ethical social dialogue, (3) faith experience dialogue, (4) religious tradition dialogue, (5) theological dialogue, (6) action dialogue, and (7) intra-faith dialogue.

Through dialogue, although finding differences (generally already known), at the same time finding similarities (generally less known). Therefore, the tendency to see other groups only based on differences will be balanced with an insight that other groups also have many similarities. Through dialogue, we are enabled to understand more clearly the differences that often cause conflicts between groups so as to eliminate prejudices and foster mutual respect. Through dialogue as well, as part of society and the nation, both groups are able to see that there are common problems that must be faced and resolved together.
YIPC Medan Programs. The programs or activities carried out by YIPC Medan are peace education and interfaith relations/dialogue. This peace education is manifested in several core programs, namely: student interfaith peace camp (SIPC) which is held twice a year, peace club (which is held regularly), young interfaith peacemaker national conference (YIPNC) which is held once within a year, commemoration of the international day of peace (every September 21), and scriptural reasoning (SR) or gathering with other members and holding friendships, Live IG (Instagram), which discusses several themes of harmony and peace, and also discuss other relevant themes.

Scriptural reasoning that is usually done is to discuss chronologically the stories of the prophets or figures in the Holy Scriptures, such as: the Tanakh, the Bible, and the Koran, then discuss and imitate the stories of the Prophets, such as: Adam, Cain or Kobil and Abel, Noah, Abraham or Ibrahim, Moses, David, Solomon or Sulaiman, Yohanes or Yahya, Maria or Maryam, or Jesus or Isa. Apart from scriptural reasoning, theological dialogues were also conducted on themes that have often been polemics between Muslims and Christians, such as; The oneness of God and the Trinity, the death and resurrection of Isa Al-Masih, the authenticity of the scriptures, whether Jihad is the same as terrorism, polygamy and monogamy, etc. With healthy dialogue, there will be a better understanding between the two peoples. Then, there is also a social dialogue that is carried out for the transformation of society regarding the themes of corruption, drugs, pornography, and others.

In addition, there are several incidental activities that are tailored to the needs and situations such as the celebration of religious holidays together, namely: Eid al-Fitr, Eid al-Adha, Christmas, Birthday of the Prophet Muhammad. Then there are World Day celebrations, such as the international day of peace every September 21, international anti-corruption day every December 9, world interfaith harmony week every 1-7 February, the commemoration of Youth Pledge Day every 28 October. In addition, YIPC Medan also held several Social Action activities such as distributing fruit parcels to patients at a hospital in Medan City.

YIPC Medan Achievements and Sustainability. For a period of 9 years, YIPC Medan has carried out and held activities and activities in the field of harmony and peace in the city of Medan. YIPC Medan has provided dialogue rooms for Muslim and Christian students in order to clarify existing prejudices. YIPC Medan also has social media accounts, such as Whatsapp, Facebook, and Instagram. Meanwhile, YIPC Center already has a Facebook, Twitter, Instagram and YouTube channel accounts. YIPC Medan often posts activities on social media such as: peace camps, seminars, FGDs, world day celebrations, scriptural reasoning, selling merchandise, watching movies together, peace walks, takjil on the road (distributing food for breaking the fast), fundraising for Rohingya Muslims in Myanmar, Ngamen for Peace (fundraising for the victims of the earthquake in Lombok), raising funds for victims of the earthquake and tsunami in Palu, being invited as a speaker at Radio Medan and Visi FM Medan stations, holding a writing competition, and so on.

Since 2013, YIPC Medan has held Student Interfaith Peace Camp (SIPC) events 15 times, namely in: April 2013, November 2013, November 2014, May 2015, December 2015, May 2016, November 2016, May 2017, October 2017, April 2018, October 2018, April 2019, November 2019, December 2020, and March 2021. Supposedly, YIPC Medan will hold a Peace Camp in April 2020, however, due to the current Covid-19 pandemic in the world including Indonesia, Peace The camp was cancelled, for the sake of mutual safety and comfort. Furthermore, in December 2020 and in March 2021, YIPC Medan innovated by holding a virtual
E-Peace Camp event. Then, until the end of 2021, YIPC Medan has never held a Student Interfaith Peace Camp (SIPC) event again, YIPC Medan has mostly carried out online/virtual activities or events through the zoom application, google meet, live IG (Instagram ). YIPC Medan usually discusses topics that are relevant/related to harmony, peace, youth, discussing the Holy Qur'an and the Bible, current social issues, and so on.

In addition, YIPC Medan also has several times established relationships, communication, and friendship with student organizations or Student Activity Units (UKM) on campuses in Medan City, and so far it has been established quite well. Several times YIPC Medan has visited the secretariat office of UKM-UKM at the University of North Sumatra (USU), Medan State University (Unimed), North Sumatra State Islamic University (UINSU) such as the Ar-Rahman Unimed Islamic Student Activity Unit (UKMI), Unit Protestant Christian Student Activities (UKMKP) Unimed, Islamic Student Association (HMI) Faculty of Ushuluddin and Islamic Studies (FUSI) UINSU, Indonesian Christian Student Movement (GMKI) Faculty of Social and Political Sciences (FISIP) USU, Student Executive Board (BEM) School College of Theology (STT) Abdi Sabda Medan, Department of Sociology USU FISIP, Unimed Student Senate, to establish friendship, communication, and cooperation. Members exchange ideas, opinions, and discuss together in understanding current issues, especially in the theme of harmony and peace.

YIPC Medan's relations with relevant government agencies in Medan City are also quite good, such as being invited several times to seminars from the government, especially regarding the theme of harmony and peace. Although the communication that has been established has not been too intense, in the future good cooperation can be established with the relevant government agencies. YIPC Medan's relations with religious organizations in the city of Medan are also quite good, such as: the Indonesian Ahmadiyah Congregation (JAI) Medan Branch. YIPC Medan's relationship with youth organizations is already quite good and is well established and has several opportunities to collaborate, such as: Kawanku Community, Muhammadiyah Student Association (IMM) Faculty of Islamic Economics and Business (FEBI) UINSU, Ahmadiyah Youth (PA) Medan, Community Hijrah Together.

5 Conclusion

From the results of the research above, it can be concluded that (1) the efforts of YIPC Medan in increasing interfaith dialogue in Medan City, namely by conducting interfaith dialogue and carrying out better organizational arrangements and trying to complement the existing deficiencies, (2) The involvement of the community, government, and institutions in increasing interfaith dialogue in the city of Medan is very necessary for the sake of increasing harmony and peace in the city of Medan, (3) the impact that can be felt by the community in increasing harmony and peace in the city of Medan is twofold, namely in the economic field, for example: increasing people's income, opening up new job opportunities and opening up business opportunities for the community through business units developed by YIPC Medan, especially in Medan City. Meanwhile, in the socio-cultural field, there is a positive impact that can be felt, namely increasing public insight about historical values, culture, tolerance, and harmony in the city of Medan. (4) Interfaith dialogue is an approach that is relevant to the condition of the people in Medan City, because Medan City has various natural, environmental, economic, social and ethnic potentials. The city of Medan can become the largest museum of religious harmony in the world, (5) The need to involve experts in social and cultural sciences in increasing inter-
Religious harmony and peace, and (6) the need for socio-cultural studies before promoting inter-religious harmony and peace in Indonesia. an area.

References

Development of Folklore Learning Materials Based on Deli Malay Culture with the Help of Quizizz for Class X MAN 2 Medan Model Students

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Abstract. This study aims to determine the results of developing folklore teaching materials based on Deli Malay culture with the help of Quizizz in class X MAN 2 Model Medan. Based on the 4-D development model, this kind of research is development research. The development of folklore teaching materials in the form of handouts has been validated by material experts and design experts. The validation results show an average of 85% with good categories. Design expert validation shows an average of 85.6 with good category. The results of the effectiveness of developing folklore teaching materials based on Deli Malay culture with the help of Quizizz were obtained from the results of research on product effectiveness tests based on the pretest with an average of 63% and posttest with an average of 84%. So it can be concluded that learning folklore based on Deli Malay culture with the help of Quizizz can improve student learning outcomes.

Keywords: teaching materials, folklore text, quizizz

1 Introduction

Learning material is a science, education, skill, and character building that must be studied and applied by students in a plan to meet the provisions of the competency guidelines. The material specified in learning and developing the experience is material that should really help with a focus on ability guidelines, essential skills and goal indicators.1

In the activities of the learning process there is an interaction between educators and students. In explaining teaching materials, educators can choose appropriate procedures and appropriate learning media to be used in conveying and explaining material, understanding, and information. This is done so that learning materials can be conveyed correctly to students in accordance with the objectives to be achieved.

One of the competencies contained in the 2013 curriculum for SMA/MA class X is that students can understand folklore. Permendikbud Number 24 of 2016 concerning Core
Competencies and Basic Competencies The example in the 2013 curriculum in the Elementary Competence section of Madrasah Aliyah class X is folklore, which is in the 3.7 "basic competence" identifying the content and values contained in folklore either orally or in writing. This basic ability is expected to make students ready to distinguish the values and contents contained in folklore both orally and in writing. Folk stories are scientific works that can explicitly be used as training materials and help students understand the surrounding insights.

Deli Malay culture-based folklore can be used as a choice of learning materials by educators during the learning process, and this study aims to provide ideas about the development of Deli Malay culture-based folklore to be used as a source of Indonesian language teaching materials. According to the information gathered, there are still insufficient student learning outcomes for comprehending folklore, particularly Deli Malay culture-based folklore.

Another element that encourages researchers to develop teaching materials for folklore based on Deli Malay culture with the help of Quizizz is the need to provide new experiences for Indonesian language educators, especially at MAN 2 Model Medan so that they have the choice to make their area a source of teaching materials.

The development of folklore teaching materials based on Deli Malay culture with the assistance of Quizizz media is one of the solutions that researchers need to find in order to address some of the issues that impede learning. With this application, students can prepare their language skills to read, compose, speak, and master syntax. This application is also not difficult and can make students race and compete with other students because it is made in a game configuration that triggers students to give replies within a certain time.

The researcher was motivated to carry out a study with the title "Development of Folklore Teaching Materials Based on Deli Malay Culture with the Assistance of Quizizz Media in class X MAN 2 Model Medan".

1 Theoretical Description

For students to meet the specified skill standards, learning materials consist of knowledge, instruction, skills, and character development. The material determined in the growing experience should be material that has upheld the accomplishment of ability principles and essential capabilities as well as the accomplishment of markers. Based on various understandings of experts, it can be concluded that teaching materials are part of the learning content. Curriculum that must be understood by students and with basic abilities to achieve competency standards for each subject in certain fields in the education unit.

The understanding of folklore as a whole is part of a collective culture that is passed down from one generation to the next among various types of collectives. Traditionally, folklore has been presented in a variety of formats, including examples presented orally and accompanied by gestures, reminders, or other means. According to a variety of expert opinions, folklore is an ancient oral tradition story that has been recognized by the community and passed down from generation to generation.

The following are included in the idea of culture as a set of ideas that the community that supports it adopts: 1) faith; (2) expertise; 3) the overall values and norms that are lived,
practiced, followed, and preserved in interpersonal relationships within a community; (4) all ways of expressing feelings with spoken language, writing, singing, playing music, dancing, painting or using symbols.4

It is possible to draw the conclusion, on the basis of this viewpoint, that local culture is the result of human labor that grows, develops, and is recognized in people's lives. It is a belief, knowledge, and overall set of values and norms for relationships between people in a particular society that are lived, practiced, and obeyed due to inheritance which is handed down through the generations preserved.

The development of teaching materials for folklore based on Malay Deli Culture contains the folklore of the Maimun Palace in which there are characteristics of the ethnic life of the community and Malay culture related to the folklore. The purpose of developing Indonesian language teaching materials in the form of Malay folklore can foster students' love for their local culture. The basic competence of Indonesian language subjects that will be developed is to identify the values and content contained in folklore (saga) both orally and in writing. This basic competency aims to make students able to identify the values and content contained in folklore (saga) both orally and in writing. One of the literary works that can specifically be used as teaching materials to help students recognize local wisdom is oral tradition (folklore) in the form of folklore.

Quizizz is a web tool in the form of a game that is used for online learning activities.5 Quizizz is an educational app based on games that brings multiplayer activities into the classroom and makes learning more fun and engaging.6 Based on the explanation of some of the opinions above, it can be concluded that Quizizz is a web tool for creating interactive quiz games that are used in classroom learning. By using Quizizz, students can carry out the learning process and practice questions in class on their own electronic devices. Quizizz invites students to compete with each other and motivates them to learn so that their learning outcomes increase.

2 Method

The term "research development," also known as "R&D," refers to the kind of research that was used in this study. This research model is one that is used to make and test particular products to see how well they work. The improvement research model utilized in this study is the 4-D model. The abbreviations for "Define," "Design," "Develop," and "Desseminate" are "desseminate" and "define." This research was carried out in accordance with the needs analysis which refers to the activities of the learning process. Interviews, literature reviews, questionnaires, observation sheets, product test sheets, and documentation are all methods of data collection. Literature study is used to collect theories relevant to the research conducted. The questionnaire was used to collect data on the need for learning material for folklore based on Malay Deli culture with the help of Quizizz media given by the teacher to students. The product questionnaire sheet is given to the expert to get the feasibility of the development. Documentation is used to complete the data from questionnaires and observations as well as the results of interviews conducted in accordance with the stages of research implementation.

An instrument that was given to experts in learning and learning design as a means of validating learning materials for folklore based on Deli Malay culture with the assistance of Quizizz media was used in this study to collect data. In this study, instruments were also given to students as objects.
Validators, small group trials, and limited group trials received validation questionnaires in the form of a Likert scale with scores as shown in the table below:

<table>
<thead>
<tr>
<th>No</th>
<th>Answer Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very good</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Well</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Pretty good</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Not good</td>
<td>1</td>
</tr>
</tbody>
</table>

(Sugiyono, 2012)7

The score classification is then converted into a classification in the form of a percentage referring to Suharsimi's (2013) theory and then interpreted with qualitative sentences, according to the table below:

<table>
<thead>
<tr>
<th>No</th>
<th>Answer Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Very good</td>
<td>90-100 %</td>
</tr>
<tr>
<td>B</td>
<td>Well</td>
<td>80-89 %</td>
</tr>
<tr>
<td>C</td>
<td>Currently</td>
<td>60-79 %</td>
</tr>
<tr>
<td>D</td>
<td>Not good</td>
<td>40-59 %</td>
</tr>
<tr>
<td>E</td>
<td>Not very good</td>
<td>&lt; 40%</td>
</tr>
</tbody>
</table>

(Suharsimi, 2013)8

3 Results and Discussion

This research is a type of research and development, and with the help of Quizizz media, it produces learning materials for folklore based on Deli Malay culture. The following will be described in this development research: 1) Utilizing the Quizizz media, which is appropriate for use, to create folklore-based learning materials for folklore. 2) Enhancing the efficacy of folklore-based learning materials with the Quizizz media, which was developed. Therefore, the Four-D Model (Model 4) research model is utilized in the study of the product development of folklore learning materials based on Deli Malay culture with the assistance of Quizizz.
There are four stages of implementation in the 4-D model research model, namely: a) definition; b) design; c) creation; and d) distribution. With the assistance of Quizizz media, this study resulted in the creation of folklore teaching materials based on Deli Malay culture.

3.1 The Process of Developing Folklore Teaching Materials Based on Deli Malay Culture with the help of Quizizz media for students of class X MAN 2 Model Medan

Defining Stage (Define)
1.1 Results of Needs Analysis

At this point, to determine whether students comprehend the material and knowledge of folklore. Based on observations made with questionnaires, it turned out that there are still a lot of students who don't know enough about folklore because there aren't any folklore teaching materials based on Deli Malay culture developed with the help of Quizizz media that fit the curriculum and the needs of students’ development. Data analysis of student needs for the development of folklore materials based on Deli Malay culture with the help of Quizizz media can be seen in Table 3 below:

Table 3. Data from Observations at the Define Stage of the Need for Development of Folklore Teaching Materials Based on Deli Malay Culture with the help of Quizizz media to students

<table>
<thead>
<tr>
<th>No</th>
<th>List of Questions</th>
<th>Answers</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Does the teacher use textbooks during learning more often?</td>
<td>- Yes</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>What is the folklore text material in the book?</td>
<td>- Yes</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Elusive package?</td>
<td>- Yes</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>What do you think about the learning resources used in learning?</td>
<td>- Yes</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Folklore, is it boring?</td>
<td>- Yes</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>0</td>
</tr>
</tbody>
</table>

Students really need the development of folklore teaching materials based on Deli Malay culture with the assistance of Quizizz media, as described in the above description of the results of the questionnaire on student needs.
Table 4. Result Data at the Define Stage carried out to the teacher

<table>
<thead>
<tr>
<th>No</th>
<th>List of Questions</th>
<th>Answers</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is your view if the content of the folklore material is based on Malay Deli culture, do you agree?</td>
<td>- Yes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Is it necessary to apply folklore material in Quizizz?</td>
<td>- Yes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Do you need Quizizz learning media in learning to improve student learning outcomes?</td>
<td>- Yes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No</td>
<td>0</td>
</tr>
</tbody>
</table>

Based on the findings of the teacher needs analysis, 2 teachers answered that they agreed if the folklore material was based on Deli Malay culture, 2 teachers said it was necessary to apply folklore material in Quizizz, 2 teachers needed learning media (Quizizz) in learning to improve student learning outcomes.

a. Student Analysis

The cognitive development and background knowledge of the students in class X, MAN 2, Model Medan. When learning to write folklore, students this age still require stimulation (an invitation to start something) or real examples including topics related to students’ everyday lives. As the saying goes, experience is the best teacher. This expression implies that experience can serve as a source of information about various life values.

According to the findings of the needs analysis interview, students' experiences with writing folklore using only textbooks, 28 students said that learning was difficult to understand, 28 students said that learning was boring, all students agreed that learning folklore based on local Malay Deli culture all students said that there was a need for Deli Malay culture-based folklore materials with the help of Quizizz media, so it was necessary to develop Deli Malay-based folklore teaching materials with the help of Quizizz media.

b. Concept/Material Analysis

Folklore is used to evaluate the subject matter that will be taught at this point. The goal of material analysis is to determine the most important aspects of folklore that students will learn. Compiled according to the reference and consideration of the results of the analysis of the needs of students and teachers. The results of the needs questionnaire analysis are still used as a reference in the preparation of folklore material that is developed and adapted to the needs of students and teachers, despite the fact that there are numerous adjustments and considerations involved in the preparation of the developed folklore material. The design of folklore teaching materials based on Deli Malay culture with the assistance of Quizizz media is the next step after the learning indicators and concepts have been established.
3.2 Validity of Data Validation Results of Folklore Teaching Materials Based on Deli Malay Culture with the help of Quizizz media

1. **Learning Design Expert Validation Results by Design Experts**

A lecturer at the State University of Medan, Dr. Evi Eviyanti, M.Pd, and Surya Masniari Hutagalung, M.Hum, carried out the validation of the learning design. The purpose of the evaluation was to ascertain the viability of a Quizizz-assisted learning material, particularly as a design. Assessment is also done to make the Quizizz media-assisted learning material more interesting to learn.

With a total score of 72 and a percentage of 90% of very good criteria, learning design experts performed validation as the first validator for the developed product design. With a total score of 72 and a percentage of 90%, the developed design passed the second validation with Very Good criteria.

2. **Results of Validation of Teaching Materials by Material Experts**

Prof. Amrin Saragih, MA, Ph.D., a lecturer at the Faculty of Applied English Linguistics (LTBI), carried out the validation. D and Dr. Shafwan Hadi, M.Hum from the State University of Medan, who is a lecturer in Indonesian Language and Literature.

With a score of 116 and a percentage of 90.62 percent, the results of the validation carried out by experts in learning materials as the first validator on the developed product design met very high standards. The second validator received a percentage of 97.65 Very Good and a score of 125.

3. **Indonesian Language Teacher Assessment Results Data**

The Indonesian language teacher's assessment of the development of learning material products assisted by the Quizizz media was carried out by Mrs. Rina Moga Sari, S.Pd., M.Pd, the MAN 2 Medan Model teacher. improve the quality of teaching materials for folklore based on Malay Deli culture with the help of Quizizz media.

With a score of 88 and a percentage of 95.65 percent, the first teacher's responses to the developed product met very high standards. The second teacher received a grade of 85 and a Very Good rating of 92.39 percent.

3.3 Effectiveness of Learning Outcomes Data Applying Folklore Teaching Materials Based on Deli Malay Culture with the Assistance of Quizizz Media

1. **Student Learning Test Results Limited Test**

Learning outcomes tests demonstrate the efficacy of folklore-based learning materials based on Deli Malay culture and made possible by Quizizz media. An essay test is the type of test used to measure effectiveness. There are two stages to taking this test: the pre-test and the post-test. The Pretest is administered prior to and the Posttest is administered after the developed product has been used. The trial was carried out in one class, namely class X MAN 2 Model
Medan, totaling 30 people. The following is shown in Table 5 the results of learning folklore.

**Table 5. Data on Learning Outcomes of Folklore**

<table>
<thead>
<tr>
<th>No</th>
<th>Student Name</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AHM</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>AD</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>AS</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>4</td>
<td>AP</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>5</td>
<td>AN</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>AR</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>7</td>
<td>BR</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>8</td>
<td>DA</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>9</td>
<td>DU</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>10</td>
<td>DN</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>11</td>
<td>FR</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>12</td>
<td>HP</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>13</td>
<td>IPS</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>14</td>
<td>IYS</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>15</td>
<td>IS</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>16</td>
<td>KN</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>17</td>
<td>MAM</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>18</td>
<td>MD</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>19</td>
<td>MA</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>20</td>
<td>MRH</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>21</td>
<td>MY</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>22</td>
<td>NB</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>23</td>
<td>RI</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>24</td>
<td>RNS</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>25</td>
<td>RS</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>26</td>
<td>RW</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>27</td>
<td>SM</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>28</td>
<td>SA</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>29</td>
<td>SAA</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>30</td>
<td>SR</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1890</strong></td>
<td><strong>2520</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>63</strong></td>
<td><strong>84</strong></td>
</tr>
</tbody>
</table>
Table 6. Frequency Distribution of Pretest Scores of Learning Outcomes to Write Folklore before Using Folklore Learning Materials Based on Deli Malay Culture with the Assistance of Quizizz Media

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-59</td>
<td>4</td>
<td>13,3%</td>
</tr>
<tr>
<td>60-64</td>
<td>4</td>
<td>13,3%</td>
</tr>
<tr>
<td>65-69</td>
<td>8</td>
<td>26,6%</td>
</tr>
<tr>
<td>70-74</td>
<td>5</td>
<td>16,6%</td>
</tr>
<tr>
<td>75-79</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>80-84</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td><strong>∑</strong></td>
<td><strong>30</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 7. Frequency Distribution of Posttest Scores of Learning Outcome Writing Folklore after Using Folklore Learning Materials Based on Deli Malay Culture with the Assistance of Quizizz Media

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-69</td>
<td>2</td>
<td>6,6%</td>
</tr>
<tr>
<td>70-74</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>75-79</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>80-84</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>85-89</td>
<td>9</td>
<td>30%</td>
</tr>
<tr>
<td>90-94</td>
<td>4</td>
<td>13,3%</td>
</tr>
<tr>
<td><strong>∑</strong></td>
<td><strong>30</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The average value (mean) of student learning outcomes on the pretest was 63, while on the posttest, it was 84, as shown in the table above. On the basis of these findings, it is evident that the average value of student learning outcomes increased by 21%.

The Pretest assessment of folklore material yielded a score of 1890, with an ideal score of 3000, as part of the school learning process. The subsequent scores were as follows:

\[
\text{Effectiveness} = \frac{\text{Total score obtained}}{\text{Total score ideal}} \times 100
\]

\[
\text{Effectiveness} = \frac{1890}{3000} \times 100
\]

63%

The posttest (Quizizz) student learning outcomes on folklore material received a score of 2520, with an ideal score of 3000, while the acquisition score is as follows:
Effectiveness  = \frac{Total \ score \ obtained}{Total \ score \ ideal} \times 100

= \frac{2520}{3000} \times 100 = 84\

The percentages at the pre- and post-tests differ by 12%, with the post-test score being higher than the pre-test. Therefore, Quizizz media has a 21 percent impact on folklore content. Therefore, it is possible to draw the conclusion that the developed learning material for folklore based on Deli Malay culture with the assistance of Quizizz media was more effective by 84 percent in the "good" category, and the student lecture method was more effective by 63 percent in the "sufficient" category. Therefore, Quizizz has been proven to be useful as an additional learning tool for students studying folklore content.

<table>
<thead>
<tr>
<th>No</th>
<th>Group</th>
<th>Average Value</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before (Pretest)</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>After (Posttest)</td>
<td>84</td>
<td>21%</td>
</tr>
</tbody>
</table>

Table 8 shows that there is a 21-point gap between the scores on the pretest and the posttest, with an average pretest score of 63 for "enough" and an average posttest score of 84 for "good." It is possible to draw the conclusion that using Quizizz media to learn Indonesian can improve student learning outcomes, particularly when it comes to writing folklore.

### 1. Limited Test Results on Student Responses

At the development stage, after the pretest and posttest, a student response questionnaire was given to 30 students in class X-IPA 11. With the assistance of the media Quizizz, the purpose of the student response questionnaire was to assess the students' interest or response to the learning process of folklore based on Malay Deli culture. It can be seen in Table 9 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>Respondent's Answer</th>
<th>Amount score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At the beginning of following this lesson, the impression</td>
<td></td>
<td>10 12 4 4  88</td>
</tr>
<tr>
<td>1</td>
<td>I'm not attractive</td>
<td></td>
<td>7 15 5 3  86</td>
</tr>
</tbody>
</table>

Table 9. Limited Trial Results Data on Student Motivation
At the beginning of following this lesson, the impression 9 15 4 2 91

I think this lesson is boring 12 10 5 3 91

At first I was confused by teacher's explanation 17 10 2 1 103

After listening to the preliminary information, I started to understand 16 11 2 1 102

learning goals and objectives 22 5 1 1 106

When facing difficulties in the eyes 22 6 1 1 109

lessons, I'm trying to find alternative solutions to the problem 21 7 2 1 110

Total Score 977
Score Percentage 81.4%

The total score of the questionnaire that was given to students in order to see how they responded to a limited trial of the development of Quizizz media-assisted learning materials applied to folklore materials was 977, with an 81.4 percent score that met the criteria for Good (B).

Stage of Dissemination (Disseminate)

The dissemination stage is the final step in the 4-D process, and it involves distributing more widely developed folklore teaching materials. This stage aims to evaluate the efficacy of Quizizz media-supported folklore learning materials. The product development trials now involve a larger group. There were 145 students in class X MAN 2 Model Medan who participated in the trial. This stage's data focuses on the efficacy of folklore learning materials and the motivation of learners to learn to write folklore through the distribution of a learning motivation questionnaire. In addition, the information gathered at this point is used to evaluate the efficacy of using Quizizz media to develop folklore learning materials and measure students' motivation to learn. The data obtained at this stage can be seen in table 10 below:

Table 10. Test Result Data Expanded on Student Motivation

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>Respondent's Answer</th>
<th>Amount score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SS  S  KS  TS</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>At the beginning of this lesson, the impression</td>
<td>60 45 20 20</td>
<td>435</td>
</tr>
<tr>
<td>2</td>
<td>I'm not attractive</td>
<td>52 49 26 18</td>
<td>425</td>
</tr>
</tbody>
</table>
At the beginning of this lesson, the impression

I think this lesson is boring

At first I was confused by

Teacher's explanation

After listening to the preliminary information, I started to understand

Learning goals and objectives

When facing difficulties in the eyes

Lessons, I'm trying to find alternative solutions to the problem

3 59 59 15 12 455
4 70 46 15 14 462
5 72 48 17 8 474
6 79 50 8 8 490
7 75 48 15 7 481
8 80 52 9 4 498
9 86 49 7 3 508
10 86 45 10 4 503

The total score of the questionnaire, which was used to determine students' motivation for participating in the expanded trial of developing folklore learning materials with the assistance of Quizizz media, was 4731, with an 81.5 percent score that met Good criteria (B). Based on the motivation's results, folklore learning materials and Quizizz media were deemed effective.

4 Conclusion

The process of compiling folklore learning materials based on Deli Malay culture with the help of Quizizz media was developed in 4 (four) stages, namely: defining, designing, developing, and disseminating. At the define stage, an examination of the needs of educators and students is carried out. Then set informative targets, namely basic competencies, indicators of competency achievement, learning objectives, and the extent of learning material for folklore based on Deli Malay culture with the help of the developed Quizizz media. Then at the design stage (planning), the layout design of the material in the planned learning media is carried out. And at the development stage, is the stage of developing the layout of the material that has been made in the previous stage into a more complete display of learning material. In addition, the disseminate stage is the dissemination stage to students.

The validity of learning materials based on Malay Deli folklore with the help of Quizizz media is an increase in learning outcomes. From the results of the research, the assessment of the material expert validator said that the product developed with a content feasibility percentage was 90.9%, then a presentation feasibility assessment was 95.4%, then a language assessment was 96.2%. Furthermore, the results of the assessment by the design expert validator said that the product developed was with an initial media design introduction percentage of 89.2%,
content design 87.5%, and typography 95.8%, illustration content 91.6%. The results of the feasibility of media presentation quality are 91.02%. The results of product assessment by Indonesian language teachers with a percentage of 85.55%.

The effectiveness of teaching materials for folklore based on Malay Deli culture with the help of Quizizz media is an increase in learning outcomes. Based on the pretest and posttest, student learning outcomes showed a 21 percent difference between pretest and posttest, with an average pretest score of 63 percent and an average posttest score of 84 percent. Therefore, it is possible to draw the conclusion that using folklore teaching materials based on Deli Malay culture with the assistance of Quizizz media can improve student learning outcomes in Indonesian subjects, particularly with regard to folklore materials based on Deli Malay culture.

References

The Study of Semiotics and Moral Values in Folk Stories in Pakpak Bharat Regency and Their Use as Literary Reading Materials

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Abstract. Semiotics is a branch of science that studies signs in literary works. Charles Pierce said there are three types of signs that can be identified, namely icons, indexes, and symbols. Currently, the government is aggressively implementing moral education because the current state of the young generation is very concerning with the many cases of immoral acts committed by teenagers. One effort that can be made to instill moral education is through literature learning in schools. Schools need to provide quality reading materials that contain moral values. This study aims to determine the study of semiotics and moral values contained in folklore, especially in Pakpak Bharat district, and their relevance as literary reading material at SMP Negeri 2 Satu Atap Salak, especially the Lae Une Folklore. This is qualitative research with descriptive analysis. Data collection techniques using library techniques, notes, interviews, and questionnaires. The data analysis technique uses interactive analysis proposed by Charles Sanders Pierce. The resource people in the study were two teachers of SMP Negeri 2 Satu Atap Salak and thirty-three junior high school students. Based on the results of the study, it can be concluded that in the semiotic studies contained in the Lae Une folklore in Pakpak Bharat Regency there are signs, namely beautiful, seven, onging-ongen, 8 icons, 18 indexes which have interpretations in the Lae Une Folklore in Pakpak Bharat Regency. The meaning of semiotics in the Lae Une story is divided into objects into icons, indices, and symbols along with the moral message obtained from the Lae Une story, namely in terms of customs, it teaches us to always obey the prevailing customs in terms of humanity, reminding us to always help every human being who difficult in discriminatingly and from a spiritual point of view to teach to always believe in God Almighty. Based on the results of questionnaires and interviews with teachers and students, it can be said that Folklore in Pakpak Bharat Regency is very relevant to be used as literary reading material at SMP Negeri 2 Satu Atap Salak.

Keywords: Semiotics, Moral Values, Lae Une, Reading Materials.

1 Intruduction

Literary works are a reflection of society, therefore literary works have a symbolic meaning that needs to be revealed with a semiotic approach. As works whose medium is language,
literary works have a language with distinctive diction and different from the language used in everyday life and standard language. Language in literature uses its style of language. Literature is the result of human creative art that displays a picture of human life, using language as its medium. These meanings and messages are often conveyed implicitly or not clearly, so it is difficult for readers to get the message they want to convey.

The semiotic analysis examines how to understand the signs contained in the communication. With the study of semiotics, a sign in communication can also give birth to a belief in society which eventually creates a myth. A sign that can not always be understood correctly and equally among people. Everyone has their interpretation of the meaning and various reasons behind it.

The symbols in folklore whose meanings or moral values are not yet known to the public, and are appointed for analysis so that the message conveyed through symbols can be conveyed. In the Pakpak Bharat area, you can find folklore that has moral values, one of which is the Lae Une folklore, which tells of a beautiful princess named Nan Tampuk Emas marrying the king’s son in the kingdom of Suak Simsim (now known as Pakpak Bharat district) and for many years the princess had not been able to give a child that the king’s son wanted, and not long after that the princess made an agreement with the umang so that when the king's baby was born he was immediately bathed and offered nditak mbetcih, baja minak and manuk mbettar and bathed Undung Une in Lae Ordi.

The reason the author chose the Lae Une folklore of Pakpak Bharat Regency as the object of research is that there is still at least the Folklore in Pakpak Bharat Regency that has been appointed to be researched and disseminated so that if you hear folklore, the community, especially North Sumatra, which consists of the Batak, Malay, Simalungun, Karo people, Dairi, Mandailing, and Pakpak, must only know Toba Batak Folklore. In addition, the folklore of Lae Une also shows the environmental and socio-cultural conditions of the Pakpak Bharat community until now. Of course, this is an added value for readers because apart from being able to enjoy every little-known story of Lae Une, readers also gain insight into the customs of the Pakpak Bharat Tribe, of course, is full of signs of semiotics.

Related to this problem, the writer is interested in the folklore entitled Lae Une Folklore by using Charles Sanders Peirce's semiotics as a theoretical basis. This is because folklore has many signs contained in sentences that imply certain intentions and contain moral values. The style of language used in the story is also interesting and unique. By using the typical Pakpak language. The research will be conducted by analyzing the semiotics in the Lae Une Folklore in Pakpak Bharat Regency and describing the study of semiotics. The research will also be conducted to see whether literary reading books are relevant to be used as literary reading materials at SMP Negeri 2 Satu Atap Salak. The Lae Une Folklore in Pakpak Bharat Regency is a learning medium that is close to students because the existence of Lae Une is known directly by students so that students can understand more about the signs and moral values in the folklore both orally and in writing.
The formulation of the problem in this study can be described by (1) how semiotics is in the form of signs, objects, and interpretations contained in the Lae Une folklore in Pakpak Bharat Regency. (2) how are the semiotics of signs, objects, and interpretations contained in the Lae Une folklore in Pakpak Bharat Regency. (3) how are the moral values contained in the Lae Une folklore in Pakpak Bharat Regency. (4) how useful are folk tales in Pakpak Bharat Regency as literature reading material in junior high school.

The operational in this study is as follows:

**Definition Of Semiotics**

Ratna, 2014: 96 states that semiotics is a direct result of formalism and structuralism. Etymologically comes from the Greek "Semeion" and "Semeiotikos which means sign or from the word semeiototikos, which means the theory of signs. Signs are used by musicians to look for song notes on musical instruments, as a semiotic term is not a new term. Semiotic embryos in the study of signs in language and culture are often associated with Plato and Aristotle.

**Understanding Moral Values**

According to Wiyatmi (2006:112) Value is something that is valuable, quality, shows quality, and is useful for humans. Something is valuable, meaning something is valuable or useful for human life.

**Definition of Folklore**

According to Bascom 1984:50, folklore is a genre of oral folklore that is told from generation to generation. There are very many categories of folklore. According to Bacsom, however, basically, folklore can be divided into three major groups: myth (mythe), legend (legend), and fairy tale (foktale).

**Reading Material**

Dalman (2013: 25) said that there are three things related to readability, namely ease, attractiveness, and understandability. Reading material that is difficult to understand will not attract the interest of the reader, as well as in terms of appearance, reading material must be able to attract the interest of the reader.

**2 Methods**

The method is used as a tool to assist in solving problems and proving hypotheses. A qualitative research method is a method for examining an object that cannot be measured by numbers or other measurements that are definite (exact). Qualitative research can also be interpreted as research that is descriptive in nature and tends to use analysis with an inductive approach.
3 Research Results And Discussion

3.1 The data obtained are verbal and nonverbal contained in the Lae Une story in Pakpak Bharat Regency.

From the data in Table 1, it can be stated that the verbal and nonverbal sentences contained in the Lae Une story in Pakpak Bharat Regency are as many as 25 sentences containing verbal sentences and as many as 17 sentences containing nonverbal sentences in the Lae Une story in Pakpak Bharat Regency.

An icon is a sign that is similar to the object it represents in the Lae Une Folklore in Pakpak Bharat, the Cantik Jelita icon as a social marker. In the Lae Une Folklore in Pakpak Bharat Regency, it is described how the main character has a very beautiful face which is very different from the friends of his age and is the reason why the royal son wants to marry him, this can be seen in the dialogue "It is said that Paklima Manik married Nan Tampuk Emas was beautiful and beautiful with a big and big party, there has never been a party like that at Suak Simsim."

Table 1. verbal and nonverbal contained in the Lae Une story in Pakpak Bharat Regency

<table>
<thead>
<tr>
<th>No</th>
<th>Lae Une Folklore Quotes</th>
<th>Verbal</th>
<th>Nonverbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is said that Paklima Manik was married to Nantampuk Mas.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>There has never been such a festive party in Suak.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>For seven days and seven nights a party was held with very lively oning-oning.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Seven badr buffalo are slaughtered for party purposes.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Kula-kula received with great satisfaction and pride the tokor berru from the king's rich and generous son.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>For years, the king's son has not produced offspring.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>During the day everyone is busy working in the fields.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Nantampuk Mas duduk melamun di jerro.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>Someone dressed in white with a crown on his head asked him.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>Nantampuk Mas is afraid he has heard stories about umangs like to harm humans.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>11</td>
<td>Putri Nantampuk Mas between believing and not believing.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>12</td>
<td>But even so the daughter of Nantampuk Mas told this to Paklima Manik.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>13</td>
<td>The king's son was so happy to hug Nantampuk Mas' daughter full of joy while carrying her to sleep.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>14</td>
<td>Greeted with joy by all the people and the whole palace.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>15</td>
<td>When the baby was born, they were given the name Undung Une and the party was very lively.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>16</td>
<td>Kula - Kula came to bring the kelimbis and Undung</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Une was in the kelembis.

17 So happy Nantampuk Mas has the offspring of a handsome baby boy. ✓
18 So that he fell asleep and forgot his promise to offer Nditak mbetchi. ✓
19 One day Nantampuk Mas changed Undung Une’s song in Jero, humming a melodious song to lull his handsome son to sleep. ✓
20 Suddenly a person dressed in white with a crown on his head stood in front of him. ✓
21 Nantampuk Mas was very surprised, he immediately remembered his promise then. ✓
22 Nantampuk Mas begs for mercy and is willing to accept the punishment given to him. ✓
23 But the umang did not care about Nantampuk Mas, the baby was quickly carried by the umang and disappeared suddenly. ✓
24 The whole village was shocked by Nantampuk Mas’ screams while Undung Une's cries were heard in Lae Ordi. ✓
25 Putri Nantampuk Mas doesn't want to stay in the palace, she follows the procession. ✓
26 The noise and cheers echoed throughout the cliffs. ✓
27 If people are looking downstream, the sound of a baby's crying is already upstream, otherwise, if people are looking upstream, the sound of a baby's crying is already downstream. ✓
28 The search was carried out until late at night with no end. ✓
29 Princess Nantampuk Mas doesn't want to go back to the palace if she hasn't found her baby. ✓
30 The conditions that Umang said to Nantampuk Mas' daughter were made again in the hope that Umang would return Undung Une. ✓
31 On the seventh day at night, you can see umang sitting on a rock behind the waterfall holding Undung Une laughing. ✓
32 The sun rays in the afternoon that hit the waterfall reflected the sparkling light and danced following the ripples of the water and the fall of the waterfall. ✓
33 Putri Nantampuk Mas was immediately excited to see her child laughing a little with the hermit. ✓
34 Princess Nantampuk Mas suddenly got a magical power. ✓
35 His already limp body gained energy to get up and ✓
36 Arriving at the deeper water he swam lightly as if he didn't need the strength to swing his legs and arms.

37 The water that rotates backward flows towards the waterfall, causing him to be drifting instead of swimming.

38 Nantampuk Mas approached the whirlpool which was getting stronger, that's when the umang threw the baby (Undung Une) into the center of the whirlpool.

39 Nantampuk Mas tried to catch up and grabbed his son but his hand did not reach him.

40 Princess Nantampuk Mas and her son Undung Une disappeared into the whirlpool.

41 The entire population looked for the bodies of the princess and her baby but were never found.

42 Every morning people always go to that place in the hope of finding the body parts of the daughter of Nantampuk Mas and the baby.

The results of the analysis of the index of research data found in the Lae Une Folklore of Pakpak Bharat Regency obtained is a quote from the story "It is said that Paklima Manik married Nan Tampuk Emas who was beautiful and beautiful with a festive and large-scale party" has the Beautiful Jelita sign as an icon that has the meaning Signifying she was very beautiful, beautiful, and beautiful.

The results of the analysis of symbols are found in the story of Lae Une, Pakpak Bharat Regency. The symbol of beauty belongs to Nan Tampuk Emas which is found in the quote below. "It is said that Paklima Manik married the beautiful Nan Tampuk Emas with a lively and large-scale party. There has never been such a festive party at the Simsim Suak. For seven days and seven nights, a party was held with very lively oningen. Seven badr buffalo are slaughtered for party purposes. Kula - kula received with great satisfaction and pride the tokor berru from the king's rich and generous son."

Moral Value of Lae Une Folklore in Pakpak Bharat Regency. Moral values that we can know after reading the Lae Une folklore in Pakpak Bharat Regency (a) In terms of customs Lae Une folklore teaches us to always obey the prevailing customs such as always including Kula-Kula at weddings. (b) In terms of humanity, Lae Une folklore reminds us to always help every human being who is in need indiscriminately, even if he is a King or Princess. (c) From a spiritual perspective, Lae Une folklore teaches to always believe in God Almighty and never cooperate with supernatural beings (umang) because it only causes harm to humans.

It’s relevance to literary reading materials. The search results from the questionnaire given to the teacher, it was found that so far the teacher used a collection of fairy tale stories as reading material and literature learning, the teacher also used textbooks or student textbooks, books in the library, and literature learning videos. The teacher stated that the book Folklore in
Pakpak Bharat Regency can be used as literacy reading material for students, it can also be used in learning or when children finish lessons, children can read this book. Another opinion also stated that this book has its own color that can attract children's interest. Another opinion also states that this book is very much needed because it will be directly related to the formation of human character or students.

In the needs analysis questionnaire given to students, it was found that 90% of students like to read legend stories, the theme of short stories that are favored by children is 13% is mystical and 14% is family. Students also stated that the short stories they read from school books were ordinary and some said they were boring. Students also stated that they felt the need for other sources that could be used as reading material.

**Teacher's Response to Folklore Books in Pakpak Bharat Regency.** Assessment of the teacher's response to the book Folklore in Pakpak Bharat Regency was carried out by Donald Supri Manik, S.Pd. and Omsin Anakampun, S.Pd. who is an Indonesian teacher at SMP Negeri 2 Satu Atap. This response was carried out to obtain information about the relevance of the Folklore book in Pakpak Bharat Regency as literary reading material at SMP Negeri 2 One Roof. The relevance of Folklore books in Pakpak Bharat Regency can be known through quantitative methods by giving a questionnaire to the teacher.

The results of the teacher's response to Folklore books in Pakpak Bharat Regency as literary reading materials at SMP Negeri 2 One Roof have a total average percentage of 89% with very good criteria. This means that Folklore books in Pakpak Bharat Regency can meet the needs of reading and learning materials for students of SMP Negeri 2 Satu Atap.

**Student Responses to Folklore Books in Pakpak Bharat Regency.** Folklore books in Pakpak Bharat Regency are very relevant to be used as literary reading materials for children, this can be proven by the questionnaire responses given to 33 students of SMP Negeri 2 Satu Atap Salak. The questionnaire is evidenced by a Likert scale test consisting of 10 questionnaire questions. All qualitative data in the form of statements of very good, good, bad, and very bad were converted into quantitative data on a scale of 1 to 4. Then, calculate the percentage for each indicator of the Folklore book in Pakpak Bharat Regency.

Students give a positive response or response to each indicator or statement so that the Story of the People in Pakpak Bharat Regency is relevant to be used as literary reading material. This is also evidenced by the acquisition of a percentage of the overall response indicators, namely 85.5% in the very good category.

**4 Conclusion**

Conclusions relating to the Study of Semiotics and Moral Values in Folk Stories in Pakpak Bharat Regency and Their Use as Reading Materials: The meaning of semiotics contained in the Lae Une folklore in Pakpak Bharat Regency in objects is divided into Beautiful Icons as social markers, Oning-Oning Icons, oningen as a cultural marker, the Kula-Kula Icon as a Social marker, and the Astrologer Icon as a cultural marker. The index includes the Behavior Index, and the Disease Index, and symbols include the Beauty Symbol, Name Symbol, Happiness Symbol, and Affection Symbol. Moral Values in the Lae Une Folklore in Pakpak
Bharat Regency The story in terms of customs teaches us to always obey the prevailing customs from a humanitarian perspective, reminding us to always help every difficult human being indiscriminately and from a spiritual point of view teaches us to always believe in God The Almighty.

References

Semiotics of The Siwaluh Jabu Traditional House in The Batak Karo Tribe and Its Utilization as Student's Reading Material

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Abstract. This research is a study of spatial planning and its current function. This study aims to describe and analyze the symbols of power and carvings of the Si Walu Jabu traditional house because symbols and carvings are important components in the construction of the Si Waluh Jabu traditional house. This study uses descriptive qualitative research methods, seeks to analyze and interpret the meaning of the object under study based on facts in the field, uses key informants as data sources, uses primary and secondary data through in-depth interviews, field observations, documentation of activities, references related to this research and data from the internet. The data analysis technique used in this research is the semiotic model of Charles Sanders Peirce. The results of this study were from four carvings that became the focus of the research, namely the Head of the Buffalo, the Roof of Ijuk, the Painting on the Roof, and the Dragging. have in common, namely the prayers and aspirations of the Karo people for the present and the future.

Keywords: Traditional house, Karo tribe, spatial planning, interior

1 Introduction

Growing the traditional house of Siwaluh Jabu is an effort for the next generation of the tribe. But in fact the Siwaluh Jabu traditional house is almost extinct which will one day become extinct if it is not preserved. Why is this Siwaluh Jabu traditional house almost extinct? This is because many successive generations have migrated to the other side and abroad. The impact on the Siwaluh Jabu traditional house with the existing one is not understood by the next generation. This is supported by Singarimbun 1989 that 70% of traditional house on earth were burned according to the war strategy at that time. It was worried that the traditional house would become extinct, which was stated by Singerimbun in 1989 because no new traditional houses were built, while the existing ones were poorly maintained.

It draws attention that the Siwaluh Jabu traditional house needs to be preserved, because the Siwaluh Jabu traditional house has special features, one of which is used as a symbol in marriage in the tribe. This is illustrated in the tribal marriage invitation letter. Basically the form of the Siwaluh Jabu house can describe deep social communication and rituals, but in reality at this time, it is almost extinct even in the Tanah Karo area, especially in villages.
where the majority of the people are indigenous people, one of which is the village of Lingga which is located at an altitude of about 1,200 meters above sea level, approximately 15 km from Berastagi and 5 km from the city of Kabanjahe Regency. This condition researchers describe based on the results of observations made directly. Not only the above, the Siwaluh Jabu traditional house which is often found in child marriage invitations in tribal communities, also experiences problems in its meaning by the current generation, for this reason it is necessary to study the Siwaluh Jabu traditional house based on semiotic studies, which will give back an improvement in quality. which affects the quality of life of its residents.

Siwaluh Jabu traditional house depicts social community, solidarity and rituals. Traditional houses are known for their occupants starting from four, eight, to sixteen families from various relationships to the head of the household, so that it can be seen that there is a relationship between the three elements, namely kalimbubu, anak beru and senina (brother/sister ties from the male and female parties). Community life cannot be separated from the traditional kinship system. The kinship system is centered on the Dalikan Si Telu. The description of the Siwaluh Jabu traditional house can provide a view for the community.

The Siwaluh Jabu Traditional House is known as a traditional house that contains various symbols that have semiotic codes that are intertwined as the background of the Karo ethnic community. It is not enough with symbols and symbols, the structure and interior layout of the Siwaluh Jabu building also has a compositional spectrum that can be encoded, this is in line with Kila Gurning's statement as the traditional head of the Karo tribe in Tiga Lingga village based on the results of interviews with researchers in 2019. Thus, it can be said that it is not easy to interpret the semiotic meaning of this Siwaluh Jabu Traditional Ruma. In line with the above, the research by Senasaputro (2019) stated that as a form of preserving cultural products, it is necessary to study the historical and archaeological aspects contained therein. These values are understood not only through the language of form, space and detail, but the language of symbolic meaning, or what is known as the language of representation through a semiotic approach.

The semiotic approach was chosen as an alternative approach, which is a basic interpretation of an object that is oriented towards sign systems, sign processes, indications, metaphors, similarities, symbolism and communication.

Along with the current development of Science and Knowledge, it turns out that the current generation does not understand the meanings of the Siwaluh Jabu Traditional House. As a consequence of the diversity of the island, the existing culture and customs, the life of the people becomes very multicultural.

The tribes and cultures that are registered are evenly distributed in every province in Indonesia, and seem to be a proud regional identity, ethnicity and culture are born and continue to be maintained by the community in the midst of globalization and modernization that continues to erode (Rufaidah, 2016).

2 Research Methods

This research is a descriptive study and the research method that will be carried out in the Semiotics research of the Siwaluh Jabu Traditional House in the Karo Batak Tribe and its Utilization as Student Reading Material is by using a qualitative method. Sugiyono (2015, p. 15) explains that qualitative research methods are research methods based on the philosophy
of positivism, used to examine the condition of natural objects, (as opposed to experiments) where the researcher is the key instrument, sampling data sources is carried out purposively and snowball, combining techniques with triangulation (combined), data analysis is inductive/qualitative, and qualitative research results emphasize meaning rather than generalization.

3 Results and Discussion

3.1 System of Signs and Markers for the Siwaluh Jabu Traditional House in the Study of Semiotics.

Most of the Karo people live in the Siwaluh jabu traditional house which has a roof made of palm fiber, and there is a buffalo head ornament at each end, where this ornament has tiered social obligations in the cultural environment of the Karo people. What distinguishes the carving from other traditional houses is the shape of the roof that resembles a person who is cupping his hands in front of his chest in a half-sitting position.

Based on the results of interviews in the field, it was found that in ancient times, this Karo tribal architect had the ability to design the durability of the house, for example, on the palas between the foundation stone and the wooden pillars supporting the house, covered with palm fibers which are useful when shaken by an earthquake, the house will follow sway direction. “On the terrace of the house, the stairs and roof supports are made of bamboo, and roofed with palm fiber and built without using iron nails or wire ties but using fibers which were built in mutual cooperation. And at the very top of the roof of the traditional house, both ends of the roof are each equipped with two buffalo horns. In ancient times, the Karo indigenous people believed in buffalo horns as a repellent against reinforcements,” said Kila Tarigan.

In ancient times, this traditional Karo house was used as a place to live for the residents of the Lingga village as well as this traditional house used as a place for deliberation or a meeting place between regional traditional leaders. However, with the passage of time, now the Karo Traditional House has been abandoned and is no longer occupied by the Karo people, but has become one of the Karo cultural heritages, and is always guarded by the guides of tourists who come to visit the village.

Human intellectual and social life is based on a system of production, use and exchange of signs. Signaling, writing activities, listening to music, seeing paintings and other activities can involve humans in interpreting these signs, as Charles Pierce argued that human life is characterized by "sign perfusion".

3.2 Interpretation of the meaning of Siwaluh Jabu House based on the study of Semiotics.

Specifically, in the discussion of this system, what will be analyzed is the focus on buffalo head ornaments, palm fiber roofs, paintings on Siwaluh jabu houses and building fasteners instead of nails using the meaning triangle model from Charles Sanders Peirce.

A. Buffalo Head

The choice of a buffalo head at the end of the roof of the Karo Siwaluh Jabu traditional house is influenced by how the Karo people think. Seeing the huge role of this buffalo in every aspect of the life of the Karo people, the Karo people consider the buffalo as a symbol of
B. Roof of Ijuk

The people of Karo use palm fiber for the roof of their house, which has its own purpose and purpose other than to give a cool feeling to the house, it is also very efficient in the period of use because the fibers can last a long time. When viewed from the seasons in Indonesia, palm fiber is a suitable and environmentally friendly material to use. The use of fibers on the roof of the house is a simple thing, the Karo people previously built houses completely made from nature, including the use of fibers, of course, the Karo people have their own goals for this.

C. Roof Painting

The painting on the roof is actually very natural when viewed in terms of color. This is because this painting is colored from natural materials. There are five colors in the painting, namely red, yellow, black, green, and white. The five colors are made from natural materials such as charcoal, betel, leaves and others. The colors found in the painting of the roof of the house have the meaning of clan silima, where each color has its own meaning and significance. The colors in front of the roof are red, yellow, black, green, and white. Each color symbolizes the basic clan of the Karo people, namely, Karo – Karo.

D. Building Fastener

Dragget means a binder or substitute for nails, dragnet is an ornament in the form of an animal, namely a lizard. Karo people believe that lizards are able to stick to anywhere and live anywhere. In the symbol of retreat which is analyzed semiotically with the theory of Semiotics of Charles Sanders Pierce, the researcher places kinship as the object represented by the representative. Based on these objects, signs are divided into three, namely, icons, indexes and symbols. The icon is a lizard or lizard animal, the index is the kinship system, the symbol is a derpih (wall) binder, and a repellent to evil or evil spirits. In the symbol of retreat which is analyzed semiotically with the theory of Semiotics of Charles Sanders Pierce, the researcher places kinship as the object represented by the representative. Based on these objects, signs are divided into three, namely, icons, indexes and symbols. The icon is a lizard or lizard animal, the index is the kinship system, the symbol is a derpih (wall) binder, and a repellent to evil or evil spirits.

3.3 The feasibility of reading materials for the Siwaluh Jabu Traditional House based on the study of Semiotics

The feasibility of a reading material for the Siwaluh Jabu Traditional House was obtained based on the validation results from material experts and design experts. Feasibility of teaching materials in terms of material includes aspects of assessment, namely the feasibility of content, feasibility of presentation and feasibility of language. The content feasibility aspect reaches an average percentage of 91.48% with the criteria of "very good". The presentation feasibility aspect reached an average percentage of 85.70% with "good" criteria. In the aspect of language feasibility, the average percentage is 93.75% with the criteria of "very good".

Based on the data above, it can be concluded that the content of the reading material for the Siwaluh Jabu Traditional House is in accordance with the cognitive level and ability of students. Thus, this reading material deserves to be presented to class XII students of SMPS Nurcahaya Medan.

Furthermore, in the aspect of graphic feasibility (design) the average percentage is 90% with
the criteria of "very good". The aspect of the feasibility of graphics includes three sub-components, namely, 1) the size of the reading material, 2) the design of the cover of the reading material, 3) the design of the content of the reading material. Where the first sub-component gets an average percentage of 93.75% with the criteria of "very good". The second sub-component received an average percentage of 91.66% with the criteria of "very good". The third sub-component received an average percentage of 84.21% with the criteria of "good".

The weakness is that when viewed from all 30 assessment items, there are 9 items that are on the "enough" criteria with a percentage of 75%, then there are 11 assessment items that are on the "good" criteria with a percentage of 87.5% and there are 9 assessment items with the "very good" criteria. good” with a percentage of 100%. The metacognition-based essay writing teaching materials have been revised according to the suggestions and inputs from design experts that have previously been presented. Thus, it can be concluded that this reading material is feasible to be presented to class IX students of SMPS Nurcahaya Medan and is suitable for use in learning Indonesian, especially in essay writing material.

4 Conclusion

Based on the results of research on the Semiotics of the Siwaluh Jabu Traditional House in the Karo Batak Tribe and Its Use as Student Reading Materials presented in this thesis, it can be concluded as follows: There are several types of symbols in the popular tradition of the Karo people, namely: (1) The form of the symbol is amak mbentar, manuk sangkep, lau simalem-malem, uis. (2) The function of the symbol is amak mbentar, manuk sangkep, (takal ten-ten, tulan gurung, thigh, kabeng, nahe, ate-ate, tinaru manuk rajamulia, cipera, gum manuk, dish pasu, nakan beat), lau simalem-malem (paula, mumbang, lau meciho, lemonade) uis karo (beka reed, kampuh, uis gara, uis nipes, uis arinteneng) (3) Mukul Tradition Values namely (skill values, intelligence values, self-esteem values, social values, moral values, the value of divinity, the value of self-control, the value of behavior, the value of will/willing/aspirations, the value of loyalty.

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The Used of Ethnic Languages Inter and Intra Ethnic Communication in Desa Lawe Tawar Regency Aceh Tenggara of Aceh Province

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Abstract. The objective of the study was to describe how people use the ethnic language in inter and intra ethnic communication. A qualitative descriptive research design was applied. The data of this study were words, phrases consist of inter and intra ethnic communication. The subject of this research were Batak Toba ethnic, Karo ethnic, Simalungun ethnic, Pak-Pak ethnic and Nias ethnic at the age 18-50 years old. The instruments used for this study were observation and in-depth interview. The results of the study in inter-ethnic in three ways i.e: (1)no ethnic language is used totally in inter-ethnic communication, (2)ethnic language used in code mixing of different levels, (3)ethnic language used in code switching while the language use in intra ethnic such as: (1)using their own ethnic language, (2)using other ethnic language, (3)using Bahasa Indonesia and other ethnic language in code mixing.

Keywords: language use, language choice, inter-intra ethnic.

1 Introduction

People who are able to master two or more languages which is called bilingual/multilingual, of course people are faced with choosing the right language. For example, when different ethnic communicate, of course, they use one of their partner languages or Indonesian as the lingua franca. Related to ethnic languages in inter and intra communication in multilingual context in Indonesia to bring up the uniqueness and typical phenomenon in terms of language use. Meaning that when the speakers want to say something in other language, but suddenly the speaker forget or do not know the word, in order the speaker has to choose another language with the intention that the speaker want to conveyed is achieved. So that the interlocutor does not feel confused and their communication is still connected. In terms of bilingual/multilingual society, the language use phenomena are often found, both in the form of people's attitudes towards their own language and the language around them as well as language choice, code mixing and switching. We also see that people’s attitude to their language negative or positive from the language they used. The birth of language choice, code mixing, code switching and language attitude phenomenon is caused by the people having two or more languages to use
alternately, as seen in societies in Lawe Tawar that can be categorized as bilingualism/multilingualism. [1] mentioned multilingualism communities is a situation that is used more than two languages by a person in interaction with others in turn. [2] stated that code-Switching and Code-Mixing are strategies to express group identity because the way people communicate with their group are obviously different from the way they communicate with others. Meaning that, the process of code mixing and code switching can occur in inter and intra ethnic communication. So, when the speaker chooses another language to use, then there is a language choice. The diversity of languages in Lawe Tawar village allows the people are able to use two or more languages then tend to use different languages when the person communicates from one ethnicity to another. In order, people often mix other languages in their communication, then raises a nuance and unique phenomenon and also different in the use of language. In this study the researcher used Language choice, code mixing. Then the researcher also found that there are some people, namely inter-ethnic, that choosing to use other languages to communicate, even though the interlocutor is also not ethnic from the language they use. In this study the researcher aims to know the ways of people used in inter and intra ethnic communication in Desa Lawe Tawar.

Beside, in doing this research the researcher used Language choice [3] mention that language choice as the ability any speaker of any language has and enables him/her to choose the appropriate language for any particular purpose.[4] sated code switching is the process of switching from one language to another in the use of two languages in a conversation. Code mixing[5] stated that code mixing is a combination of two languages where one of the languages is the primary language while the other is just pieces, or phrases without any function. (6) mention the differentiation levels of code mixing divided into six level in the forms of (1) Word, (2). Phrase (3) Baster, (4) Repetition (5) Idiom 6) Clause.

2 Method

The research design used by the researcher was descriptive study with qualitative approach. Descriptive study is used which focuses on understanding social phenomenon from the perspective of the human participants in natural setting. The data of this study were words, phrases consist of ethnic languages in inter and intra ethnic communication uttered by the people in Lawe Tawar. The source of the data were taken from Batak Tobanese, Karonese, Simalungunese, Pak-Paknese and Niasnese. The data of the study was collected by accidental sampling. Accidental sampling is a sampling technique based on accidentally meet a researcher can be used as a sample, if the people considered suitable as a data source for the researcher without looking of social status, gender, age, profession, and so on [7].

3 Result and Discussion

The Use of Ethnic Languages in Lawe Tawar

There five ethnics reside in Lawe Tawar, there are; (1) Batak Tobanese, (2) Karonese, (3) Pak-Paknese, (4) Simalungunese, (5) Niasnese. Each of ethnics has its own ethnic language and they communicate in two form of communication mode if it is viewed from the participants of the communication. These ethnics may involved in a communication with two or more ethnics as its participant. This mode of communication is called inter-ethnic communication. They can
also have communication with its participants are all from one ethnic members. This mode of communication is called intra-ethnic communication. In the two modes of communication, the ethnic languages are used differently.

The Use of Ethnic Languages in Inter-Ethnic Communication

The use of Ethnic language in Inter-Ethnic Communication was identified to happens in three ways, namely:

1. No Ethnic Language is Used Totally in Inter-ethnic Communication.

Among the 5 ethnic languages in Lawe Tawar, namely (1) Batakne, (2) Karonese, (3) PakPaknese, (4) Simalungunese, and (5) Niasnese, there is no ethnic languages was totally used in their conversation. However, Bahasa Batak Toba (BT) and Karo language(KR) are dominantly used than other ethnic languages. The dominance is indicated by the use of the two languages as the primary language, while the other ethnic languages are used in code mixing. Meanwhile, What happened was that Bahasa Bahasa Indonesia is used as language franca among inter-ethnic who do not totally master other ethnic languages. Then Bahasa Indonesia is used as primary language, while the other ethnic languages are used in code mixing.

a. Bahasa Indonesia as Primary Language mixing as shown in data 1.

Data 1
Context : at the Karonese’s house, a male 18 years old Niasnese (FR), Spoken language (NS,KR and BI) and a female 21 years old Batak Tobanese(ML) Spoken language (BT and KR) talking about a baby

(is aunty still in school?)

ML: iya masih sekolah[BI]
(yes, aunty is)

(where is aunty school)?

(in Berastagi, so how about you?)

(I’m in Lawe Desky)

ML: oh,dekat berarti dari kampung kan[BI]
(Oh, it is close to our village. Isn’t it?)

(Yes aunt)
In data 1, the participants are Karonese and Niasnese. Indonesia language is used as primary language while KR is used as code mixing. It can be seen from the utterances that used by ML in line two and line six. In ML’s utterance Indonesia language was used in complete sentence. While FR used Karo words which is inserted to Indonesia language. FR does not speak BT, and ML does not speak Niasnese. Both of them speak KR, but they do not master the language well. Therefore, they chose BI as the primary language in their communication.

b. Bahasa Batak Toba as Primary Language

Beside BI, Batak Toba language (BT) is also used as primary language as data 2 shows

Data 2
Context: at the Batak Tobanese house, a male 28 years old Pak-Paknese (TO), Spoken language (BT, KR and PP) and a female 31 years old Batak Tobanese (MA) Spoken language (BT and KR) talking about a baby

TO: nga[BT] langkem [KR]/ate[BT]? (he facedown right?)

TO: dang sesak hatop molo leleng [BT] langkem [KR]? (doesn’t he feel short of breath quickly if he facedown for a long time?)
MA: ikkon dibalikon muse, molo nga agak leleng[BT]. (he should be turned over again, if he has been prone for a long time)

In data 2, three languages are used by the participants. BT language is used as primary language meanwhile KR and BI languages are used in code mixing. KR and BI insert in words level which is showing into code mixing. Besides, in line two, TO’s utterance occur code mixing in Karo language in the word ‘langkem’ meaning ‘facedown’ then in the last line in MA’s utterance is occurred complete sentence in BT Language.

c. Bahasa Karo as Primary Language

In addition to BT, Karonese language is also used as primary language as shown in data 3.

Data 3
Context: at the Karonese house, a female 22 years old Batak Tobanese (MY), Spoken language (BT and KR) and a female 20 years old Karonese (NN) spoken language (KR and BT) talking about go on a trip.


[We rarely visit this person’s house]


[Especially while holding a baby, we are lazy to visit people’s houses]

As in data 3, Karo language (KR) is primary language while Batak Toba language (BT) is used in code mixing in the word ‘mangoppa’ and mardalani inserting to primary language in Karo language. In the data two, can be seen that the using of Karo words are the most if comparing to BI and BT words.
2. **Ethnic Language is Used in Code Mixing of Different Levels**

In inter-ethnic communication in the use of language found there were four levels of code mixing according [6] as in data 4 shows.

a. Phrase Types
b. Repetition
c. Baster

3. **Ethnic Language is used in Code Switching**

**The Use of Ethnic Language in Intra-Ethnic Communication**

Intra-ethnic communication refers to conversation among the same ethnic; no other ethnic participating in the conversation. In the conversation, ethnic languages are used in three different ways, they are:

1. **Using Their Own Ethnic Language**

As in the data, RM is Karoese meanwhile PN also Karonese. In this conversation the participants chose their own ethnic language. It can be seen from sentences uttered by RM and PN used Karo language in their conversation. In the their conversation there was a debate between RM and PN which is RM want to explain to PN that it is okey, if one of their member family come with them but PN is still does not want if one of their family member come with them even they use each other's money.

2. **Using Other Ethnic Language**

Another way of using ethnic language in conversation of which participants are from one ethnic is that they chose to use other ethnic language rather than using their own ethnic language. As in data 10, SA is Karonese RI is Karonese but in their conversation the both participant chose another ethnic language in Batak Toba language. It can be seen from the participants' utterance are in Batak Toba language.

3. **Using Bahasa Indonesia and Other Ethnic Language in Code Mixing Form**

In the intra-ethnic communication, participants of conversation from the same ethnic may use Bahasa Indonesia and other ethnic language in code mixing form. As in data can be seen in line two there is the change of pronunciation occurs in AN’s utterance shows code mixing at the phonological level, in the word ‘salimut’ and ‘adduk’ in the middle of sentence, as when Batak Toba say an Indonesia words, but modify it to Batak Toba language in phonological structure.

4. **Conclusion**

Based on the complete analysis and findings of the previous chapter in this study relate to the ethnic language used in inter and intra ethnics communication in language choice used in the ways they are: In inter-ethnic communication there were three ways of people communication such as: no ethnic language is used totally in inter-ethnic communication, Ethnic language used in code mixing of different levels, and the last is ethnic language used in code switching.
In intra-ethnic communication the ways of people in communicating, such as: the first is using their own ethnic language, the second is using other ethnic language, and the last is using Bahasa Indonesia and other ethnic language in code mixing.

Acknowledgments. The appreciation is dedicated to her first thesis adviser, Prof. Dr. Berlin Sibarani, M.Pd. and her second adviser, Prof. Dr. Siti Aisyah Ginting, M.Pd for all of their valuable advices and guidance in the process of finishing this thesis.

References

The Study of Gender Humor Discourse in ‘Friends’ Comedy Series

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Abstract. The study focuses on the gender humor discourse in the comedy series "Friends". The study's objective was to classify the gender humors present in the comedy series "Friends". Critical discourse analysis and a qualitative descriptive methodology were both used in the study. The study's data comes from gender humor discourse-heavy scripts from the television sitcom "Friends". Martin et al.(2003)'s classification of gender humor types was employed in the study. The four categories of humor identified by Martin et al. are affiliative, self-enhancing, aggressive, and self-defeating. According to the study's findings, 26 clauses of various humor types were identified, including: eight (31%) types were self-defeating. Self-defeating types appeared frequently in the 'Friends' comedy series, with seven aggressive types (27%) and six affiliative types (23%) and five self-enhancing different types (19%).

Keyword: Gender, Humor, Discourse, Comedy Series.

1 Introduction

Gender disparities is one of the most often searched for humorous topics. Most kinds of humour there would have shown to be more appreciated and used by males than by females, though not all. Gender differences are especially pronounced in nasty or repulsive comedy. According to¹, males found Women found sexist and racist jokes to be less offensive than men, and males found inappropriate jokes and insult humor to be hilarious than women.

Numerous research on comedy and gender have been conducted in the past, but few of them have directly addressed the workplace. Furthermore, there are probably assumptions regarding gender disparities as a result of the wider stream. According to these studies, males are more likely than women to use and value comedy (both offensive and non-offensive), both in self-report studies and studies in which other people's judgments on humor are recorded. If the

effectiveness and perceived behavior of a leader are related, women may be at a disadvantage in this conversation. Positive humor is more likely to help men than women. Since men are more likely than women to use crude and derogatory humor, it is more likely that such communications will be accepted if they are expected from men.

According to Kramarae\(^2\), because men and women have diverse perspectives on the world, they probably have different interests in humor. Because they must adhere to the social standards of the dominant group, women are more likely to notice men's lighthearted interests than vice versa. He believed that this was the genesis of the widespread belief that women lack a sense of humor. In other words, even while women find comedy funny, guys may not necessarily need to.

There is unquestionably a need for more research on the topic of comedy and gender over time. It is being done in this instance to see whether there are any similarities or contrasts between the gender humors that were provided in prior studies and the most recent humor phenomenon. One of the media that can show humor is film, which can also show people communicating and interacting at the same time and location. A comedy movie was one that was intended to entertain and make people laugh. As a result, the focus of the study's debate will be on the critically acclaimed and widely watched comedy series "Friends".

Friends is a short film series that ran for a total of 236 episodes over the course of 10 seasons on American television from 1994 to 2004. This comedy series received a reasonably good rating from the audience, which is 8.8/10, according to statistics from IMDb.com, the biggest and most complete online film database. Therefore, it should come as no surprise that this comedy series has garnered numerous accolades, including the ASCAP Film and Television Music Award for Top TV Series in 2005, the Primetime Emmy Award for Outstanding Lead Actress in a Comedy Series in 2002, the Primetime Emmy Award for Best Directing Comedy Series in 1996, the American Comedy Award for Funniest Supporting Female Performer in a TV Series in 2000, and numerous others. Friends presented the story of six "Friends" who, at the age of roughly thirty, were attempting to find their place in the world while still struggling to make ends meet. They talked about the challenges of life, such as friendship, love, drama, and family issues, amidst the bustle of Manhattan. Six men and six women respectively portrayed Rachel Green, Phoebe Buffay, Monica Geller, Joey Tribbiani, Ross Geller, and Chandler Bing in the hit television series "Friends".

The goal of this study was to categorize the many gender-related humors, such as those used by men and women in the sitcom "Friends" when talking with individuals of the same gender and those used when interacting with people of a different gender.

**Critical Discourse Analysis**

Mullet\(^3\) defined discourse has become prominent concepts in the fields of language, culture, and gender. It can also be anything that aims to understand social problems in society and to create a new, more ideal reality. A few examples include laws, stories, written texts like letters or textbooks, speeches, classroom activities, nonverbal cues, visual cues, multimedia, and movies.

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The term "discourse" refers to the study of language in connection to its social context, whether written or spoken. Understanding how language is used in everyday situations is its purpose, with a focus on the social aspects of communication and the ways in which individuals use language to "achieve certain goals. Fairclough describes more details on discourse in a variety of ways, including (1) as a component of the social process of meaning formation, (2) language associated with a specific social sector or practice (e.g., 'political discourse,' and (3) a way of construing world features associated with a specific social perspective.

Humor

According to humor is the type of media that the public is most receptive to. We encounter humor frequently because it has the power to amuse audiences. Humor also serves as a deterrent from stressful circumstances. Furthermore, descriptions of comedy frequently concentrate on the audience's or the speaker's intended meaning. Humor is "a particular sort of communication that establishes an incongruent relationship or meaning and is delivered in a way that causes laughing".

Types of Humor

The concept "humor styles" describes how people (who can be men or women) use humor in their everyday lives. A concept called "humor styles" was put out by Martin et al. They investigated individual variations in these four forms of humor by studying affiliational, self-enhancing, aggressive, and self-defeating humor. By learning more about comedy kinds, we may better understand how individuals engage with one another and employ humor on a personal and interpersonal level.

Affiliative

The capacity to use humor in speech, jokes, and practical pranks on people to amuse them, grab their attention, foster connections, and reduce any tension that may develop in interpersonal relationships is known as affiliation. Since it benefits both the user and others, this kind of humour is not hostile and improves social connections. Affiliative humor is a sort of constructive comedy that focuses on using humor to develop group bonds, such as supporting the statement "I love making others laugh". As stated above, persons who have affiliative humor typically use humor to gain social or interpersonal advantages. They thrilled and amused others to raise the quality of social interactions (to strengthen interpersonal ties and allure). Since affiliative humor reinforces both the self and others and enhances conflict resolution in romantic relationships, it is linked to both intimacy in interpersonal relationships and conflict resolution in dating couples.

Self-enhancing

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The capacity to keep an optimistic attitude on life even when other people do not is self-enhancing. It involves using humor as a strategy to get over challenges and have pleasure, especially while dealing with life's mistakes and inconsistencies. Positivity and self-focus toward humor are characteristics of the self-enhancing humor style. High self-enhancing joke scoring can "cheer" themselves by agreeing to the statement, "Even if I'm alone, I am constantly fascinated by life's oddities," as an example of how they utilize humor to boost their spirits. The example that follows shows how people with self-enhancing senses of humor use humor can maintain or improve their emotional fellow human. They manage challenging situations by viewing them from a humorous angle, maintaining a lighthearted viewpoint on life.

Aggressive

Aggressive humor refers to the desire to make fun of or manipulate other people through the use of sarcasm, uncomfortable jokes, or other means. It's a style of humor that some people could find offensive. "Aggressive humor," which focuses on other people and involves making fun of and criticizing them, is a form of negative comedy. I frequently taunt others about their mistakes, as in the sentence "When someone commits a mistake". Those phrases are used with an aggressive sense of humor. It use humor more as a technique of harming or controlling people than as a way to improve interpersonal interactions for both the self and others.

Self-Defeating

Self-defeating: People who indulge in this type of comedy do it at their own expense, making others laugh as they make themselves look foolish or despised. This style of comedy also involves the concealment of emotions through the use of comedy as a crude sort of protection. The sense of humor seems to be an attempt to win over others or obtain acclaim at the price of oneself, which is a sign of low self-esteem. This type of humor is in contrast to self-deprecating humor, which is a positive form of humor in which people can laugh at their own flaws and not take themselves too seriously. A person-centered strategy is self-defeating humor. Self-defeating performers make fun of themselves. Sometimes people use self-defeating humor to try to fit in or be accepted by a group, but the humor is directed at the person instead of the group. For instance, accepting the statement, "Letting people make fun of me is how I keep my friends and family happy". From the previous example, it can be inferred that those who had a self-defeating sense of humor made other people laugh by making fun of themselves. They use comedy as a coping mechanism to avoid facing issues and dealing with uncomfortable emotions.

Gender and Language

Holmes claimed that sociolinguistics addresses the issues of gender and language. There are minute distinctions between the language forms used by men and women in every linguistic community. A brief explanation of how sociolinguistics uses the terms "sex" and "gender". In contrast to gender, which refers to divides based on biological traits, he prefers the term gender since it is better suitable for categorizing people according to their socio-cultural behavior, including speech. The main focus of discussions on gender is how men and women speak differently.

As characteristics of female language usage, Lakoff\(^8\) identified lexical hedges, tag question, rising declarative intonation, empty adjectives, exact color terms, intensifiers, hypercorrect grammar, superpolite forms, avoidance of powerful swear words, and emphatic stress. Lexical Hedges are pauses in conversation sentences that take the form of phrases or filler words to indicate a lack of confidence, incomplete knowledge, doubt, uncertainty, or bewilderment.

A request can also be a very polite order that suggests a course of action to be taken in the speaker's support or sympathies rather than making a direct demand for compliance. Let's say that you are watching TV while seated. The person in front of the TV is not merely standing there in the statement above; the speaker wants them to relocate or go somewhere else so that the TV is not blocked.

Men Language

A variety of factors contribute to the establishment of linguistic distinctions between men and women. The masculine language was said to be more aggressive, mature, and in direct or pointed forms. These words include ones like mhm, yeah, and right. These words are frequently used by men to establish control. Second, when giving directions and directives, men frequently utilize the words gimme, going to, and gotta as well as the words want to and kinda, especially when they are with other guys of the same sex. Third, there was a common misconception that men used more swear words than women. Males and men used far more expletives in discussion than did women and women, according to Coates' research, but mixed conversations tended to accommodate both sides. Take the words "gosh dang," "fuck," "chew," "crap," etc. Fourth, when it comes to compliments, studies reveal that men choose to complement one other on their abilities and belongings. For instance, it's nice, nice person, and well done. The fifth theme is that discussions between men or in groups of people of the same sex occasionally center on current events, travel, and sports. And finally, men ask questions to learn more information in a different way from women, who occasionally employ question tags. They directly posed the query.

Gender and Humor

Few studies have particularly examined the workplace, despite the fact that there have been many studies on comedy and gender. Particularly given that there are more and more women working in businesses, this field of study is essential. The bigger stream, however, surely generates presumptions on gender disparities. Men appear to use and value comedy (both non-offensive and offensive) more than women, based on self-report studies and studies on how other people interpret humor. If comedy is connected to how leaders are perceived to act and perform in this discussion, women may suffer. Positive humor may help men learn more than women. Additionally, men use crude and insulting humor more frequently than women do, which increases the likelihood that others will accept such statements coming from men.

A classification of comedy subtypes was created. The usage of humor is influenced by both gender and the makeup of the group, according to log-linear modeling. The most statistically significant findings were that women were more likely than men to employ observational comedy, insults and role-playing were more common in single-sex talks, and humor including quotes or obscenity was more frequently used by males than by women.

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According to a study on the purposes of comedy, women are more prone than men to utilize humor to foster camaraderie. Women in particular frequently used comedy to reveal intimate details about themselves. Men were more likely to leverage on similarity or shared experiences when employing humor to foster a sense of camaraderie. Power-based tactics like inciting conflict or manipulating others were extremely rare. Men are more prone than women to use comedy just to advance their position, forge bonds with others, and enhance their sense of self. Men are more prone to use comedy to deal with situational issues than women are, who are more inclined to utilize general coping mechanisms to deal with issues that are unrelated to the current scenario. Compared to men, women were more likely to utilize humor that was focused on a human-related issue. More jokes about work, computers, TV shows, books, or movies were made by the males. In single sex groups as opposed to mixed groups, speakers are significantly more likely to utilize humor targeted at a member of the same sex group. Speakers who interacted with people of different sexes maintained gender boundaries by making jokes about them.

Friends Comedy Series

'Friends' is a popular comedy series in American culture because it has reached a large number of people in the United States since its debut in 1994-2004. Through six characters, three men and three women, it illustrates what should be "normal relationships" between men and women. The dynamics of these six buddies are a good subject to study because they show men and women interacting together and separately in everyday life with even proportions.

Six characters in their twenties who live in New York City and "pursue love, happiness, and career" are Rachel (Jennifer Aniston), Monica (Courtney Cox-Arquette), Phoebe (Lisa Kurow), Chandler (Matthew Perry), Joey (Matt Le Blanc), and Ross (David Schwimmer). The majority of the action took place underground (in their flats or the Coffee House), where they congregate to talk about recent occurrences, primarily romantic misadventures. Early on, the show's creators determined that it should be an entirely ensemble production, with none of the six characters taking center stage. They remained with this decision for the whole ten-season period.

2. Method

This study performed a qualitative descriptive analysis using the critical discourse analysis method. This CDA was used to emphasize the significance of societal issues or phenomena. The study's main methodology was paradigm-based approach. In this study, a qualitative descriptive analysis was conducted using the critical discourse analysis methodology. The purpose of this CDA was to emphasize the significance of social phenomena or concerns. The study used a paradigm-based technique as its major methodology. The study's primary source of data were phrases from the comedy series "Friends" that included gender-related humor. The information came from the ten-season script of the NBC comedy sitcom Friends, starring Marta Kauffman and David Crane, which ran from September 22, 1994, to May 6, 2004, according to the data sources. Clauses uttered

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by actors and actresses, three men (Rs, Ch, and Jy), and three women, made up the study's data. The linguistic analysis of these data served as the basis for the CDA's input. Additionally, the data collection method included observation and documentation.

3 Result and Discussion

Based on the theory of humor types provided by \(^{11}\), several varieties of humor were examined in this study. Humor subtypes include those that are affiliative, self-enhancing, aggressive, and self-defeating. Table 1 lists many gender comedy categories.

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Humor</th>
<th>Males</th>
<th>Percentages (%)</th>
<th>Females</th>
<th>Percentages (%)</th>
<th>Total Frequencies</th>
<th>Total Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Self-defeating</td>
<td>5</td>
<td>36</td>
<td>3</td>
<td>25</td>
<td>8</td>
<td>61</td>
</tr>
<tr>
<td>2</td>
<td>Aggressive</td>
<td>4</td>
<td>29</td>
<td>3</td>
<td>25</td>
<td>7</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>Affiliative</td>
<td>3</td>
<td>21</td>
<td>3</td>
<td>25</td>
<td>6</td>
<td>46</td>
</tr>
<tr>
<td>4</td>
<td>Self-enhancing</td>
<td>2</td>
<td>14</td>
<td>3</td>
<td>25</td>
<td>5</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14</td>
<td>100</td>
<td>12</td>
<td>100</td>
<td>26</td>
<td>200</td>
</tr>
</tbody>
</table>

As shown by the data in the table above, the comedy series "Friends" in this study used four different types of humor. The percentages of men and women were different. They were self-defeating type 5 (36%). The aggressive type 4 (29%), affiliative type 3, and self-enhancing type 2 (14%) personality types were all used by 14 males. The total of 12 females included self-defeating type 3 (25%) self-enhancing type 3 (25%) aggressive type 3 (25%) affiliative type 3 (25%) and self-enhancing type 3 (25%) types. Because men and women in this comedy series employ humor, including the inappropriate use of comedy as a form of emotion camouflage, self-defeating behavior became common. Humor that is detrimental to oneself is egotistical. Self-defeating humor is practiced by those who parody themselves. Self-defeating humor is sometimes used by individuals in an effort to fit in or gain acceptance by a group, but this humor is aimed at the individual rather than the group.

Males likewise indicated that comedy at work was more amusing and offensive than females, suggesting a connection between gender differences and comedy of this kind. It has been found that men are generally better at understanding and using comedy than women are. It is evident from this humor that men use humor more frequently than women. Compared to men, women typically score lower on comedy. This demonstrated that men are more relaxed when conversing with people of the same gender as themselves. They enjoy warming up a chilly environment, whereas women typically take problems more seriously.

The findings of this study revealed a phenomena that appeared when there was humor in the comedy series "Friends" in terms of humor clauses. According to Martin et al., there are four categories of humor: 1) Self-defeating humor, which is more frequently used by men than by women. Conclusion: Males apply comedy more frequently than females in terms of humor types. In this instance, it was determined that all of the "Friends" comedy series restrictions applied. 2) Males are more likely than females to use aggressive humor. It occurred because men in general tend to act aggressively, and it did so in this comedy series. When talking to everyone they met, men were very animated. 3) Affiliative: As can be seen, in this kind, the use of affiliative humor balances the numbers. In this comedy type, there were three clauses used by males and there were clauses used by women, totaling six clauses. 4) Self-improvement; this type uses a total of five clauses, with both men and women using them. Women used clauses more frequently than males did. According to the hypothesis, this affiliative refers to a tendency to say amusing things, tell jokes, and play practical jokes in an effort to amuse others, attract attention, help people get to know one another, and help reduce any tension that may arise in interpersonal relationships. The tendency to maintain a lighthearted attitude on life even when others do not do the same is what is meant by the self-enhancing.

A few humorous phrases were discovered to indicate self-improvement in this study. It was really frequent. Aggressive, meanwhile, refers to a tendency using humor to irritate someone with jokes, make them look silly, or control them through the use of sarcasm. In this study, it was discovered that there are negative and aggressive forms of humor. Humor is a person's way of making others laugh and conveying a humorous impression. It's because research has shown that the masculine humor in this comic series, violence is more overtly displayed, and mockery of body parts is encouraged.

It can be inferred from the various types of humor that men frequently inject humor into every sentence they utter. The study's findings, which showed that men were more likely than women to find humor amusing, made this conclusion clear. But among the four types, self-enhancing humor was one in which women used it more frequently than the others. It occurred because, in general, women have more polite feelings and language than men. Women typically find the humor in the clauses in this comedy series better than men do. The men enjoyed using humor, especially sexist humor, in their group in order to convey a sense of superiority over the other group that was being despised. It makes sense that his peers would respond favorably to this brand of humor, strengthening their friendship in the process. Men's desire to be accepted by their peers, gain recognition in their environment, and develop closer relationships with their friends was really their only motivation for using sexist humor. Collins' theory, which asserts that sexism is a way of thinking or a set of beliefs that thinks that a state where men are viewed as being superior to other genders (women). This is evident in the way that men speak to one another and in their monologues about women, where it is implied that women are unattractive animals or that they are figuratively represented as having things of low worth.

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4 Conclusions

It is determined that the comedy series "Friends" uses one of the four categories of humor defined by Martin et al. They were aggressive, affiliative, self-defeating, and self-enhancing. Since self-defeating humor was a person-centered strategy, it became common in comedy series where humor is used as a poor kind of defense to mask someone's emotions. People who mock themselves are making fun of themselves. Men use self-deprecating humor more frequently than women. It might be inferred that the main theme of the comedy series "Friends" was the achievement of intrapersonal rewards. Men tend to employ comedy in every sentence they make and engage in spontaneous humor, according to the sorts of humor. This was clarified by the research's findings, which showed that men had a far larger percentage of humor than women did. But of the four varieties, self-enhancing humor was one in which women used it more frequently than the others. It occurred because, on general, women have more courteous feelings and language than men. In this comedy series, women often find the scenarios to be funnier than males do. It was to generate a sense of superiority over the other group that was being reviled that the men enjoyed employing comedy, especially sexist humor, in their group. It makes sense that his peers would respond favorably to this brand of comedy, strengthening their connection in the process. Men really had more of an incentive to use sexist comedy than to denigrate women; they only wanted to stand out, fit in, and develop closer relationships with their buddies. The evidence supports Collins' argument, according to which sexism is an understanding or belief system that maintains that a phenomenon in which some genders (men) were superior to others, is real (women). This can be heard in the way that men talk to one another or in their monologue about women, where it is intimated that they are disgusting creatures or that they hold both actual and figurative objects that are offensive to them.

Acknowledgement. I would like thank Dr. Widya Andayani, S.S. M.Hum and Dr. Anni Holila, M.Hum for serving as my advisors. For their insightful and helpful comments during the planning and development of this study work. It has been really appreciated that they have been so eager to donate their time.

References

Javanese Language Maintenance
In Dusun Kampung Banjar Labuhanbatu Utara

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Abstract. This research deals with describing Javanese language maintenance in Dusun Kampung Banjar Labuhanbatu Utara. This research is conducted by using qualitative method. This research aims to examine the factors affecting the Javanese language maintenance in Dusun Kampung Banjar. The data were collected from nine persons (male and females) of Javanese people using the observation and interview. The observation was used to examine the factors affecting Javanese language maintenance in seven domains. The data were analyzed by Miles, Huberman, and Saldana (2014). There are seven factors affecting Javanese language maintenance in the Dusun Kampung Banjar namely; Etno Linguistics Vitality (16.33%), Family Domains (16.33%), Neighborhood Domains (18.37%), Workplace Domain (10.2%), Religion Domain (18.37%), Educational Domain as a new insight in this research (6.12%), and the last Practice Traditional Domain (14.28%).

Keywords: language maintenance, the factors affec, Javanese People in Dusun Kampung Banjar

1 Introduction

Language and culture have a relationship from each other to save the culture identity. The speaker must keep their local language. The maintenance of language depends on their life because in daily activity we need language to communicate with others. With the language, we can share our feelings, our thoughts, wishes, purposes, and so on. The difference between us and other things can be seen from the use of language [1]. We build our identity through the language we use because language can show who we are. Language and society are closely related because the interaction between tribes, ethnic groups, and religions can happen [2]. After all, it can be concluded that language has a relationship with human life in the community. Define that language shift is a change that occurs in society or the loss of a language. The vernacular language is one of the ethnic identity symbols and if the language shift cannot be minimized, the vernacular language will slowly disappear. If the vernacular language is lost, it means that Indonesia will lose its cultural wealth especially ethnic identities. So to maintain the integrity of cultural identity, we need language maintenance.

2 Review of Literatures

2.1 Language Maintenance

Language maintenance is the effort of keeping the language alive by using that language continually [3]. It means that language preservation depends on the effort of the speakers in maintaining the language continually in society. Language maintenance is the extent to which an individual or group continue to use their language. Highlighted that language maintenance is not merely the absence of language shift.
2.2 The Factor of Language Maintenance

There are some factors that cause the speaker maintenance the language, those factors are participants, attitude, value and identity, economic pressure, occupation, and environment [5]. There are five domains of language use that influence the maintenance of languages like family domain, friendship domain (neighborhood domain), the religion domain, the education domain, and the workplace domain [6].

Ethno Linguistics Vitality. Ethno linguistic related to the attitudes of language users to their language. To permit the language maintenance the speakers must have pride to their culture. When the society views language as an important symbol of ethnic identity, it can be sure the language is maintained longer. It can be said that the support effort to use the vernacular language and it heps people resists the pressure from majority group to switch to their language.

Using Language in Family Domain. Using the local language with family especially with parents is a good reason to help maintain a language. The other words parents play an important role in maintaining the language. In maintaining language can be started from the family and continue to the community [7]. Using the Javanese language starts with a family in daily activity and the community uses the Javanese language in their activity so that it can avoid the loss of language itself.

Using Language in Neighborhood Domain. The transmitted local language by interaction with a friend who has the same culture and participating in society [8]. Language maintenance is determined by the size of the community of the speakers. It means that communication between families such as neighborhoods can help a minority group to maintaining the vernacular language.

Using Language in Religion Domain. The religion domain is a place for prayer, not only praying, but the region domain is also a place for learning the religion, laws in religion, and religious organization. In discussing religion, a language is needed. Religious language can be referred to as a language that is “consistently used with religion” or within a religious domain of language use [9].

Using Language in Workplace Domain. Some factors affected language maintenance namely political factors, social factors, demographic factors, cultural factors, and linguistic factors [10]. It means that the economic and social factors are important in maintaining a language. Someone must have good competence in speaking a language or master a language to get a good job. Obtaining work is the most obvious economic reason for learning another language. So, the economic factor gives a big effort in maintaining a language.

Using Language in Educational Domain. The educational domain is a place for the teaching-learning process such as school and university. In the teaching-learning process, a language needed to transfer knowledge. School and university they can interact with others use the language and also a place for learn and develop about language.

Practice of Traditional Event. The last factor is the following cultural event or activity. The traditional event also affected the maintenance of the language. For the Javanese and Muslim community, Suro or Muharram is sacred and very important because it is believed to be starting record for a new life stage for the following year. In comparison, Muharram is celebrated as the advent of the Islamic New Year by Muslims. For Muslims who live in Java, especially the central Jaka and East Java Suro or Muharram is a month in which they do reflection on what they have done in the previous years and as a celebration of a new year as well as a prayer for safety, prosperity, and happiness in the coming year.
3 Research Methodology

The research used the descriptive qualitative method because it is not deal with numbers in this research. The data of the research covered the sentences used in the Javanese language used in Dusun Kampung Banjar, Labuhanbatu Utara. The data sources are 9 participants including all generation that has been selected who still use and maintain the Javanese language. In analyzing data, the researcher uses an interactive model Miles, Huberman, and Saldhana the emphasizes peoples’ lived experiences are fundamentally well suited for locating the meanings people place on the events, processes, and structure of their lives and for connecting these meanings to the social world around them. There are three steps to analyze the data, namely: data condensation, data presentation and conclusion. Triangulation is useful to check the trustworthiness of the data in this research. Triangulation refers to the use of or than one approach to the investigation of a research question in order to enhance confidence in ensuing findings.

4 Result and Discussion

After analysing the data, researcher found there are seven factors that influence Javanese people maintain the Javanese language.

<table>
<thead>
<tr>
<th>No</th>
<th>Factor of Language Maintenance</th>
<th>Frequencies</th>
<th>Percentages (%)</th>
</tr>
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<tbody>
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<td>1</td>
<td>Ethno Linguistic Vitality</td>
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</tr>
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<td>Family Domains</td>
<td>8</td>
<td>16.33</td>
</tr>
<tr>
<td>3</td>
<td>Neighborhood Domains</td>
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<td>18.37</td>
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<tr>
<td>5</td>
<td>Religion Domains</td>
<td>9</td>
<td>18.37</td>
</tr>
<tr>
<td>6</td>
<td>Educational Domain</td>
<td>3</td>
<td>6.12</td>
</tr>
<tr>
<td>7</td>
<td>Practice Traditional Domains</td>
<td>7</td>
<td>14.28</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 1 there were seven factors found in maintaining the Javanese language in Dusun Kampung Banjar. In the analysis, the researcher clarifies the data by an explanation about the factors of Javanese language maintenance in Dusun Kampung Banjar such as Ethno Linguistic Vitality (16.33%), Family Domains (16.33%), Neighborhood Domains (18.37%), Workplace Domains (10.2%), Religion Domains (18.37%), Educational Domains (6.12%), and Practice Traditional Domains (14.28%). It means that in every domain there is a language maintenance to carried out by the Javanese people which can be seen from the presentation of each domain.

3.1 Ethno Linguistics Vitality

Ethno Linguistic Vitality defined as what makes a group likely to behave as a distinctive and active collective entity in intergroup situations. Vitality was the attitude of the speakers toward their language and the importance which they attach as a major symbol of their identity. So, ethno
linguistic vitality is one factor that can affect language maintenance it is related to Javanese people if they have a positive attitude toward their language, and the language will be maintained.

It can be seen from some respondents’ statements, as follow:

(First generation)


(I am proud. That’s pride. We are Javanese. It must be preserved because this is our cultural heritage.)

(Second generation)


(Be proud. Why are we not proud of our own culture? We speak Javanese, it shows that we are proud to be Javanese.)

(Third generation)


(Of course proud. if we communicate with Javanese people and we use the Javanese language itself, the sense of familiarity is immediately. So when we are talking is even better and doesn't seem stiff.)

From the statement’s respondents, when the researcher asked SL, KS, and TK their answer is “Banggalah” (of course proud). “Itu kebanggan” (that’s pride). “Budaya sendiri kok gak bangga” (Why are we not proud of our own culture?). Based on the respondents’ statements shows they are proud of speaking the Javanese language and being Javanese people. While the statement from TK says that “……kita pake Bahasa Jawa itu sendiri rasa akrab itu langsung ada. Jadi ngobrol pun lebih enak dan gak terkesan kaku” (and we use the Javanese language itself, the sense of familiarity is immediate. So when we are talking is even better and doesn't seem stiff). It was shown that Javanese have a good positive attitude with always use the Javanese language to make familiarity with others. It certainly factors affected to keep on maintaining the Javanese language.

3.2 Using Language in Family Domain

Families are basic units and play an important role in communities. Family is the first place when the children know the language because the first language from parents and the first unit to transmit the language. The children will speak the language as to how did their parents use the language. In the family domain use of the vernacular language is very influential in language maintenance. Some responses from respondents are below:

(First generation)


(If at home with my wife, my children used Javanese language. But while at this time with my grandchildren use Indonesian language. Currently, many people are married with the different ethnic group. For example: Javanese with Batak, Javanese and Banjarnese and so on.)

Respond of respondent SS (as second generation) below:

(Of course, it shows us as Javanese people. So, Javanese language must be preserved especially the speech level of Krama Inggil. If my parents when they did communication they use Indonesia language but Krama Inggil still taught to us. So, if we talk with the older people we always use Krama Inggil. For example, “Susi”, “Yes mom”, “What happened mom?” If we make a mistake. “I am sorry mom”. No one said “What mom?” because that is the less polite.)

Respond of respondent SP (as third generation) below:


(At home I use Javanese language when communicating with my parents. Because of childhood I have used Javanese language to communicate. But in neighborhood I use Indonesian language if they use Javanese language I also use Javanese language)

Based on the SL statement “Kalau di rumah ini aku sama orang rumah, anak-anakku ya ngomong bahasa Jawa”. (If at home with my wife, my children used Javanese language). And also the participants SS and SP “Kalau almarhum orang tua itu ketika ngomong berdua mereka menggunakan bahasa Indonesia tetapi Krama Inggil itu tetap diajarkan kepada kami”. (If my parents when they did communication they use Indonesia language but Krama Inggil still taught to us. So, if we talk with the older people we always use Krama Inggil). “Aku kalau dirumah sama orang mamak pake bahasa Jawa. Karena memang dari dulu dari waktu kecil kami memang pake bahasa Jawa untuk berkomunikasi”. (At home I use Javanese language when communicating with my parents. Because of childhood I have used Javanese language to communicate)

Based on the statement, the researcher concluded that in family domain has a big role in maintaining the language. The habits of parent to speak Javanese language to their children have an important role to supported the language maintenance in Dusun Kampung Banjar. It is one of factors to maintain their language, so family domain was basic level of the language maintenance.

3.3 Using Language in Neighborhood Domain

The use of vernacular language in neighborhood domain is one factor which supported the maintenance of Javanese language. It was evident from respondents collected by interview below:

Respond of respondent SL (as first generation)


(If the speech level of Ngoko use in daily communication like at home or in the neighborhood. But the speech level of Krama use in the special event like engagement. If we are Javanese people we use Javanese language)

(Second generation)
R : Kalau misalnya bertemu dengan orang yang latar belakang orang Jawa pak?
(If you meet with Javanese people, sir?)

WH : Pakai bahasa Jawanya.
(Using Javanese language)

Based on the data, it was clear that one of the factors of the Javanese language by using the neighbor. It certainly makes the Javanese language still maintained. The other sample was shown to:

(Third generation):


(At home when I communication with my parents sometimes I use Javanese language sometime Indonesia language but more often Javanese language. In the work place, most of my partners are Javanese people I also use Javanese language but sometimes Indonesia language. With neighbor for example I talk with the older than me I usually use Javanese language than Indonesian language.)

From the data transcript above, the language used depends on the interlocutors because when meeting with different ethnic. So, they use the Indonesian language but when meeting with the Javanese people, they still use the Javanese language. It can be concluded that the use of language in the neighborhood domain is supporting Javanese language maintenance and Javanese people in Dusun Kampung Banjar still maintain their language.

3.4 Using Language in Religion Domain
The use of the Javanese language in the religion domain is also one factor to support language maintenance. From the data showed that the use of the Javanese language in the religion domain in Dusun Kampung Banjar also affecting to the maintenance of the Javanese language in Dusun Kampung Banjar.

(First generation)

HP : Sekarang ini mbah uda gak pernah lagi ikut wirrit karena jalan saja udah susah. Tapi sewaktu masih ikut wirrit mbah selalu pake bahasa Jawa.

(At this time, I didn’t attend the religious events because it is difficult to walk alone. But when I attend it I always use Javanese language)

(Second Generation)


(In the Perwiritan when talking to Javanese people use Javanese language. Sometime when we speak Javanese with the different ethnic they replay with their local language. Then we realize that we are talking to people who don’t understand. So we use Indonesian language.)

(Third generation)

TK : Kadang bahasa Jawa, kadang campur Bahasa Indonesia

(Sometime Javanese language, sometimes mix Indonesian language)
Based on the data above they maintain the Javanese language in the religion domain and they used the Javanese language with each other. Meanwhile, TK’s answer is “kadang Bahasa Jawa kadang campur Bahasa Indonesia” (Sometime Javanese language, sometimes mix the Indonesian language). From TK’s answer, although she sometimes used mixed Indonesian language she still uses the Javanese language, which happens to depend on the environment. It means that Javanese people still maintained their language in religion domain like in Perwiritan. Even though, sometimes they use mixed language Javanese and Indonesian language. It can be concluded that the use of language in the religion domain is supporting Javanese language maintenance.

3.5 Using Language in Workplace Domain

A workplace is a place people's daily activities where there is interaction with other workers. In the workplace, we find many workers with different backgrounds and ethnic, they use the Indonesian language to get success in their job and communication. From the data showed that the use of the Javanese language in the workplace domain in Dusun Kampung Banjar:

(First Generation)

(My job is the host of the bride and groom in the Javanese wedding. So, in the event I use Javanese language because that is Javanese culture. Usually I use the speech level of Krama.)

(Second generation)

SS : Iya dengan sesama orang Jawa selalu memakai bahasa Jawa.
(Yes, with the fellow Javanese always use the Javanese language.)

(Third generation)

(At home when I communication with my parents sometimes I use Javanese language sometime Indonesia language but more often Javanese language. In the workplace, most of my partners are Javanese people I also use Javanese language but sometimes Indonesia language. With neighbor for example I talk with the older than me I usually use Javanese language than Indonesian language.)

Based on the answers participants they are HP, SS, and TK the statements of the first, second, and third participants. HP’s answer “…………Otomatis menggunakan bahasa Jawa karena itu kan budaya Jawa……..” (So, in the event I use Javanese language because that is Javanese culture). SS’s answer is “Iya dengan sesama orang Jawa selalu memakai Bahasa Jawa” (Yes, with the fellow Javanese always use the Javanese language). And TK’s answer “Tapi lebih sering bahasa Jawa sih. Kalau ditempat kerja, karena disana juga banyak kawan yang orang Jawa jadi kadang juga pakai bahasa Jawa kadang juga Indonesia”. (In the workplace, most of my partners are Javanese people I also use the Javanese language but sometimes the Indonesian language). From the answer of participants that they always speak the Javanese language in the workplace domain to maintain of Javanese language in Dusun Kampung Banjar. So, the workplace domain was an influence in maintaining the language. From the data above, it can be concluded that the Javanese language in Dusun Kampung Banjar still maintains its language.
3.6 Using Language in Educational Domain

The learning process needs a language made early in the removal of knowledge. If the school already has good communication, the learning process will also run well. In the school, people can do interaction with other people like teachers, students, and employees. From the data showed that the use of the Javanese language in educational domain in Dusun Kampung Banjar:

Second generation)


(At home I use Javanese language when I talk with the maid because my husband Bataknese. At school I use Javanese language with the Javanese teacher)

(Third generation)

SP : Dulu waktu masih sekolah iyaa kadang Indonesia kadang Jawa. Nah sekarang dikuliahan, disana baru ful bahasa Jawa mau itu diluar kampus atau didalam kampus dengan dosen atau teman-teman karena lingkungannya juga berbahasa Jawa.

(In the past, when I was in school, sometimes I use Indonesian or sometimes Javanese language. Now at campus I use Javanese language continuously with lecturer or my friends because the environment is also use Javanese language)

Based on respondent’s answer and the statement of SS and SP, researcher found the statement from participant “Kalau disekolah sama guru-guru yang suku Jawa saya berbahasa Jawa.” (At school I use Javanese language with the Javanese teacher) and “………………Nah sekarang dikuliahan, disana baru ful bahasa Jawa mau itu diluar kampus atau didalam kampus dengan dosen atau teman-teman karena lingkungannya juga berbahasa Jawa.” (Now at campus I use Javanese language continuously with lecturer or my friends because the environment is also use Javanese language).

From the statement of respondents use the Javanese language to interact with others, especially with the Javanese people. When the researcher asked the respondent about using the Javanese language in the educational domains the Javanese language still used with the Javanese teacher, lecturer, and friends

3.7 Practice of Traditional Events

Javanese people said that the practice of traditional events is the factor that supports the Javanese language because they always use the Javanese language among them or during the cultural event. As the participant statement below:

(First generation)


(Oh yes. Like this, if it’s the month of Suro it means that we are welcoming the moon’s child. In Muslim, Suro is Muharram where Muharram is celebrated as the advent of the Islamic New Yeas by Muslim. So, we must welcome and respect. In Javanese there is a feast suro, the purpose of Javanese people makes it to appreciate the arrival of the new moon and ask for protection, safety for the next year life that we will live in order to avoid the danger and stay on the path of Gusti Allah. In the feast suro use Javanese language especially Krama speech level.)
(Second generation)
KS : Ya iya la. Yang ikut tradisi itu kan semua orang Jawa
(Yes of course. Because all of the Javanese people follow this tradition)

(Third generation)
SP : Iya kak pake bahasa Jawa.
(Yes, I use Javanese language)

Based on the data, the statement from SL, KS, and SP. SL’s answer “……Dalam acara kenduri Suro pake Bahasa Jawa halus atau Kramane.” (In the feast suro use Javanese language especially Krama speech level). KS’s answer “Ya iya la. Yang ikut tradisi itu kan semua orang Jawa” (Yes of course. Because all of the Javanese people follow this tradition). And SP’s answer “Iya kak pake Bahasa Jawa” (Yes, I use the Javanese language). From the responses of participants, they use the Javanese language in the traditional event. It can be concluded that the traditional event is one factor in maintaining of Javanese language. The reason they are using the Javanese language in the traditional event domain is to respect and give honorable to their ancestors and they only meet Javanese people there.

4 Conclusion
Based on the analysis, the conclusion was drawn as the following: there are seven factors that influence Javanese language maintenance in Dusun Kampung Banjar, are ethnolinguistic vitality, in the family domain, in the neighborhood domain, using language in the religion domain, in the workplace domain, in educational domain and practice of the traditional event.

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References
Analysis of Translation Methods Used in Emma Heesters Song Lyrics Album

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Abstract. This article was aimed to analyze the translation method used by the translator in Emma Heesters song lyrics album, based on Peter Newmark (1988) theory. They were word for word translation, literal translation, faithful translation, semantic translation, adaptation translation, free translation, idiomatic translation and communicative translation. This article applied descriptive qualitative method. The data of this research were taken from the five songs lyrics in Emma Heesters album. The methods used in the songs lyrics translation were quit random but more dominant on adaptation translation, free translation, communicative translation, and literal translation. The orientation of the translation was tent to the target language to make it more natural and contextual.

Keywords: Translation, Methods, Song Lyrics, Emma Heesters

1 Introduction

One of applied linguistics branch is translation which is also part of human communication in different languages. As known, different countries have different languages, then translation has become a common strategy used by people in everyday life to get more information from overseas. As a result, translation aims to facilitate and bridge language differences. In today's globalization, translation is growing exponentially in both commercial and literary fields.

Source or original language (SL) must be used as the core idea to be translated into the target language that the translator tried to achieve a good translation (TL). The translator used the text in the original text from the source language (SL) as the base material that need to be well understood and examined in order to gain meaning that can be transferred to the purpose of the target language to just be able to comprehend the meaning. Thus, translation is an effort to locate texts in the source and destination languages that have equivalent meanings. Many industries, including those in entertainment, education, law, medical, economics, and many others, require translation.
One kind of translation is song translation. It is one of the best ways to help the people to listen or who speak different languages to enjoy not only the rhythm of the music but also comprehend the meaning of those foreign song lyrics, song translation is offered. Some people find it difficult to translate a song. When translating a song, it is important to understand what the lyrics may be like and what the purpose of the lyric is. As a result, in order to avoid making mistakes when translating into another language, some methods for problem solving are required.

It can be challenging to discern whether a word can be compared to its original form while translating a book, especially "lyrics". The original language or more common to call it the source language should retain the meaning of the target language as well.

Texts are translated by translators using a variety of techniques (or lyrics). According to Nord (1991), individual characteristics as well as a lack of understanding of language, context, culture and translation are to blame for problems in translation.

The song lyrics translation methodology from Indonesian to English is an interesting one to research because the two nations have diverse languages and customs. The next step for song translators is to make sure that the message of the original lyrics can be expressed in the target language and turned into singable song lyrics. The trend of covering song that has been greatly increased and this trend leads not only to singing the original song in the source language but also to transfer it to foreign language as the target language. There are some Indonesian songs that have been transferred to foreign language and sung by the foreigner. One of the singers is Emma Heesters. She is an American singer who is successfully sing several Indonesian songs into English. Translators should also take into account five factors while creating song translations: singability, sense, naturalness, rhythm, and rhyme (Low, 2013). To successfully translate a song, translators must strike a balance between these five characteristics, being careful not to highlight any one of them over the others. Since the translator might view the song's music as the most crucial component of the translation, another choice is to create new lyrics to the original music. The following option for the translator is to modify the music to the translation in order to maintain the meaning. The last possible solution is to modify the translation to match the original music. To develop target lyrics that match the song's original music, the translator alters the translation of the source lyrics.

2 Literature Review

Language Music has always been part of human cultures and is a great tool for sharing experiences and feelings with others. As a result, songs and music are used not only for communication within one's own culture, but also as a tool for communication with cultures other than one's own, and songs will occasionally be taken across language borders to be performed for people who may not understand the lyrics of the songs. This has led many performers to translate or ask for their songs to be translated into the language of the recipient culture. However, the act of translation, is when it comes to songs not as straightforward as

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1 Translators should also take into account five factors while creating song translations: singability, sense, naturalness, rhythm, and rhyme (Low, 2013).
with literary texts since songs have been complex artistic works with so many non-semantic
variables such as rhymes and melodies, and singability. A literal or close translation of any
song will almost always result in an unsingable piece that does not fit the original music.
Translation is common strategy that people use in daily life, and aims to bridge the differences
among languages. Newmark (1988) translation is the method of communicating the intended
meaning of a text into some other language using the same form that the author meant. A
rendering activity that is related to the author's goal is what Newmark defines as a translation
activity. It indicates that when we translate a message, we should perceive the target
demographic of the author into account and look for terms that can effectively convey that
message in the target translation.
Additionally, according to Newmark (1988), translation is an art form in which the identical
written word in one language is substituted by a translation into a different language. He
asserted that We should really be able to write a target text with a similar message to the
source text, and it is suggested that we provide comprehensive explanation so that the target
readers can understand may comprehend the message just like the readers of the source text
did. Shown in Table 1.

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Target Text 1</th>
<th>Target Text 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Kamu dari mana? B: Dari Supermarket.</td>
<td>A: Where have you been? B: I've just come back from the Supermarket</td>
<td>A: Where are you from? B: I'm from Indonesia.</td>
</tr>
</tbody>
</table>

A translator should have been capable of transmitting the source material's message while
preserving the author's intended meaning in mind, according to Newmark's definition of
translation. In the previous example, "Kamu dari mana?" can be translated as "Where are you
from? ", "Where have you ever been?" and "What have you been up to?" (if the writer wants
to ask "where someone is from"). To establish the appropriate translation for "kamu dari
mana?" the translator should then look to the preceding or following sentence (the speaker's
response).

There is more than one translation being done at once. In order to get a successful translation,
some techniques are utilized to help the translator render a text from SL to TL. There are eight
different kinds of translation, according to Newmark (1988): literal, faithful, semantic,
communicative, idiomatic, free and adaptation.
Following is the V diagram of Newmark (1988, pp. 45-47)

<table>
<thead>
<tr>
<th>SL emphasis</th>
<th>TL emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word-for-word translation</td>
<td>Adaptation</td>
</tr>
<tr>
<td>Literal translation</td>
<td>Free translation</td>
</tr>
<tr>
<td>Faithful translation</td>
<td>Idiomatic translation</td>
</tr>
<tr>
<td>Semantic translation</td>
<td>Communicative translation</td>
</tr>
<tr>
<td>Foreignization</td>
<td>Domestication</td>
</tr>
</tbody>
</table>

**Fig. 1. V diagram of Peter Newmark’s translation theory**

The approaches a translator takes are a reflection of the ideology they’ve chosen. Ideological translation is described by Hoed as a belief or principle about what is right or bad. Whether the translator prefers the source or target language, the translation’s results would be obvious. The two translation ideas are domestication and foreignization. Foreignization tends to be the target language, whereas domestication is an ideology that tends to be the target language.

This theory of foreignization has the advantage that readers of texts in the target language may comprehend the source language’s culture, the translated text can convey the subtleties of the source language’s culture, and incentive learning is achievable. The target language material can feel difficult and strange in its use of language, and negative characteristics of the source language’s culture can readily enter and affect the reader. The downside is that the reader of the target text may not be familiar with numerous terms.

1. **Word-for-Word Translation**

According to Newmark, the words are translated with the most usual meanings, regardless of context, and the word order is the same as in the original language. The word is translated literally using this way if it is related to other words or cultural meanings. TL is usually used as an example of interlinear translation, with the TL words following the SL ones. The SL word order is maintained when translated outside of context, and each word is translated according to its most prevalent meaning. Word-for-word translation is mostly used to understand the mechanics of the original language or to interpret a challenging material as a pre-translation procedure.

2. **Literal Translation**

This translation converts the grammatical structure of the source language to that of the closest target language, but each word is translated independently of context. When the source and destination languages have differing sentence structures, this strategy is generally employed. The lexical words are translated single, devoid of context, while the SL grammatical structures are translated to their closest TL equivalents. This serves as an indication of the issue that has
to be resolved before translation.

3. Faithful Translation

This translation makes an effort to capture the context-sensitive meaning of the original text, which is still limited by its grammatical structure. The meaning and aim of the original text are maintained in this translation. According to Newmark, it "transfers" cultural terms while maintaining the translation's degree of grammatical and lexical "abnormality" (deviation from SL norms). It makes an effort to accurately reflect the text-realization and intents of the SL writer.

4. Semantic Translation

The only way semantic translation differs from faithful translation is that it must take into account the aesthetic value (i.e., the lovely and natural sounds of the SL text, sacrificing "meaning" where necessary so that no assonance, word-play, or repetition jars in the final form). A nun ironing a corporal cloth, for example, might be translated as "a nun ironing a cloth", utilizing culturally neutral third or functional terms rather than their cultural equivalents. It may also make other modest concessions to the reading. Semantic translation differs from "faithful" translation in that the latter is more flexible, allows for the creative exception to 100% fidelity, and takes into account the translator's intuitive empathy with the original. The former is uncompromising and dogmatic, whereas the latter is more flexible.

5. Adaptation Translation

The "freest" sort of translation is this one. The TL culture is translated into the SL culture, and the text is rewritten. It is mostly utilized for dramas, comedies, and poems; the themes, characters, and plots are typically kept. Many terrible adaptations have been produced as a result of the abhorrent practice of having a play or poetry literally translated and then redone by a renowned playwright or poet, but other adaptations have rescued historical songs.

6. Free Translation

Free translation, according to Newmark, replicates the subject matter without the style or the material without the structure of the original. These justifications contend that this type of translation sacrifices the original form of the source language by frequently employing the form of a paraphrase and making substantial alterations to the target language text.

7. Idiomatic Translation

According to Newmark, idiomatic translation mimics the "message" of the original while distorting the subtleties of meaning by favoring colloquialisms and idioms in places where they are absent in the original. This explanation claims that this technique frequently makes use of colloquial terms that are not present in the original language. Authors as different as Seteskovitch and Stuart Gilbert like this vibrant, "natural" translation, which replicates the "message" of the original but tends to misrepresent nuances of meaning by favoring colloquialisms and idioms where they do not exist in the original.

8. Communicative Translation

In order for the reader to accept it, this strategy tries to replicate contextual meaning in terms of both language and substance. This is stated by Newmark, who makes an effort to accurately capture the original's contextual significance while yet making the content and language accessible to the readership. A conclusion may be drawn from the diagram and discussion above that the first four methods: word-for-word translation, literal translation, faithful
translation, and semantic translation put a larger focus on the source language. The next four techniques, adaptation, free translation, idiomatic translation and communicative translation, place a greater emphasis on the target language.

### 2.1 Song Lyric Translation

Sung words can be translated from a source language, often abbreviated SL, into a separate target language, often abbreviated TL, just like all other texts. Sung-word translations, like other translations, can be either literal or literary, with both terms referring to a variety of options. For instance, depending on the intended application of the translation, literal translations that transmit meaning can be done word-by-word, phrase-by-phrase, or sentence-by-sentence. Literary translations of sung lyrics aim to replicate formal aspects of the original text, such rhyme and meter, as well as to convey implications and subtexts, in contrast to literal translations, which exclusively focus on meaning.

### 3 Method

The method of this research was descriptive qualitative research. This study sought to analyze the methods used in translating Indonesian songs into English. The types of methods used for the analysis were adapted from Newmark (1988). The researcher figured out the methods that the translator used by analyzing the difference between the Indonesian and English lyric translation version.

The data population was drawn from Indonesians song lyrics that have been translated into English. The total of the data are 5 songs.

#### Table 2. Translation methods used in the English lyric

<table>
<thead>
<tr>
<th>No.of Data</th>
<th>Target Text (TT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/TT/Z1/L1</td>
<td>I know that we can not be together it’s a fact</td>
</tr>
<tr>
<td>2/TT/Z1/L1</td>
<td>But please tell me why do I keep running into you</td>
</tr>
<tr>
<td>3/TT/Z1/L1</td>
<td>I know what my heart needs to do, it should not get</td>
</tr>
<tr>
<td>4/TT/Z1/L1</td>
<td>any feelings for you but I just can’t</td>
</tr>
<tr>
<td>5/TT/Z1/L1</td>
<td>my heart is… already so attached</td>
</tr>
</tbody>
</table>

### 4 Results

The researcher intended to identify the translation methods that have been used in the song lyrics translation with the title "Maafkan Aku" in this section. Using Newmark's theory (1988, pp. 45-47), the researcher identified the translation methods. Newmark proposed eight translation methods: word-for-word translation, literal translation, faithful translation, semantic translation, communicative translation, idiomatic translation, free translation and adaptation translation. The following table shows the results of the translation method analysis.
Table 3. Translation methods used in the songs lyrics translation

<table>
<thead>
<tr>
<th>Methods</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word for word</td>
<td>-</td>
<td>v</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Literal</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>5</td>
</tr>
<tr>
<td>Faithful</td>
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<td>Semantic</td>
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<td>Adaptation</td>
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<td>Communicative</td>
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Table 4. Translation methods used in the english lyric

<table>
<thead>
<tr>
<th>Methods of Translation</th>
<th>Target Text (TT)</th>
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<tbody>
<tr>
<td>Literal</td>
<td>✓ That beautiful smile</td>
</tr>
<tr>
<td></td>
<td>✓ it just delays the pain</td>
</tr>
<tr>
<td>✓ you make everything so beautiful</td>
<td></td>
</tr>
<tr>
<td>Adaptation</td>
<td>✓ I know that we can not be together it’s a fact</td>
</tr>
<tr>
<td>✓ I know what my heart needs to do, it should not get</td>
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<tr>
<td>✓ I wish...I wish I never knew this</td>
<td></td>
</tr>
<tr>
<td>Free</td>
<td>✓ any feelings for you but I just can’t</td>
</tr>
<tr>
<td>✓ my heart is… already so attached</td>
<td></td>
</tr>
<tr>
<td>Communicative</td>
<td>✓ But please tell me why do I keep running into you</td>
</tr>
<tr>
<td>✓ but please tell me why do I keep running into you</td>
<td></td>
</tr>
<tr>
<td>✓ That one day you will choose me, my love,</td>
<td></td>
</tr>
</tbody>
</table>

5 Conclusion

In establishment of which song lyrics translation is more successful than the other, the researcher set out to investigate the techniques utilized in the process. The introduction made reference to the Newmark theory and diagram. The first four methods; word-for-word translation, literal translation, faithful translation, and semantic translation, all had their attention on the original language, as shown by the diagram. Other approaches focused on the target language and included adaptation, free translation, idiomatic translation, and communicative translation.

After thoroughly examining the information on 5 (five) songs by Emma Heesters, the author. The author formulates some conclusions about this research in light of the problem formulation. The translator employed many methods for translating the song lyrics. Additionally, the methods that are mostly employed to translate each song vary. The Emma Heesters album's five songs produced 114 data points. Using four different translation techniques—adaptation translation, literal translation, free translation, and communicative translation—30 data points from "Maafkan Aku" were translated into "Forgive Me." The
The following data contained 20 data that were taken from the song "Lebih Dari Egoku," which is also known as "More Than My Ego."

The five translation methods include word-for-word translation, adaptation translation, literal translation, free translation, and communicative translation. However, free translation predominated in this song. Four translation techniques—adaptation translation, literal translation, free translation, and communicative translation—were used to convert 23 pieces of information from "Pura-pura Lupa" into "Pretend to Forget. There are 27 data taken from song Cinta Luar Biasa which was translated to be "Incredible Love". There are 4 translation methods used they are: Adaptation translation, Literal translation, Free translation, and Communicative Translation but again the free translation also still dominantly used in this song lyrics translation. And the next song which the title of the song is Hanya Rindu which was translated to be Just Missing You. From the 14 data displayed, there are 4 translation methods used, they are Adaptation translation, Literal translation, Free translation, and Communicative Translation. From the total of 114 data, each original data could be stated to have different translation methods. Some lyrics were translated by emphasizing the source language, while others were translated by emphasizing the target language.

References

Preventing of Tsunami by Using Oral Tradition Smong as a Means of Children Literature in Elementary School

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Abstract. Simeulue oral traditions called Smong are the result of a tsunami natural disaster in 1907 that taught how to protect oneself from the tsunami. Nevertheless, the current generation rarely sings Smong and story. Children on other islands must also know their history, in addition to being required for school students in Simeulue to know their history because it is useful as a science in coping with natural disasters. Smong oral tradition and its use as literary reading material in elementary schools were investigated. Using qualitative data collection methods such as observation and document review, the research writing method employs quantitative data collection methods. Smong can be used as literary reading material in elementary schools, according to this report, by translating the original form of Smong, which is a chant in Acehnese, into children stories that use more practical terms and use appropriate illustrations.

Keywords: Simeulue, Smong, Children Literature.

1 Introduction

Natural disasters are natural events that cannot be prevented by humans. Types of natural disasters that occur in Indonesia are quite diverse, from floods, earthquakes, to tsunamis [1]. The number of victims caused by natural disasters is usually quite large and is prone to disasters caused by the position of the Indonesian archipelago which stretches along the path of an active volcano, which amounts to 13% [2]. Due to the large number of victims of natural disasters and children being the age group that is most prone to being the most victims [3], it is necessary to prepare children to know how to mitigate natural disasters.

The way that can be used in preparing children for natural disaster mitigation is to use picture story books as a medium for distributing mitigation information in a concise and understandable way by children. One of the forms of children's story books is the form of children's literature. Children's literature is generally in the form of picture story books containing stories about the introduction of letters and numbers, legends, myths, fantasies, and fables as a tool for the development of children's grasping power of what is presented by the
book's contents. In Davis' view of children's literature [4], children's literature is literature written by adults, and read by children, but under adult supervision. The type of children's literature that will be appointed is children's literature in fiction ingredients with a focus on traditional stories [5]. Intrinsic value in children's literature has several points: 1) it presents fun, excitement, and enjoyment; 2) can develop the child's imagination; 3) present new experiences for children; 4) develop the child's human nature; 5) provide broad experience; 6) to tell the previous literary form. Extrinsic form there are four points: 1) language development; 2) cognitive development; 3) development of personality; 4) social development [6].

Children's literature that will be written is an oral tradition from Simeulue. Simeulue is one of the areas in Aceh located in the Southwest of Aceh Province, which is 105 miles from Meulaboh, West Aceh Regency, or 85 miles from Tapak Tuan, South Aceh Regency. It has a total area of 1,838.09 km², and the largest island is Simeulue Island, which has a population of 88,335 people [7].

The history of Simeulue's oral tradition about how to save oneself from the tsunami natural disaster is called the story of “Smong” Year Seven”. This story was written in colonial records in the United Kingdom Earth Sciences magazine, Part XXXIV (1917) translated by Jefta Samuel [8] "In Simeuloee the earthquake occur frequently and are mild. However, in 1907, the entire area of the West coast was hit by a huge tidal wave. There were many victims. Many villages were lost because of the waves and the land in the surrounding area became barren. The people were unable to overcome this disaster, and the former prosperity was never achieved again.” The 1907 tsunami occurred on January 4, 1907, with an earthquake strength of 7.6 Mw at a depth of 20 km at 2.48 North Latitude and 96.11 East Longitude [9]. When compared with the 2004 tsunami, which occurred in 1907 was not that great, however, the tsunami wave height reached 15 meters, this is in accordance with the number of victims on coconut and durian trees [10]. After the incident of “Smong year seven”, the people of Simeulue created an oral tradition that was passed on from generation to generation. Thus, in the 2004 tsunami, only seven people from Simeulue died out of 78,128 people, although many of them live on the coast, they survived [11].

From the history and form of the Smong oral tradition, this research will be directed to become a form of children's literature by using pictures as a medium in explaining the situation of the written story. In accordance with the objectives of the “Tanggap Tangkas Tangguh Menghadapi Bencana” Pocket Book [12] published by BNPB, the purpose of this children's literary story book will have the same purpose as the pocket book. Children's literary story books that will be written must comply with the standards of PERMENDIKBUD Number 8 of 2016, in Article 3 Paragraph 6 concerning Books Used by Education Units and contain clear explanations of tsunami natural disaster mitigation in a way that is easy for children to understand.

2 Research Methods

This study uses a qualitative descriptive method, using book and text analysis techniques that contain original poetry from the Smong oral tradition which is owned by the Simeulue people. The original poems of the Smong oral tradition were converted into Indonesian language, so
that they could be used as complete data in composing the vehicle from oral tradition into children's literary story books that are easy to understand.

3 Result and Discussion

3.1 Result

Contents of the Simeulue Oral Tradition

Here is Smong's verse in Devayan/Simulul:

_Enggelan mon sao surito_ (hear a story)
_Inang maso semonan_ (once upon a time)
_Manoknop sao fano_ (sink a village)
_Uwilah da sesewan_ (that's how it's said)

_Unen ne alek linon_ (started by earthquake)
_Fesang bakat ne mali_ (followed by a giant wave)
_Manoknop sao hampong_ (sink the whole country)
_Tibo-tibo mauwi_ (suddenly)
_Anga linon ne mali_ (if the earthquake is strong)
_Oek suruik sahuli_ (followed by low tide)
_Maheya mihawali_ (hurry up and find a place)
_Fano me senga tenggi_ (highlands to be safe)

_Ede Smong kahan ne_ (That's Smong's name)
_Turiang da nenek ta_ (the history of our ancestors)
_Miredem teher ere_ (remember all this)
_Pesan nafi-nafi da_ (message and advice)

_Smong dumek-dumek mo_ (your bath water from tsunami)
_Linon uwak-uwakmo_ (your swing by earthquake)
_Eklaik keudang-keudang mo_ (the thunder as your drums)
_Kilek suluh-suluh mo_ (lightning as your light) [13].

Meaning of Smong Poetries

Smong lyrics belong to the logogenic type of music. Logogenics in ethnomusicology is a form that is more focused on the text than the rhythm or melody. The goal is to direct how to respond to natural tsunami symptoms. The following is the explanation given by Takari, et al
First Part

In the first part, the contents of the lyrics have true meaning. The first part is that parents tell their children about past events that befell their ancestors. The incident in question was the sinking of a village on Simeulue island.

Second Part

The second part has a real meaning as well, which is about natural phenomena before the tsunami. These signs are in the form of a large earthquake and followed by a very large wave of water. The result was the sudden sinking of the village. This part is continued with the next part.

Third Part

In the third part, he explained how the characteristics of before the emergence of the big wave water. Its characteristics are the existence of a large or strong earthquake before the tsunami occurred and the sea water receding suddenly. If you see the receding water, immediately run to find a higher place or hills to be safe.

Fourth Part

In part four, it also has a real meaning, explaining about the name of the incident, namely Smong which is a story from an ancestor, and suggestions for remembering this story so that it can be passed on to posterity. A tsunami is a terrible thing, because it can wipe out one landmass with just one big wave.

Fifth Part

The fifth part has a metaphorical connotative meaning. In the "Tsunami your bath water" section, it is a reminder not to be afraid but still be aware of the tsunami.

3.2 Discussion

Conversion from Oral Tradition Into Children's Literary Stories

Burhan Nurgiyantoro's explanation about the language used in children's books should have simple language from all aspects, from vocabulary, sentence structure, and meaning [15]. In fact, the Center for Curriculum and Bookkeeping [16], explains that the vocabulary used must be familiar to the child, if there is vocabulary that the child does not understand, the teacher must explain the vocabulary with the illustrations.

In accordance with the explanation above, the researcher tries to form a children's story that
tells about the tsunami in accordance with the content of the Smong oral tradition. The content of the story as follows:

a. At the beginning of the story, tell about how the main character's background is
b. Followed by the supporting characters who are close to the main character
c. Tells the atmosphere and the things that are usually done by the main character
d. Starting to tell about the tsunami natural disaster that affected the main character and supporting figures
e. Describe the atmosphere
f. The main supporting character (the main character's father) talks about how grateful they are because of the Smong oral tradition, it really helped them in saving themselves from the tsunami.

Complete Contents: Children's Stories about Smong

Hello, I'm Ali. I live on a small island in Aceh called Simeulue. I live near the coast with my family. I have a younger sister, her name is Nisa, my mother and father. My father is a fisherman. My mother is a mathematics teacher at my school.

I have lots of friends. There are Imron, Fauzan, Afif, Ammar, and Bilal. Actually, I have more friends, but their house is too far from mine. My five friends, their house is also near the beach like mine. Because our houses are close together, we often play football together every day.

Today, after coming home from school with my mother and sister, after having lunch at home, I do my homework in the living room.

However, suddenly the house shook very strongly. The things on the table started to fall. The water in my glass moves to the right and left. Heard neighbors shouting "Earthquake!!! Earthquakeeeeee!!"

My father ran from the beach to pick us up at home. "The sea is receding!! The sea is receding!! Run to the hills!!" dad said.

"Big waves are coming!!!! Tsunami!!! Tsunami!!! Smong!!! Smong!!! Smong!!!!!!! Big waves are coming!!! Run to the hills!!!! Run to the hills!!! !" shouted everyone. Everyone ran towards the hills to save themselves.

Everyone survived for going to the hills. But our houses were destroyed. Many farm animals died. The ships were destroyed and could not be used anymore. But, as long as we're all safe, it shouldn't be a problem.

"Fortunately we all survived," said Dad. "Thank God, we can all run to the top of the hill" said mother.

We all survived because of the stories from our grandparents. About Smong or Tsunami telling us to run to the hills if a tsunami comes.
Illustration for "Smong" Children's Story

In the process of understanding the contents of the story more precisely and quickly by children, the pictures in children's story books are very important. Pictures and texts have the same position in the task of describing the content of the story [17]. The benefits of pictures in children's story books are: as an attraction for children, fun when reading them, there are challenges for children to think, provoke children in conversation, and as a liaison between stories in children's stories and their daily lives [18]. From the illustrations made in the book, it will become a medium for children to build new vocabulary through pictures and writing in the book [19].

Based on the points that are used as references in the formation of illustrations in children's story books, one example of the images that will be used in a children's literary story book with a tsunami theme, which is a simple depiction of the Smong oral tradition owned by the people of Simeulue. An example of an illustration to be used is as follows:

Fig 1. Illustration depicting a tsunami that will hit one of the residents

The picture above is a depiction of one of the residents who fled the tsunami. It depicts a tsunami along with heavy rain and pitch black clouds. From the picture above, children can know for sure that when a tsunami comes, which is taller than humans, it comes along with heavy rain. People running from the tsunami attack, can also be known to have the emotion of fear, which is clearly illustrated in the illustration.

The description above, it can be said, can describe the overall form of emotion and form of the tsunami itself. If it is adjusted to the content of the story that has been written, it will be in accordance with the section “Big wave coming!!!! Tsunami!!! Tsunami!!! Smong!!! Smong!!! Smong!!!!! Big wave coming!!! Run to the hills!!!! Run to the hills!!!!” shouted everyone. Everyone ran towards the hills to save themselves.”.

In the process of drawing, using color, emphasis on lines, shapes and styles of illustrations can give a distinct image. The presence of colors that depict sadness or anger, it depends on the symbol and culture of a place. In fact, the emphasis of the line in each picture can give a different meaning, according to the person who sees it [20]. For the development of the overall content in the image illustration, the researcher will adjust it by adjusting the theme and image so that the core of the story and the emotions depicted in the story are conveyed.
4 Conclusion

The number of writings in children's literature with the theme of natural disaster mitigation is still relatively small. In several types of natural disasters, such as earthquakes, volcanic eruptions, and floods, several writers have worked on them. However, the writing of children's stories about the tsunami natural disaster is still relatively small. Moreover, in Indonesia, which turns out to have an oral tradition that explains how to mitigate the tsunami natural disaster named Smong, who came from Simeulue, an archipelago located in the Aceh area.

Smong is basically told only by word of mouth, from generation to generation, and the Smong story is likely to fade. There is no written form in Smong stories that can be used as lessons for children in how to save themselves if a tsunami or Smong comes. Researchers develop children's stories based on stories from the Smong oral tradition, so that there is a simple description for children in mitigation. Smong stories are adapted to illustrated images that are very helpful for children in knowing the situations, conditions and emotions in the pictures, so that the delivery of story content is even easier to convey to children.

References


Women Characteristics in the Novel "Laksamana Malahayati Sang Women Keumala" by Endang Moerdopo its Utilization as Literature Criticism Reading Material at STKIP Usman Safri Kutacane Aceh Tenggara

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Abstract. This study aims to describe the toughness of the female character found in the novel Laksamana Malahayati Sang Perempuan Keumala by Endang Moerdopo which can be used as an inspiration for women today. The formulation of the research problem is how the toughness and character of the character of Laksamana Malahayati is found in the novel Sang Perempuan Keumala. The method used in this research is descriptive qualitative method of analysis and historical research. The results of this study indicate that the toughness and character of the female characters that appear in the novel is the toughness of the warrior figure in the battlefield against the Dutch and the Portuguese. This Keumala woman found several characters, namely Leadership Spirit, Courage, Curiosity, Nationalism, Responsibility, and Religion. Based on the results of the character analysis, it is hoped that the character of Admiral Keumalahayati can be an example and inspiration for today's women. Analysis novel Laksamana Malahayati Sang Perempuan Keumala Karya Endang Moerdopo baca sebagai bahan bacaan Kritik feminisme di universitas.

Keywords: Social, Language and Cultural Education

1 Introduction

Judging from the history of the nation's struggle, the national revival movement originated from the ethical politics of the Dutch East Indies which provided opportunities for Indonesian youth to experience education in schools. Actually the intention of the Dutch East Indies government policy was to produce workers such as educated workers, teachers, lowly bureaucrats, and doctors who could treat the ailments of the natives. Thus they can reduce the operational costs of the colony (Indonesia) which is too expensive when using imported personnel from the Netherlands. But it turns out that this policy has its own benefits for Indonesian youth. The enlightenment in the world of education that they get requires their young souls to start moving to fight for the rise of this nation towards independence later. Until 1908, the Budi Utomo
organization was established which became the point of national awakening. Actually, long before Budi Utomo was inaugurated, the names of great and strong female fighters had been born who played a role in fighting for independence.

Call it the name Keumala Malahayati or known as Admiral Malahayati who became the Commander of the Women's Sea Fleet War when Aceh was ruled by Ali Riayat Shah (1586-1604), Alaudin Riayat Shah (1604-1607), and Iskandar Muda (1607-1636). In the novel "Laksana Malahayati the woman Kelumala" Malahayati is told to lead a fleet of 2,000 female soldiers. Besides Malahayati, we also know Martha Christina Tiahahu (1801-1818), Cut Nyak Dien (1850-1908), whose struggle was continued by her son, Cut Meurah Gambang, Cut Meutia, Pocut Baren, and many more warriors and the resilience of women there.

Entering the era of women's struggle without weapons, a female warrior named R.A. Kartini (1879-1904) who struggled in advancing education for women. He raised public awareness at that time by replacing the wrong mindset which stated that women did not need to receive education, with a mindset of progress that required women to also experience education in schools. Not only the Low School, but must be able to continue to a higher school, just like the boys.

The novel Laksana Malahayati Sang Perempuan Kelumala depicts a female character named Keumalahayati. Keumalahayati is a female figure who is known to be very brave in defending the State of Indonesia, especially in the Aceh Darussalam area. The novel Laksana Malahayati Sang Perempuan Kelumala shows the existence of a feminist ideology by telling women who have succeeded in equalizing gender so that women are at a superior stage.

In the novel Perempuan Keumala, it is narrated that Keumalahayati is a woman who holds the rank of admiral. Here is the quote.

“It has become his dream to drag on every day to be able to grow up here and become his joke every time to be able to gain knowledge in this place. His nautical soul has grown so widely in his blood, his spirit of courage lives abundantly in the breath of this master's descendants, O Tuanku Ahli...” (Moerdopo, 2008: 31)

Keumalahayati's positions described in the novel are also in accordance with historical facts. History records that Keumala was indeed the Commander of the Royal Protocols of Darud Donya. In this context, Hasjmy (1993:240) explained that Keumala had indeed served as the Protocol Commander for the Kingdom of Darud Donya Aceh Darussalam. When her husband died in Haru Bay to expel the Portuguese, Keumalahayati was still serving as the Protocol Commander for the Kingdom of Aceh Darussalam at that time. Keumalahayati's third position is Commander of the Inong Balee Troops. After the death of her husband, Keumala asked Sultan Al-Mukammil for permission to form an army consisting of widowed women whose husbands died in the Haru Bay War just like her.

In Malahayati's novel, this is a true story that comes from Aceh. This novel has two versions, this is evidenced by the existence of a children's book entitled Laksamana Malahayati by M.A. Maya Amanda. Then, there is also a novel entitled Laksana Malahayati Sang Perempuan Kelumala by Endang Moerdopo. The difference between the two novels is in terms of language, where the novel made by Endang already has a translation from Acehnese to Indonesian while the novel by Amanda still uses a lot of regional languages.

In the novel, it is narrated that Keumalahayati was one of the high-ranking officials of the Acehnese kingdom at the time of the sultan Alaiddin Riayat Syah Al-Mukammil.
Keumalahayati was an officer and served as admiral to guard the Malacca prayers in place of her husband who was martyred for defending Nagroe. The courage of Keumalahayati was aroused when she left her husband. Since then she decided to continue her husband's struggle against the invaders and he founded an army consisting of widows who were martyred by their husbands.

In her struggle and toughness against the invaders, Keumalahayati cannot be separated from her public role and in her domestic role, Kumala has always been an exemplary wife who always prays for her husband in fighting against the prayers that she prays to God to always be blessed and always be in God's protection. Not easy for women, there must be obstacles. Barriers related to the role in the family and the demands of his role in the public sphere. In the domestic sphere, women carry out their roles as mothers and wives, while in the public sphere they have responsibilities related to work and tasks in the public sphere. The dual role is a risk that women inevitably have to take when they are involved in the public sphere.

Before the birth of great Acehnese women such as Cut Nyak Dien, Cut Nyak Meutia, Tengku Fakinh, Pocut Baren, and Pocut Meurah Intan, there was one woman who had already come down to fight against the invaders with enthusiasm, namely Keumalahayati. The record of the story of Keumalahayati is rarely known by many people and in the world of literature there are not many who tell about this figure of Keumalahayati completely and clearly. In fact, Keumalahayati is a woman who served as the first laksana in Indonesia and even in the world. However, it was not until 2017 that President Joko Widodo inaugurated this first female admiral as a national hero. This book reveals that women can participate, fight, and dare to defend the country without losing the instincts possessed by a woman. Through this book, it is hoped that Keumalahayati's character can be imitated and can increase motivation and can inspire especially Indonesian women and young people to always fight and increase their love for the homeland. In this article, the author is interested in discussing the character of Admiral Malahayati more deeply through the analysis of the novel "Laksamana Malahayati the Woman Keumala" which is expected to inspire women today to imitate the character values of Admiral Malahayati.

2 Research method

This study uses descriptive qualitative analysis and historical methods, namely through several stages, namely source criticism (testing), data collection, analysis and interpretation, and historical writing. (Sugiyono, 2008)

The first step is heuristics, namely finding and collecting historical data and relevant sources through literature study. Literature study to help collect sources that support the completion of the topic under study, the first step is to collect sources in the form of books or journals concerning the story of Laksamana Malahayati.

The second step, namely source criticism, is the assessment of the sources needed to carry out historical writing. Source assessment is needed to determine the credibility and authenticity of a source. Source criticism is divided into external criticism and internal criticism. External criticism aims to test the authenticity of a source, so that the original source is obtained, not an imitation or fake. The wider the description of the source, the more reliable the source. Internal criticism is an investigation of the facts by evaluating the data that has to do with the source facts so that the data is truly accurate (credibility test).
The third step is analyzing and interpreting, for this stage the author connects more data obtained from studies in the library. For this analysis stage, the theme is related to the book about Laksamana Malahayati. The fourth step, Historiography, is a stage in the form of writing activities on the results of the interpretation of facts and attempts to reconstruct the past to provide answers to the problems that have been formulated. Thus the results are poured back into an interesting story.

3 Discussion
Character is a value that is embedded in a person and manifested in behavior. These values are interpreted as actions that want to do good and actually have a good life (Muchlas Samani and Hariyanto, 2012: 42). In addition, in the Big Indonesian Dictionary (KBBI) character is the nature, character, or character that makes an individual different from other individuals. From some of the meanings of character that have been described above, we can conclude that character is the attitude, behavior, action of a person that distinguishes himself from others in everyday life.

Character is personality, character, temperament, character, behavior. Character refers to attitudes, behavior, motivation, and skills (Rohmah, 2017). Character is not something that can be inherited. Character must be formed and developed consciously through a process. Character is not something you are born with that cannot be changed. Each individual is responsible for the character they have and has full control over their character and themselves. Through Laksamana Malahayati, it can be seen that character is something that is owned by an individual that is formed over time and is influenced by various factors that are around him.

Character Analysis of Admiral Keumalahayati
The character values possessed by Admiral Keumalahayati include (1) Leadership Spirit, (2) Courage, (3) Curiosity, (4) Nationalism, (5) Responsible, (6) Religious. Which character values can be imitated in everyday life.

1. Spirit of Leadership
Ma'had Baitul Maqdis military education is a place of learning that produces brave officers and is well known for their courage who is ready to defend the nanggroe. The cadets from various regions of Nanggroe choose this education, including Malahayati, it has been his dream for a long time to gain knowledge, develop, and spend time in this education. Malahayati completed his education with good honors and the highest grades. Malahayati was once the head of ocean security. He got the position because he succeeded in defeating the sea pirates who disturbed the fishermen who were looking for fish. Its guard area is very wide, from the Malacca Strait to the Indian Ocean.

This is what proves the courage of this female officer to all the people. Malahayati then served as the Protocol Commander for the Kingdom of Darud Donya Aceh Darussalam whose task was to regulate all activities carried out by Sultan Alaiiddin Riayat Syah, he was tasked with managing the life in the palace, receiving guests of honor who would meet with the Sultan. Malahayati is required to be broad-minded with tasks that are

Malahayati served as the Royal Protocol Command because His Majesty had a crisis of trust in the officials in the palace. And at that time what was more concerning was that the Sultan did not trust his family and relatives because they were suspected of having a personal interest in
controlling the country. His Majesty Sultan began to realize that something was wrong with his second son, namely Sultan Muda who was planning something to fight against the power of his own father, namely Sultan Sultan. Therefore, the Sultan gave Malahayati the trust of getting an assignment in the palace which aimed to secure the Sultan.

Once upon a time, there was a battle in Haru Bay against the Portuguese who brought victory, but behind the victory obtained, the war claimed thousands of lives, including Admiral Tuanku Mahmuddin bin Said Al Latief who was the Commander of the Malacca Strait Fleet who was none other than the husband of Malahayati. As a result of the death of her husband, Sultan Sultan dismissed Malahayati from his position, namely Commander of the Royal Protocols, and then appointed him as Commander of the Malacca Strait to replace her husband, Tuanku Mahmuddin bin Said Al Latief to secure and protect the Straits of Malacca. Not long after the slump period due to the death of her husband and the loss of her daughter, Malahayati rose again and asked for permission from the Sultan to form the Inong Balee troops, namely women who became widows due to the death of their husbands who died in battle to help defend Nanggroe for join the war against the enemies who have disturbed the peace of Nanggroe and uphold the truth.

2. **Courage**

The thing that shows how high Malahayati's courage is when Nanggroe is visited by two foreign ships from the Netherlands, each led by Frederick de Houtman and Cornelis de Houtman, aiming to establish trade relations. At first this group received a good reception from the Aceh Sultanate. But gradually the unpleasant behavior of these Dutch people was revealed. They treat women with disrespect and they force the traders to sell their wares cheaply, if the merchants refuse they do not hesitate to resort to violence. Malahayati had heard this and he did not remain silent and in the end he fought against the Dutch people and in the end he killed Cornelis de Houtman using the dagger he had.

3. **Curiosity**

When Malahayati just entered the Ma’had Baitul Maqdis education, he indeed showed a different character from the others, he was a brave person, a leader at heart and had a high curiosity as written in the book (Moerdopo, 2018). Undergoing education at Ma’had Baitul Maqdis has been his dream for a long time, he wants to gain knowledge and grow in this military education.

4. **Nationalism**

Malahayati has lost her husband Admiral Tuanku Mahmuddin bin Said Al Latief and Cut Dek who is none other than his son has been taken by Admiral Teuku Mughal Fadil Syah and he experienced a fight which ended he was stranded on the beach. Malahayati was really very down and felt sad for all that had happened to him. All the events that constantly plagued him had taken up all his time and mind so that he forgot his country. But one day Malahayati woke up from his slump and realized that he had been left behind all this time.

Malahayati’s condition did not make him forget his beloved homeland. Even in a slumped state, Malahayati still remembers that his country is in danger, and he says that he shouldn't be in this slump, the spirit has re-emerged in Malahayati, he promises to rise up to defend the country. His enthusiasm has turned into a strength that makes Malahayati still able to stand up and be able to go through the day, he is aware that duties and responsibilities await.
From the actions taken by Malahayati, it can be seen that he is a person who has a high spirit of nationalism, loves his homeland very much, he is willing to put aside his personal feelings in order to defend his beloved country.

5. **Responsible**

Malahayati is a commander or leader who is very responsible for whatever he does. When she was stricken with deep sadness due to the loss of her loved ones, be it her husband, children, and friends, Malahayati realized that life would go on and he as a leader had a responsibility to protect his country from outsiders and people alike within the sultanate itself. Likewise when he led the Inong Balee Fleet troops he continued to pay attention to his troops and ensured that they remained safe and nothing bad happened to them. During training, the Inong Balee troops who have children are given a place to leave their children while they are training or when they are going to fight.

Then at another time he killed Tuanku Ibrahim Jaffar because he had violated the orders and trade rules made by the Sultan, after that the Sultan of Johor did not accept the death because they could no longer freely roam the north sea as usual, and they chased Malahayati. Then Malahayati said that he would be responsible for the death of Tuanku Ibrahim Jaffar himself because he was the one who killed him.

6. **Religious**

Malahayati is a very religious figure, as evidenced by he always involves the creator in everything he does and he always remembers Allah in every condition. When she had a bad feeling before her husband’s death she kept chanting the name of Allah to ask for protection and safety for her husband, and she did not forget to always pray that her path would always be eased in fighting for the truth.

**5 Conclusion**

Malahayati is a woman who is tireless in fighting for and crushing enemies who try to disturb or disturb her country. He loved his country so much that nothing could destroy it. Despite the many obstacles, calamities, and sorrows that Malahayati went through, he still tried and struggled with the strength and courage he had. Malahayati is a picture of women who are able to fight and prove that women are not weak creatures that can be underestimated, and women can also fight in defense of their beloved country. But behind the greatness of an Admiral Keumalahayati, there are not many historical records that tell about this Acehnese woman. Her name was not as popular as other female heroes, even though her struggle was extraordinary and she was very instrumental in the glory of the Aceh Sultanate at that Time.

Utilization of reading materials in the Literary Criticism course can be done in the form of reading books that are used in learning according to CPMK. Feminism Literary Criticism reading book product for STKIP students Usman Safri Kutacane Aceh Tenggara is used as supporting or additional reading material in the learning process.

**Acknowledgement.** This research could not have been done without guidance from my supervisors, Mara Untung Ritonga, S.S., M.Hum., Ph.D and Dr. Elly Prihati Wuriyani, S.S., M.Pd.
References


Development of Teaching Materials for Fable Texts Assisted by Animated Films for Class VII Students of SMP Swasta Katolik Assisi Medan T.P 2021/2022

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Abstract. Teaching materials are all forms of tools used to assist teachers in carrying out teaching and learning activities. The teaching materials used by teachers will affect the achievement of students in achieving learning objectives. This study aims to produce teaching materials for modules assisted by animated films in fabled text learning in grade VII students of SMP Swasta Katolik Assisi Medan. Data analysis through questionnaires shows that students still depend on books produced by Kemendikbud with material content that has not been adapted to the local area of students and the teaching materials used are less innovative, creative and contemporary. The use of animated films can help visualize abstract material in an interesting way. This is evidenced by the effectiveness test using the Gain Test on the animated film-assisted fable text module with an average pretest score of 60.94 students with the lowest score of 45 and the highest score of 70. Meanwhile, the average posttest score of students was 83.44 with the lowest score of 75 and the highest score of 95. Based on these data, it can be concluded that the fable story text module assisted by animated films is feasible and effective for use in learning to improve student learning outcomes, especially in fable text materials.

Keywords: module, fabled text, animated film

1 Introduction

Education always adjusts to the pace of development of science and technological innovation, so that it remains relevant and contextual to the changing times. The form of education that is in accordance with the development of modern science is to produce humans who understand and are competent to face various realities and possibilities in society including the ability to solve problems independently. Realizing independent learners, schooling through learning requires many ways for it, one of which is the role of the teacher. Teachers become a great fulcrum and trust in changing and improving the quality of learners. In him, there are two functions that cannot be separated, namely educating and teaching.
Efforts to improve the quality of teachers in teaching can be done by presenting dynamic learning innovations such as the selection of appropriate learning methods and media, the provision of effective teaching materials and the development of teaching materials that are in accordance with the needs of students. Teaching materials are a set of materials that are systematically arranged in the learning process. Teaching materials are grouped into four types, namely printed teaching materials, heard teaching materials (audio), teaching materials seen and heard (audiovisual) and interactive teaching materials (interactive teaching materials) (Majid, 2016: 175). Modules are one of the printed teaching materials that are systematically packaged and contain a set of learning experiences designed to help students master learning goals. The use of modules in learning, especially Indonesian learning, aims to improve the language skills of students as well as to instill character values as curriculum demands. The subjects of Indonesian in Junior High School (SMP) in the 2013 curriculum are characterized by a text-based learning approach. One of the text learning materials that must be mastered by students through the development of teaching materials for the class VII SMP module in the 2013 Curriculum is Fable Text.

Fable is a literary work of fiction based on the author's sheer delusion. Etymologically fable comes from the Latin language known as fabulat, meaning a story about the life of an animal that behaves like a human. Fable texts have moral and ethical values that can be edified by children. Actions, words and good personalities by the perpetrator of the story can be encouraged to be imitated by the learner. Nurgiantoro (2010:22-23) mentions that the main characteristic of fables is that the perpetrators of the story are animals that can speak, behave, and behave as well as humans. He added that fabled stories are still universal, these stories are found in various societies of the world. Generally, there is a certain animal that is used as the main culprit of the story, for example, tigers, deer, squirrels, apes, foxes, and others depending on the selection of society. Sugihastuti (2013:25-26), fables are also referred to as persuasive texts that attach importance to the recipient, reader and listener. It is this persuasive feature that often makes fables an active or educational text. In line with that, Danandjaja (in Sulistyorini 2014:628) explains that fabled stories generally include wild animals and domestic animals, such as rabbits, crocodiles, ants, deer, eagles, bees, and fish.

The results of observations made by researchers during the pre-survey in March 2021 at SMP Katolik Assisi Medan, there were obstacles faced by teachers when teaching fable text material. Students who still have difficulty producing fabled texts in written form, this is because the content and perpetrators in febel stories are still universal and have not been based on stories taken from the local area. Learners find it difficult to develop their imagination to produce a fabled text if it is only based on snippets of stories in textbooks. This can be seen from the results of cognitive scores of students writing fable texts based on their structure class VII-1 with 32 people with an average number of scores of 69.2 while KKM Indonesian is 75. Learning that only relies on text books makes learning saturating for students. Therefore, teachers need media or other innovative materials to support the achievement of fabled text learning in the classroom.

Based on these problems, it is important to develop fable story text materials by utilizing learning media that have been provided by schools in the form of audio media and audiovisual media. These two media are media for distributing information in the form of teaching materials that are in accordance with the development of science and technology. One of the technology-based teaching materials is an educational children's animated film. Film is not only an entertainment medium but has an educational cultural role. This view then ushers films into classrooms in schools so that films become one of the alternative media used by teachers in learning. Animated film is an animation is a set of images arranged sequentially and recorded
using a camera to make a static presentation come to life or look moving (Hidayatullah et al., 2011: 63). The style, attitude, and behavior of the characters featured in the film can be imitated by anyone who watches it (Anjarsari, 2018: 2). Film media can also make communication and interaction more lively and logical in the classroom because film is a tool that can help clarify the meaning of the message conveyed in a story. Therefore, this animated film media is expected to be able to develop the imagination and creative ideas of students to be able to write fable story texts. Writing fabled story texts by utilizing children's animated films as a tool is based on the fact that this type of film is a favorite type of film for children, teenagers and even adults. The various stories presented are expected to be able to come up with new ideas for students, such as the film Finding Nemo which tells the story of a fish named Marlin with his son named Nemo.

Based on this, students can process their ideas into an interesting new story without losing the original behavior of the animal. The relevance of writing fabled texts with the help of animated films, students are expected to be able to master the concepts or ideas of the writing they will write and be able to collect information as a concrete support in their writing. Children's animated films can respond through learning modules to encourage learning interaction activities in the classroom. Writing fabled story texts with the help of children's animated films is expected to be able to make students master the concepts or ideas they will write. Therefore, the focus of this paper is the development of teaching materials for fable text modules assisted by animated films in class VII students of SMP Swasta Katolik Assisi Medan.

2 Research methods

Location of this study was carried out in class VII of SMP Swasta Katolik Assisi Medan with a total of 32 research subjects. This research uses a type of R&D (Research & Development) research and development which is directed to research, design, manufacture, test, product validity and implementation of the resulting product. This research and development was put forward by Borg and Gall.

The development of teaching materials for fable texts assisted by animated films is arranged programmatically using preparation and planning with the following steps.

1) Conceptual studies, this term defines the objectives of developing fable text teaching materials assisted by animated films, adjusting teaching materials that are raised using student needs and choosing achievement goals. Development of fabled text teaching materials assisted by animated films using interview techniques and questionnaires for the needs of teachers and students. Target products of teaching materials fable texts in this study are students of class VII SMP Assisi Medan.

2) Researchers use various supporting sources to produce teaching materials for fable texts assisted by animated films. The test of experts yang has competence in the field of study yang relevant carried out in order to obtain better improvements. There is this context the expert test is carried out on two learning material experts and two design experts.

3) Individual trials of teaching material products (5 students) were carried out in one meeting.

4) The results of individual trials are used to improve and develop products.

5) Trial of teaching material products in small groups (10 students).

6) The results of small group trials are used to improve and develop products.

7) Large group field trials (1 class VII-1 totaling 32 learners).
8) The results of a large group field test to find out the response of students about the product of teaching materials for fable texts assisted by animated films used.
9) Evaluation of learning outcomes by using fable text teaching material products to obtain information about whether or not fable text writing skills are improved in the learning process in the field. Evaluation of learning outcomes on products through differences in the value of learners on the competence of writing fable texts before and after being given treatment. The difference in learning values is called pre-test and post-test.
10) Dissemination and application of teaching material products of fable text modules that have been evaluated and revised from experts.

This study used 2 types of research data sources, namely 1) data sources for the need for fabled text teaching materials assisted by animated films of teachers and students of grade VII of Assisi Junior High School Medan. The number of trial subjects is an individual group of 5 students, a small group of 10 students, and a large group of 32 students in grades VII-1, and 2) data sources for validation of teaching materials and learning designs for writing fable texts assisted by animated films play a role in assessing production feasibility. The data collection techniques used in this study were in the form of questionnaires, writing tests, interviews and observations. The instruments used to collect data are questionnaires, tests for writing fable story texts, interview guidelines and observation sheets. The questionnaire grid of students' needs for fabled text teaching materials can be viewed as follows.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>1.</td>
<td>Do you have any other handbooks for learning fabled text materials?</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Do you have trouble studying the fabled text material from which the book originated? (e.g. completeness of the material, explanatory techniques, format, etc.)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Do you use other teaching materials to teach fabled text materials? (e.g. modules, videos, props and others)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>If so, does teaching materials make it easier for you to understand fable text material?</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Are you enthusiastic about participating in fable text learning?</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Are you having trouble knowing the fabled text material through teaching materials and methods applied by the teacher?</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Do you need other teaching materials to study fabled text materials more easily and interestingly?</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Do you agree that fabled text teaching materials are developed with the help of animated films so that the material is easy to understand?</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Categories of assessment of the quality of learning materials

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>76% &lt; 100% &lt; value</td>
<td>Valid</td>
</tr>
<tr>
<td>51% &lt; 75% &lt; value</td>
<td>Valid Enough</td>
</tr>
<tr>
<td>26% &lt; 50% &lt; value</td>
<td>Less Valid</td>
</tr>
<tr>
<td>0% &lt; 25% &lt; value</td>
<td>Tidak Valid</td>
</tr>
</tbody>
</table>

\[ P = \frac{f}{N} \times 100\% \]  

Information:
(1) \( P \) = Percentage of assessment
(2) \( f \) = Questionnaire value
(3) \( N \) = Overall value

The gain test was carried out to see the effectiveness of learning using an animated film-assisted fable text module. This test was carried out on class VII students of SMP Katolik Assisi Medan with a total of 32 students. The formula used to determine the effectiveness of learning is as follows:

\[ \text{Gain Index (g)} = \frac{(s_{post}) - (s_{pre})}{s_{max} \times 100} - s_{pre} \]  

After obtaining the Gain Index, the results are interpreted according to the following criteria.

Table 3. Interpretation of the effectiveness of module use

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-gain ≥ 0,7</td>
<td>High</td>
</tr>
<tr>
<td>0,3 ≤ N-gain &lt; 0,7</td>
<td>Medium</td>
</tr>
<tr>
<td>g &lt; 0,3</td>
<td>Low</td>
</tr>
</tbody>
</table>

3 Results and discussion

The results of the research obtained from the research on the development of a fable text module assisted by animated films in class VII students of SMP Swasta Katolik Assisi Medan are as follows. The development of an animated film-assisted fable text module in grade VII students of Assisi Catholic Private Junior High School began with problem discovery and data collection. The results of the data collection were in the form of an analysis of the needs of teachers based on the results of a questionnaire conducted on 2 subject teachers Indonesian stated that they needed teaching materials in the form of fable text modules assisted by animated films. Meanwhile, the analysis of the needs of students was obtained that they had never used teaching materials in the form of fable text modules assisted by animated films.

Material expert validators provide an assessment based on the questionnaire that has been provided. Some aspects that are the assessment of teaching materials for fabled texts assisted by animated films are (1) aspects of the feasibility of the content / material. The feasibility aspect of the content/material in the module obtained an average score of 86% with the criterion of "excellent". (2) aspects of presentation feasibility. The feasibility aspect of presentation in the
The developed module obtained an average score of 89.4% with the criterion of "excellent". (3) aspects of language worthiness. The language feasibility aspect in the module obtained an average score of 87.5% with the criteria of "excellent" and (4) the aspect of conformity of teaching materials with the theme of fabled texts assisted by animated films. The aspect of conformity of teaching materials to the theme of fabled texts assisted by animated films developed obtained an average score of 100% of the "excellent" criterion. Based on the discussion about the validation of the material as a whole, it is explained that the animated film-assisted fable text module is declared suitable for use or application in learning even with minor revisions / rules.

Design validators provide input and comments on the developed teaching materials. As for some inputs and comments from design expert validators, namely (1) the color of the module cover was changed, (2) the introduction page should not be empty much, (3) the module title circle was replaced, (4) the concept map was colored to make it attractive. The assessment carried out by design experts on the graphic aspect obtained an average score of 89.4% with "excellent" criterion. Furthermore, the design assessment was based on the conformity aspect of fabled texts assisted by animated films with an average score of 92.6% with the criterion of "excellent". Based on the discussion about the validation of the design as a whole, it is explained that the fable text module assisted by animated films for grade VII students of SMP Swasta Katolik Assisi Medan is declared suitable for use in the learning process with revision.

Based on the results of the response data of 2 teachers of Indonesian subjects at the SMP Swasta Katolik Assisi Medan, a score was obtained based on the fable text material indicator obtained an average of 100% with an average of 100% with an average score of 100% with the criterion of "excellent". Based on the data from the responses of teachers of these subjects, the fable text module assisted by animated films was declared suitable for use in the learning process with an average score of 98.1% with the criterion of "very good". After analyzing the needs of students, teachers, material expert validation and design experts, a trial of the fable text module assisted by animated films was carried out based on indicators that had been made in accordance with the fable text material. The trials are carried out through 3 stages, namely, individual trials, small group trials and limited field trials.

The feasibility of teaching materials in the form of fable text modules assisted by animated films has similarities with the research conducted by Parida (2019) with research entitled Development of Children's Film-Assisted Fable Story Text Writing Modules in Class VII Students of SMP Negeri 6 Tambusai Utara Rokan Hulu Riau. This study explains that fabled texts assisted by children's films are suitable for use in classroom learning. The animated film-assisted fabled text module obtained a score of 89.1% with the category of "excellent", the results of teacher responses to the module obtained an average score of 92.5 with the category of "very good", the results of student responses through individual tests of the module obtained a score of 91.2% with the category of "very good" and the results of limited field trials obtained a score of 89% with the category of excellent.

At the time of pretest (before using the animated film-assisted fable text module) students obtained an average score of 60.94, while at the time of posttest (after using the animated film-assisted fable text module) an average score of 83.44 was obtained. This means that there is an increase in student learning outcomes before and after using the animated film-assisted fable text module of 22.50. The increase in test results is proof that the modules developed can have a positive impact on student learning outcomes, especially on fable text materials Based on the results of
the gain test conducted on 32 students of class VII of SMP Swasta Katolik Assisi Medan, it can be seen that as many as 5 students (15.63%) showed high effectiveness criteria, as many as 27 students (84.37%) showed moderate effectiveness. Meanwhile, the average gain index was 0.6 with moderate effectiveness criteria. So, it can be concluded that the animated film-assisted fable text module is used by students at SMP Swasta Katolik Assisi Medan.

This research is in line with the results of research conducted by Anif with the research title Improving the Ability to Write Fables Using Animated Film Media in Grade VII C Students of SMP Negeri 1 Bonorowo for the 2016/2017 Academic Year. The improvement of the ability of grade VII C students of SMP Negeri 1 Bonorowo in learning to write fables using animated film media can be seen from the results of student scores that achieve an average score above KKM (70). In the pre-cyclical stage, students who obtained scores above KKM were only 19.44%, cycle I increased to 64.71% and cycle II increased again to 94.11%. Based on this increase in value, it can be concluded that the use of animated film media can improve students' ability to learn to write fables.

4 Conclusion

Based on the results of research and discussion on the development of an animated film-assisted fable text module for grade VII students of SMP Swasta Katolik Assisi Medan, the following conclusions were obtained, this research succeeded in developing a product in the form of a fable text module assisted by animated films. The development of this module consists of 10 steps, namely problem discovery, data collection, product design, validation, product revision, product trials, revisions, limited field trials, revisions, and the final product; the text module of the fable text module assisted by animated films developed is suitable for use for grade VII students of SMP Swasta Katolik Assisi Medan. This can be seen from the validation results obtained from material experts, design experts and media experts. The results of the validation carried out by the material expert validator obtained a percentage of the overall average value of 90.7% with the criterion of "excellent". The average percentage is obtained from the aspects of content feasibility, aspects of presentation feasibility, aspects of language feasibility and aspects of the theme of fabled texts assisted by animated films. The validation results carried out by the design expert validator obtained a percentage of the overall average value of 92.6% with the criterion of "excellent". The average percentage is obtained from the aspects of graphic feasibility and the theme of fabled texts assisted by animated films. The feasibility of the animated film-assisted fable text module is not only seen from the assessment of experts, but also seen from the responses/responses of module users, namely teachers and learners. The assessment of the animated film-assisted fable text module by two subject teachers Indonesian obtained an average score percentage of 98.1% with the criterion of "excellent". The average percentage is obtained from the material aspects of fabled texts, terragency, and language. Meanwhile, responses from students were obtained through trials conducted 3 times, namely individual trials, small group trials, and limited field trials. In individual trials, an average score percentage of 88.5% was obtained with the criterion of "excellent". In small group trials, an average score percentage of 94.4% was obtained with the criterion of "excellent". Furthermore, in limited field trials, an average value percentage of 94.4% was obtained with the criterion of "excellent"; the animated film-assisted fable text module for grade VII students of SMP Swasta Katolik Assisi Medan was declared effective for use in learning. This is proven through the learning outcomes of students in writing fabled texts on pretest and posttest. At the time of pretest, students obtained an average score of 60.94, while at the time of posttest, an average
score of 83.44 was obtained. This means that there is an increase in student learning outcomes before and after using the animated film-assisted fable text module of 22.50. The effectiveness of such modules is also analyzed through gain tests. Based on the gain test, the average value of the overall gain index is 0.6 with the criterion of moderate effectiveness.

References


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Abstract. Teaching materials are all forms of tools used to assist teachers in carrying out teaching and learning activities. The teaching materials used by teachers will affect the achievement of students in achieving learning objectives. This study aims development of ecology-based exposition text teaching materials in the new normal era for class VIII students of SMP Kristen Kalam Kudus Pematang Siantar. Data analysis through questionnaires shows that students still depend on books produced by the Ministry of Education and Culture with material content that has not been adapted to the local area of students and the teaching materials used are less innovative, creative and contemporary. Teaching materials in the form of fable ecology-based exposition text modules were developed as an interesting learning support medium in writing exposition story texts. The use of this ecology-based module can also help rationalize abstract material in an interesting way. This is evidenced by the effectiveness test using the Gain Test on the ecology-based exposition text module in the new normal era for class VIII students of SMP Kristen Kalam Kudus Pematang Siantar with an average pretest score of 60.94 students with the lowest score of 55 and the highest score of 70. While the average posttest score of students was 83.44 with the lowest score of 75 and the highest score of 98. Based on these data, it can be concluded that the ecology-based exposition text module is feasible and effective to be used in learning to improve student learning outcomes, especially in exposition text materials.

Keywords: module, exposition text, ecology

1 Introduction

The Covid-19 pandemic creates new things and must be learned. The public must quickly understand the situation and conditions anywhere and anytime. The presence of this situation has resulted in a number of fields, including agriculture, health, economy, and education, which must jointly step up for the progress of the Indonesian people. Especially viewed in the world of education, educators need a blazing spirit so that students get the expected knowledge. In this regard, educators must be able to change the online learning process in an innovative, active, and creative way.

In connection with this, in learning, of course, many problems are found. However, this is not an obstacle in a learning process because educators should be able to make the learning
atmosphere safer and not disappoint students, both parents and students. Between parents and educators must encourage each other and establish good cooperation in creating a good learning atmosphere. Moreover, the situation in the new normal, which is often called the New Normal, of course requires the government to change all learning processes that will be applied in each school.

Since the Indonesian Ministry of Education and Culture issued a circular on Study from Home (SFH) in March 2020, many questions have arisen in social media, referring to what the learning process is like and how it is applied. Positive and wise questions should be based on the spirit of entering the New Normal era, namely; What lessons can we learn from SFH to be used as a modality to enter the New Normal era? What paradigms and practices of education in the Old Normal era should we leave behind? What will tomorrow's "school" plan look like?

In fact, this pandemic is a crisis because it occurs suddenly without warning which brings about change. Therefore, none of the stakeholders are ready, prepared, and prepared to deal with it so that the implementation of SFH still has many shortcomings here and there. However, if you think positively, you can learn many valuable lessons. There are also many schooling practices in terms of learning capital that were previously rejected such as distance learning, home schooling, school exams and the like, as long as we apply SFH. It is no exaggeration if SFH has returned education to its essential essence, namely learning.

This research was conducted as an innovation for the development of teaching materials for writing ecological-based exposition texts that had never existed in previous studies and studies. The advantage of using this ecology-based approach is that students are closer to their environment. This is so that students can understand the text without having to make it up, by understanding the ecology based on their own culture or environment.

Through the problems above, the researcher seeks to develop the concept of writing an ecological-based exposition text. The ecology-based concept has not been widely used in learning to write both in terms of materials and teaching materials used. Haspari’s research (2011: 123) in the journal Lens Vol.1 NO. 2 July-December 2011 suggests that teaching writing so far only focuses on grammatical theory (grammar) or procedures (punctuation) only. So, based on these problems, researchers are interested in researching with the title "Development Of Ecology-Based Exposition Text Teaching Materials In The New Normal Era For Class VIII Students Of SMP Of Kristen Kalam Kudus Pematang Siantar T.P 2021/2022".

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2 Research Methods

The theoretical framework is a supporter of research in a study. The theoretical framework contains theories related to research problems. These theories are used as the basis and reference for research discussions. Given the importance of this, the supporting theories must be appropriate to the problem to be studied for clarity in a study. Teaching materials certainly have a function for educators and students. Teaching materials are things that are really needed during the learning process to help educators to facilitate learning activists, both written and unwritten. Prastowo (2012:25) states that, "in general, teaching materials for teachers are to direct all activities towards students in the learning process, while for students they become guidelines in the learning process and are the substance of competencies that should be studied. Teaching materials also function as an evaluation tool to measure student learning outcomes in class."

The grouping of teaching materials by type is carried out in various ways by several experts and each has its own justification when grouping it. Heinich, et al (in the journal Sadjati 2010: 6) classify the types of teaching materials based on how they work which are divided into 5, namely:

- Teaching materials that are not projected, such as photos, diagrams, displays, and models;
- Projected teaching materials, such as slides, filmstrips, overhead, transparency, computer projections;
- Audio teaching materials, such as cassettes and compact discs;
- Video teaching materials, such as videos and films;
- Computer media teaching materials, for example computer mediated instruction (CMI), computer or hypermedia.

The feasibility aspect of a learning material in the form of print can be presented as shown in the table below. Types of teaching materials are distinguished by several grouping criteria. According to, Koesnandar (2008) the types of teaching materials based on the subject consist of two types, including: (a) teaching materials that are deliberately designed for learning, such as books, handouts, worksheets and modules; (b) teaching materials that are not designed but can be used for learning, for example clippings, newspapers, films, advertisements or news. Koesnandar also stated that in terms of function, the teaching materials designed consisted of three groups, namely presentation materials, reference materials, and self-study materials.

Exposition Text Structure

According to Kosasih (2014: 24), the exposition text is formed by three parts, namely as follows.

Thesis, the section that introduces a problem, issue, or general opinion that summarizes the entire content of the writing. This opinion is usually a general truth that cannot be denied anymore.

A series of arguments, which contains a number of opinions and facts that support the thesis.

Conclusion, which contains a reaffirmation of the thesis stated at the beginning.

Steps to Compose Exposition Text:
Writing is a literacy activity that can be done after reading carefully. In compiling an expository text, there are steps that must be considered carefully, namely as follows:

choose and determine the topic to be written,
determine the purpose of writing the text,
collect data to support arguments,
compose the outline of the writing,
discuss the problem by developing the outline of the essay,
make conclusions.

The term ecology was first used by Haeckel a life scientist in the mid 1860s. This term comes from the Greek, namely eikos which means house and logos which means knowledge. Therefore, ecology literally means the science of living things in their homes or can be interpreted as the science of living creatures' households (Supriadi, 2006: 1). According to Soerjani (in Supriadi, 2006: 1) stated that: Ecology is the basic science to question, investigate, and understand how nature works, how living things exist in living systems, what they need from their habitats to sustain life, how to do all of that with other components and other species, how individuals within species it adapts, how living things face limitations and must be tolerant of various changes, how individuals in the species experience growth as part of a population or community. All of this takes place in a complex, but quite orderly process of natural order, principles and provisions, which we understand by ecology.

Teaching materials are the most important part in the learning process. Teaching materials are a set of lesson substances that include curriculum content that must be achieved in learning activities and arranged systematically so as to create an environment or atmosphere that allows students to learn. One form of teaching materials used in schools is textbooks. There are many approaches used in preparing teaching materials, but in this study, teaching materials were developed by loading text as the delivery of material. It is intended that the teaching materials that have been developed become an alternative choice to improve the ability to understand expository texts at school, which expects students to have the ability to understand the implied and explicit intentions of the text.

Exposition text is a text that tries to provide information or explanation to the reader by developing ideas so that it becomes wider. One form of expository text is to describe a process by loading the text as the delivery of material.

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It is intended that the teaching materials developed become alternative choices to improve students' ability to understand implied and explicit intentions. One form of expository text is to describe a phenomenon that occurs in the surrounding environment, people's habits to events that are currently happening. That is, the exposure in the exposition text includes nonverbal forms. The phenomenon studied is related to the ecology that occurs in the environment of students.

This research will be conducted in the even semester of the 2021/2022 academic year in March 2021, when Indonesian language learning takes place in class VIII of SMP Kristen Kalam Kudus Pematang Siantar. The research subjects were students of class VIII SMP Kristen Kalam Kudus Pematang Siantar. The selection of these places as research subjects is to help students in learning expository texts as well as being the subject of trials of using exposition text learning materials for students of class X and SMA Kristen Kalam Kudus Pematang Siantar can represent the type of formal level of middle and upper secondary which has never been conducted research that the same as the problem to be studied.

3. Research Design

This study uses the Research and Development (R&D) method proposed by Sugiyono (2015:1) in the book Research and Development Methods; Research and Development. This research model refers to the Brog and Gall model combined with the Dick and Carey learning development model (Trianto, 2007:62). The steps from the stages of development are as follows:

- conducting preliminary research, which includes: 1) identifying learning needs or objectives and determining subject competency standards, 2) conducting learning analysis by determining the more specific skills learned, 3) identifying the characteristics and initial behavior of students, and 4) write down basic competencies and indicators;
- compiling a benchmark reference test by developing assessment items to measure students' expected abilities in learning;
- collection of materials, which include: 1) collection of learning materials and 2) making and collecting images (illustrations);
- development of teaching materials;
- product validation;
- product revision;
- product trial.

First step (preliminary study)

Namely problem and needs analysis carried out to collect information (library studies, KI and KD analysis, and observations of teaching materials in books that are widely used at SMP Kristen Kalam Kudus Pematang Siantar with exposition text writing material, identification of problems encountered in observing teaching materials.

Second step (initial product development)
At this stage, the researcher will try to make an initial product related to the exposition text which will later be tested on several types of groups (test subjects).

Third step (expert validation)

At this stage, the researcher validates the exposition text textbook by asking for input and advice from two material experts (validators), namely, the first validator as an expert on exposition text material and the second validator as an exposition text design expert. At this stage too, the two experts revised their assessments and suggestions on the initial product developed by previous researchers.

Fourth step (test on three students)

In this stage, the researcher tested the initial product that had been revised by the two previous validators. The subjects of this test were three class VIII students of SMP Kristen Kalam Kudus Pematang Siantar.

Fifth step (revision II)

In this stage, the researcher has tested it on individual groups and will be revised again based on the previously provided questionnaire.

Sixth step (small group tryout on nine students)

In this stage, the researcher tested the product that had been revised by the previous validator. The subjects of this test were nine class VIII SMP Kristen Kalam Kudus Pematang Siantar.

Seventh step (revision III)

In this stage, the product that has been tested in small groups will be revised again based on the previously available questionnaire.

Step eight (large group trial on twenty eight students)

In this stage, the researcher tested the product that had been revised by the two previous validators. The subjects were twenty-eight students of class SMP Kristen Kalam Kudus Pematang Siantar.

The ninth step (revision IV)

In this stage, the product that has been tested in large groups will be revised again based on the questionnaire that has been previously provided.

Tenth step (final product)

This stage is the last stage which is the final stage of research and product development which has been tested in the previous three stages and is ready to be used by paying attention to various things.

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Table 1. Grid of questionnaires for the needs of learners

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Do you have any other handbooks for learning exposition text materials?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>2.</td>
<td>Do you have trouble studying the exposition text material from which the book originated? (e.g. completeness of the material, explanatory techniques, format, etc.)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
<td>Do you use other teaching materials to teach exposition text materials? (e.g. modules, videos, props and others)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>4.</td>
<td>If so, does teaching materials make it easier for you to understand fable text material?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>5.</td>
<td>Are you enthusiastic about participating in exposition text learning?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>6.</td>
<td>Are you having trouble knowing the exposition text material through teaching materials and methods applied by the teacher?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>7.</td>
<td>Do you need other teaching materials to study exposition text materials more easily and interestingly?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>8.</td>
<td>Do you agree that exposition text teaching materials are developed with the help of ecology so that the material is easy to understand?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Table 2. Categories of assessment of the quality of learning materials

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>76% &lt; 100% &lt; value</td>
<td>Valid</td>
</tr>
<tr>
<td>51% &lt; 75% &lt; value</td>
<td>Valid Enough</td>
</tr>
<tr>
<td>26% &lt; 50% &lt; value</td>
<td>Less Valid</td>
</tr>
<tr>
<td>0% &lt; 25% &lt; value</td>
<td>Tidak Valid</td>
</tr>
</tbody>
</table>

\[ P = \frac{f}{N} \times 100\% \quad (1) \]

Information:

(1) \( P = \) Percentage of assessment

(2) \( f = \) Questionnaire value

(3) \( N = \) Overall value
The gain test was carried out to see the effectiveness of learning using an ecology an exposition text module. This test was carried out on class VIII students of SMP Kristen Kalam Kudus Pematang Siantar with a total of 30 students. The formula used to determine the effectiveness of learning is as follows:

\[
\text{Gain Index } (g) = \frac{(x_{\text{post}} - x_{\text{pre}})}{5 \times (100 - x_{\text{pre}})}
\]

(2)

After obtaining the Gain Index, the results are interpreted according to the following criteria.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-gain ≥ 0.7</td>
<td>High</td>
</tr>
<tr>
<td>0.3 ≤ N-gain &lt; 0.7</td>
<td>Medium</td>
</tr>
<tr>
<td>g &lt; 0.3</td>
<td>Low</td>
</tr>
</tbody>
</table>

4. Results And Discussion

The process of preparing ecological-based exposition text teaching materials in the new normal era refers to the R & D model. The process of developing ecology-based exposition text teaching materials starts from the analysis stage by taking into account the feasibility and requirements of developing teaching materials based on the Discovery Learning learning method. Problems that occur include the lack of time to achieve a thorough understanding of students, persuasive text references in this school are also very minimal. Students only have references in the form of textbooks and enrichment modules. The scores obtained by students during the daily assessment of persuasion are also on average below the KKM with the highest score of 75.

The researcher also conducted a needs analysis by distributing questionnaires to Indonesian language teachers and 30 students (grade VIII-1) at SMP Kalam Kudus Pematang Siantar. The results obtained are: 100% of students and teachers have never specifically applied teaching materials in the form of persuasive text modules, they only used teaching materials provided by the school. 100% of teachers and students have never used an ecology-based exposition text module. Teachers and students feel that they need additional teaching materials regarding persuasive texts with a percentage of 98.62%.

Next is the design stage which aims to design ecological-based exposition text teaching materials. The design stage starts from the form of the module cover, introduction, introduction, learning activities, summary, evaluation, answer key, bibliography and glossary. After that, product development is carried out. The activities of this stage are compiling and perfecting each material starting from learning materials, pictures, and others. Expert validation assessment and in-class product testing is limited.

Next is the design stage which aims to design ecological-based exposition text teaching materials. The design stage starts from the form of the module cover, introduction, introduction, learning activities, summary, evaluation, answer key, bibliography and glossary. After that, product development is carried out. The activities of this stage are compiling and
perfecting each material starting from learning materials, pictures, and others. Expert
validation assessment and in-class product testing is limited.

After validation and product improvement were carried out, a limited field trial was carried
out to see the results of using the module in the classroom which included measuring learning
motivation and student learning outcomes. This stage took place three times starting from
individual trials, small groups (10 students) and the product was implemented in actual
classroom situations, namely students of class VIII-1 (30 students). During implementation,
the method design that has been developed is applied to conditions in the real class.

Next is evaluation, at this stage an assessment of students is carried out to assess the feasibility
of ecological-based exposition text teaching materials. After this stage is done, the writer
concludes that the product developed is quite effective for persuasive text learning. The
teaching materials of persuasive texts based on the discovery learning method are arranged
differently from the teaching materials offered by schools. Persuasive text teaching materials
in schools refer to modules and textbooks distributed by the Ministry of Education and Culture
whose contents consist of identifying invitations, directions and considerations of persuasive
texts, reviewing structures, presenting persuasive texts and competency tests. What is
presented in the textbook is not much different from what is in the module, the only difference
being the form of the exercises given. While the teaching materials of persuasive texts in the
form of modules offered by researchers refer to the discovery learning method which is one of
several learning methods promoted by K13. The discovery learning method refers to
discovery, so it is hoped that after the teacher uses this method, students are able to 'create'
something. The material of persuasive text based on the discovery learning method in the step
of learning activities consists of six steps, namely: Giving stimulation, identifying problems,
collecting data, processing data, proving and drawing conclusions.

The validation of ecological-based exposition text teaching materials was obtained based on
the validation assessment of a team of experts who were divided into two, namely material
experts and design experts. The teacher's assessment then tests the product individually, in
small groups and in a limited field. The validator of the material assessment was carried out by
material experts from the State University of Medan with an average assessment of material
experts regarding ecological-based exposition text materials was 89.87%. There are several
things that need to be improved from the teaching materials of ecological-based exposition
texts, starting from writing the introduction into a preface, the introductory sub-chapter which
must contain learning objectives because it was not previously included, a concept map that
must contain the basic competencies to be achieved, then improve its content, activity 1,
activity 2 until the final evaluation and improvement of some punctuation and writing. Then
the teaching materials are repaired and assessed after revision. The average result of the
validator's assessment is 97.82% which is categorized as very feasible, so it is feasible to be
applied in class VIII SMP materially.

It was concluded that there was an increase in students' assessment of the ecological-based
exposition text teaching materials seen from individual trials, the result of student assessment
on this product was 89.1%, then product improvements and trials were carried out. carried out
in small groups the results of student assessments regarding teaching materials. that's 90.8%.
Furthermore, improvements and limited field tests were carried out and the average number of
assessments was 92.4% which was categorized as very feasible. So that the teaching materials
of persuasive texts based on the discovery learning method are very suitable for use for class
VIII Students of SMP Kristen Kalam Kudus Pematang Siantar.
5. Conclusion

Conclusions are obtained from the formulation of the problem, objectives, results and discussion in the research and development of persuasive text teaching materials based on the discovery learning method for class VIII students of SMP Kristen Kalam Kudus Pematang Siantar. The conclusions are outlined as follows.

The process of developing persuasive text teaching materials based on the discovery learning method is carried out based on the ADDIE research model which is carried out in five research steps. The first stage of analysis was carried out by analyzing the learning needs of persuasive texts at the Kalam Kudus Christian Junior High School Pematang Siantar, the problems experienced by teachers and students along with teaching materials at school (packaged books and enrichment modules). Next is the design stage, the authors design persuasive text teaching materials based on the discovery learning method that are adapted to the student's learning environment and learning videos that can help students understand. Furthermore, the assessment of the product was carried out by two material experts, two design experts, an Indonesian language teacher and students of the students Kristen Kalam Kudus Pematang Siantar. Next is the implementation stage, the product is tested on individuals (3 people), small groups (10 people) and limited classes. Furthermore, an evaluation was carried out in the form of an assessment of the effectiveness of the product of ecological-based exposition text teaching materials for class VIII students of SMP Kalam Kudus Pematang Siantar. The form of ecological-based persuasive text teaching materials in the new normal era is arranged differently from the teaching materials offered by schools.

Persuasive text teaching materials used in schools refer to modules and textbooks circulated by the Ministry of Education and Culture whose contents consist of identifying invitations, directions and considerations of exposition texts, study structures, presentation of persuasive texts and competency tests. What is presented in the textbook is not much different from what is in the module, the only difference being the form of the exercises given. While the teaching materials of persuasive texts in the form of modules offered by researchers refer to which is one of several learning methods carried out by K13. The discovery learning method refers to discovery, so it is hoped that after the teacher uses this method, students are able to 'create' something. Ecological-based exposition text material in the new normal era in the learning activity step consists of six steps, namely giving stimulation, identifying problems, collecting data, processing data, proving and drawing conclusions. Examples and problems included in the teaching materials also include problems that occur around the student learning environment to make it easier to understand and apply.

The validation of the material assessment was carried out by a material expert from the State University of Medan with an average final assessment result of 97.82% of the validator in the very feasible category and the validation of the design expert's assessment was carried out by a design expert. Medan State University lecturer with an average design expert final assessment result of 96.2%. An assessment was also carried out by Indonesian language teachers at the Kalam Kudus Christian Junior High School Pematang Siantar with a percentage of 90.3% being in the very decent category. Furthermore, a limited field test was conducted on 30 students of class VIII SMP Kristen Kalam Kudus Pematang Siantar and obtained an average
of 92.4 which was categorized as very feasible. The effectiveness of teaching materials of ecological-based exposition texts in the new normal era is obtained from learning outcomes that come from two steps, namely pre-test and post-test. The results of the pre-test were 2,132 with an average of 71, the score was categorized as "enough" and did not meet the KKM score of 75. After using persuasive text teaching materials assisted by the discovery learning method and post-test the total score of students increased to 2,431 with an average of 81 categorized as "good". This shows that persuasive text teaching materials assisted by the discovery learning method bring good development and are effectively used in class VIII of Kalam Kudus Christian Junior High School Pematang Siantar.

References

Translation Techniques in Children Story Book

Yan’s Hajj The Journey of A Lifetime

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Abstract. This study aims to analyze translation techniques by using Molina & Albir theory (2002) in the children story book themed religious Yan’s Hajj The Journey of A Lifetime. This research is a qualitative research with a descriptive approach. The source of data is the children story book English version as the source text (TS) and Indonesian as the target language (TL). Based on the analysis, it is found that: In the translation of the children story book, there are 10 translation techniques used, namely Adaptation, Amplification, Description, Established Equivalence, Linguistic Amplification, Linguistic Compression, Literal, Modulation, Reduction and Transposition. The most dominant translation technique used in translating the children story book is Transposition technique.

Keywords: Children story book, Translation Techniques

1. Introduction

Translation is extremely useful for people who want to obtain information from non-native language reading sources without having to spend time learning that language. According to [1] The term translation can refer to a variety of thing, including the broad subject matter, the product, and the procedure. It relates to [2] who stated that translation which then occur of meaning transfer from source to target language, by message, accuracy, readable, and acceptability.

Translation techniques are methods used to divert messages from source language to target language, applied at the level of words, phrases, clauses or sentences. According to [3], translation technique works on translation results and it is applied from the lowest level of the language unit.
Translation Techniques

There are 18 translation techniques proposed by [3]

Adaptation is a technique for replacing source text elements with text elements from the target culture. In some cases, cultural or social elements in the source text are replaced by different but corresponding elements in the translation. It is usually more familiar to the target audience.

Amplification technique is a technique that introduces details not made clear in the source text. You can write it directly or type it into the footnote. This technique describes the source terminology so that the target reader can understand it.

Borrowing technique is a translation technique that takes words and phrases directly from another language. The translator consciously decides to use the same words in the target text that appear in the source text. This is especially right when there are no corresponding terms in the target language. Translators can also unambiguously place texts in specific cultural contexts through the lexical index used.

Calque technique is a special type of borrowing in which one language borrows a word or phrase from another and translates each element of it literally.

Compensation technique is the technique of inserting source information or stylistic effects elsewhere in the target text, because they cannot be reflected in the same place as the source text. This allows the translator to transfer the stylistic difficulty to another section of the text.

Description technique is the technique of replacing a term or phrase with a description of its form and/or function. This technique is similar to the hardening technique, but here the source code elements have been removed.

Discursive creation technique is techniques for creating temporal equivalences taken from completely unpredictable contexts. This technique is commonly used when translating book or movie titles.

Established equivalent technique is a technique in which a term or phrase recognized in a dictionary or common language is used as its equivalent in the target language.

Generalization technique is a technique that uses more general or neutral terms. This happens when there is no equivalent word in the translation, so the translator converts the word to broader or generic.

Linguistic amplification technique is a method for placing language factors into the goal text. It is frequently utilized in consecutive deciphering and dubbing.

Linguistic compression technique is a technique to reduce the language elements of the target text. It is often used in simultaneous interpretation and subtitling.

Literal translation technique is a technique that translates words and phrases word by word. A literal translation is when there is exact structural, lexical, or morphological equivalence between two languages.

Modulation technique is a technique that changes the perspective, focus, or cognitive category of a source text. It can be lexical or structural. Modulation's main feature is a change of perspective, but it also involves a change of grammatical category. It is used when other techniques produce text that is grammatically correct but incorrect, idiomatic, or awkward.
Particularization technique is the technique for using or relating terms more precisely. This contradicts the generalization technique. In some cases, an element is common in the source language and is replaced with a more specific term when translated into text to ensure acceptance by the target audience.

Reduction technique is a technique for suppressing information elements in the target language. This happens when additional elements of the source text are known to the target reader.

Substitution technique is the technique for converting linguistic elements into paralinguistic elements (intonation, gestures) and vice versa. Mainly used for interpreting.

Transposition technique is the techniques for changing grammatical categories. Semantic elements are transferred to grammatically distinct word groups. This technique is used to overcome problems associated with different language systems.

Variation technique is the techniques that alter linguistic or paralinguistic elements (intonation, gestures) that affect some aspect of linguistic variation: Changes in text tone, style, social dialect, and geographic dialect.

Children Story Book

According to [4], children's literature in this case, children's books, is defined as one of the categories that exists based on the relationship with the segmented children's readers. Meanwhile [5] states that children's literature doesn't have to talk about children, their world, and the events in which children are involved. According to him, children's literature can tell everything related to the life of people, animals, plants in the world, and the life of other creatures in other worlds. Nonetheless, He argued that regardless of content, a child's story should be told from the child's point of view, from the way the child sees and handles things, and that the story should be appropriate for the child's emotional understanding and thinking.

Yan’s Hajj: The Journey of a Lifetime

This book is a story about Yan, a poor but kind and happy farmer who loves Allah, and wants to go to Makkah for Hajj. He works hard on his farm to save enough money for the pilgrimage. As soon as his money bag is full, he sets out on his journey to Makkah. But each time he leaves for Hajj, he comes across a situation where money and his help is needed.

2. Method

This study was conducted in a descriptive qualitative research study. The data from this study were the translation unit which consist of words, phrases, clauses and sentences found in the text of children story book Yan’s Hajj: The journey of A Lifetime. Overall appearance of the text are as the data. It has 30 pages. The source of data in this study were be a text of a children story book Yan’s Hajj: The Journey of a Lifetime. This research used document analysis method as suggested by [6] when analyzing data, the theory were applied by the researcher that proposed by [7]. These are data condensation, data presentation and validation, and conclusions.
3. Results and Discussion

Table 1. The Percentage of the translation techniques in children story book.

<table>
<thead>
<tr>
<th>Number</th>
<th>Translation Techniques</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adaptation</td>
<td>0.62%</td>
</tr>
<tr>
<td>2</td>
<td>Amplification</td>
<td>6.38%</td>
</tr>
<tr>
<td>3</td>
<td>Description</td>
<td>0.62%</td>
</tr>
<tr>
<td>4</td>
<td>Established Equivalence</td>
<td>1.24%</td>
</tr>
<tr>
<td>5</td>
<td>Linguistic Amplification</td>
<td>12.42%</td>
</tr>
<tr>
<td>6</td>
<td>Linguistic Compression</td>
<td>10.56%</td>
</tr>
<tr>
<td>7</td>
<td>Literal</td>
<td>22.98%</td>
</tr>
<tr>
<td>8</td>
<td>Modulation</td>
<td>15.53%</td>
</tr>
<tr>
<td>9</td>
<td>Reduction</td>
<td>1.24%</td>
</tr>
<tr>
<td>10</td>
<td>Transposition</td>
<td>27.95%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on the data analysis from 18 Techniques that proposed by [3] only 10 techniques that are applied in Children Story Book, they are Adaptation (0.62%), Amplification (6.38%), Description (0.62%), Established Equivalence (1.24%), Linguistic Amplification (12.42%), Linguistic Compression (10.56%), Literal (22.98%), Modulation (15.53%), Reduction (1.24%), and Transposition (27.95%).

From the result, it can be stated that in children story book the most frequently used is Transposition technique. This is due to a structural shifts. The shifts occur in the arrangement of sentences, clauses, or phrases. In the Source Language, many sentences use clauses, but in the Target Language, they are converted into sentences. This is to make it easier for the target reader to read simple sentences.

4. Conclusion

Based on the data analysis from 18 Techniques that proposed by [3] only 10 techniques that are applied in Children Story Book, they are Adaptation, Amplification, Description, Established Equivalence, Linguistic Amplification, Linguistic Compression, Literal, Modulation, Reduction, and Transposition.

Acknowledgments. The appreciation is dedicated to her first thesis adviser, Dr. Masitowarni Siregar, M.Ed and her second adviser, Dr. Meisuri, M.A for all of their valuable advice and guidance in the process of finishing this thesis.

References


The Influence of Inquiry Model by Scientific Approach of Student Evaluation of Physics

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Abstract. The low student learning outcomes caused by the lack of student activity in the teaching and learning process is the background of this research. The problem in this study is whether there is an effect of the Inquiri learning model with a scientific approach on the physics learning outcomes of eighth grade students of SMP Swasta IT Madani. The population in this study were all students of class VIII totaling 120 people, with a total sample of 60 people consisting of 2 classes, with class VIII 1 being taught using the Inquiri model and class VIII 2 being taught using the conventional learning model. As a data collection tool, a test of students' physics learning outcomes was used in the form of 20 multiple-choice questions, which had been tested for validity and reliability. The results of the research carried out obtained the average and standard deviation for classes taught using the Inquiry model were $X_1 = 15.77$ and $S_1 = 3.500$ while for classes taught using the conventional model were $X_2 = 13.56$ and $S_2 = 3.095$. For the $t$-test using a significant level of $a = 0.05$ and degrees of freedom 58 obtained $t_{\text{count}} = 2.732$ and a table with the same significant level of degrees of freedom seen from the distribution table obtained $t_{\text{table}} = 1.672$.

Keywords: Inquiry, Scientific Approach, Evaluation, Physics.

1 Introduction

Education is one of the most important things for this country is to improve the standard of living of its people so that they are able to compete globally. Indicators of whether a country is advanced or not are strongly influenced by the level of success and equity in education for its people. According to data from UNESCO (United Nations Educational, Scientific and Cultural Organization) referring to data collected obtained from the Education For All (EFA) Global Monitoring Report 2013, that the Education Development Index (EDI) places Indonesia in 64th position out of 127 countries.

Physics is one of the disciplines in science, which should be can prioritize the development of scientific attitudes (scientific attitude) such as curiosity (curiosity), the habit of looking for evidence before accepting a statement (respect for evidence), a flexible and open attitude with
scientific ideas (flexibility), the habit of asking critically (critical reflection) and attitude sensitive to living things and the surrounding environment (sensitivity to living things and environment). In the physics learning model, there is a need for learning that uses a scientific approach (Scientific Approach). However, in the teaching and learning process of Physics students tend to be bored with abstract learning with explanations of formulas so that they do not understand the concept. For this reason, it is necessary to develop a learning model that is needed and in accordance with the learning of Physics which is a branch of the field of Science. 

Based on the results of previous research conducted by Indri (2013) regarding "The Influence of Guided Inquiry Learning Models on Student Learning Outcomes on the concept of Vibration and Waves" states that learning using the inquiry method has a significant influence on student learning outcomes and this research deserves to be continued.

For this reason, I as a researcher are interested in conducting a research entitled "The effect of the inquiry learning model with a scientific approach (Scientific Approach) on student physics learning outcomes".

2 Research methods

2.1 Research design

This research is categorized in associative research which aims to determine the relationship between two or more variables. In this study, a theory will be built that serves to explain, predict, or control a symptom (Sugiono, 2004:12).

In this study, there are two variables that connect the form of the relationship between variables, namely causal. This can be described as follows:

![Figure 1. Causal/cause-effect relationship, X affects Y](image)

Where:

- (X1) = Inquiry learning model treatment
- (X2) = Conventional learning model treatment
- Y = Student physics learning outcomes
2.2 Population and Sample

**Population.** The population in this study were all of 7th grade students in the second semester of SMP Swasta IT Madani for the 2021-2022 academic year, totaling 120 students consisting of 4 classes.

**Sample.** Determination of the sample in this study is determined by random sampling, which is taking randomly from the existing class. The random sampling system carried out by researchers is by drawing two lots. So that there are 30 students in class VIII-1 as the Inquiry learning model class with a scientific approach and class VIII-2 as many as 30 students as the conventional learning model class and Indicators

1. Variables There are 2 types of variables in this study, namely independent and dependent variables with the following information:
   a. The independent variable (X1) is the inquiry learning model with a scientific approach
   b. The independent variable (X2) is the Conventional Learning Model
   c. The dependent variable (Y) is the result of learning physics on the subject of vibrations and waves

2. Indicators. Indicators are descriptions or conditions of research to clarify indicators. So in this study the indicators are:
   a. The independent variable indicator (X1) is lesson plans using the inquiry learning model with a scientific approach.
   b. The independent variable indicator (X2) is lesson plans using the conventional learning model.
   c. The dependent variable (Y) is the test score of students' physics learning outcomes on the subject matter of Vibration and Waves

2.3 Research Instruments

To measure physics learning outcomes, tests are used. The test used is in the form of multiple choice or multiple choice consisting of 25 questions with 4 answer choices. With a score of 1 if the answer is correct and 0 if the answer is wrong, so that the maximum score obtained by students is 25

3 Result and Discussion

Research activities in the classroom are carried out using guided inquiry learning models and conventional learning models, with at the end of the activity a physics learning outcome test is given. using 4 indicators in the cognitive domain, namely remembering, knowing, understanding, and applying.

In this study, there are two variables that connect the form of the relationship between variables, namely causal. This can be described as follows
Table 1. Statistics of students' physics learning outcomes

<table>
<thead>
<tr>
<th></th>
<th>Experiment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Highest Score</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Lowest Score</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Ideal Score</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Average score</td>
<td>17.73</td>
<td>13.33</td>
</tr>
<tr>
<td>Deviation Standard</td>
<td>3.50</td>
<td>3.30</td>
</tr>
</tbody>
</table>

Table 1. shows the data on students' physics learning outcomes. Based on the sample studied, it was found that the physics learning outcomes of students in the experimental class showed an average score of 17.73 and in the control class of 13.33. For the standard deviation in the experimental class is 3.5 and in the control class is 3.30.

Table 2. Scores for Student

<table>
<thead>
<tr>
<th>Interval</th>
<th>Experimental</th>
<th>Control</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
</tr>
<tr>
<td>8-9</td>
<td>0</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>10-11</td>
<td>2</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>12-13</td>
<td>2</td>
<td>5</td>
<td>16,67</td>
</tr>
<tr>
<td>14-15</td>
<td>2</td>
<td>8</td>
<td>26,67</td>
</tr>
<tr>
<td>16-17</td>
<td>3</td>
<td>4</td>
<td>13,3</td>
</tr>
<tr>
<td>18-19</td>
<td>13</td>
<td>4</td>
<td>13,3</td>
</tr>
<tr>
<td>20-21</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2 shows that the physics learning outcomes of experimental class students for the very low category 0 and high category 8, control scores of students' physics learning outcomes 3 students in the moderate category and very high category 0.

The categorization and percentage of physics learning outcomes of students in the experimental class and control class can be seen in the following diagram:
As for the research data that has been carried out, it can be seen that for the normality test, the value of $X^2$ count < $X^2$ . So it can be concluded that between the experimental class and the control class the scores of students’ physics learning outcomes are normally distributed. For Chi-Square analysis of physics learning outcomes scores, it can be seen in the following table:

**Table 3. Normality Test Results of Physics Learning Outcomes Scores Experimental and Control Class**

<table>
<thead>
<tr>
<th>Variable</th>
<th>$X^2$</th>
<th>$\alpha$</th>
<th>Students &lt; $\alpha$</th>
<th>Normal distribution or not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>7.815</td>
<td>0.139</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>7.815</td>
<td>Scientific</td>
<td>Normal</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows Approach (Scientific Approach) Lcount = 0.1238 and Conventional Learning Model L = 0.139 with L for both 0.161 (Lo < L), it is stated that the two student learning outcomes for the two models are normally distributed. The two variances are homogeneous with the provisions $F_{inmg} < F_{bel} = 1.281 < 1.923$. The results of students' physics learning using the Inquiry learning model with the Scientific Approach approach and the Conventional Learning model with the t test results showing the t value? tabdl that is 2.732>1.656 states H, accepted.

From the description of learning outcomes above, it can be seen that learning using the Inquiry learning model with a scientific approach is better and more efficient than conventional learning models and has a significant influence in improving students' physics learning outcomes, especially on the subject of vibrations and waves. However, the researcher realizes that there are limitations or shortcomings that allow students to be less serious in completing the tests given so that they do not describe the actual learning outcomes.

Based on the research results obtained from data analysis and hypothesis testing, the following conclusions can be drawn:
Physics learning outcomes of students who are taught using the Inquiry Learning Model with a Scientific Approach (Scientific Approach) have the highest score of 20. The physics learning outcomes of students who are taught using the Conventional Learning Model has a score of 18. The t-test criteria, namely $t_{test} > t_{tab}$, then the alternative hypothesis (Ha) is accepted. From the results of the statistical calculation of the t-test, it turns out that $t_{test} > t_{tab}$ or $2.732 > 1.656$ then the alternative hypothesis (Ha) is accepted. So it can be concluded that there is a significant effect between the Inquiry learning model and the Scientific Approach approach on student physics learning outcomes on the subject matter of Vibration and Waves in Class VIII SMP Swasta IT Madani.

4 Conclusion

Based on the research results obtained from the results of data analysis and hypothesis testing, it was found that the learning outcomes of students taught by the inquiry learning model with a scientific approach were better than the learning outcomes of students taught by conventional learning. These results indicate that there is an effect of the Inquiry model with a scientific approach on student learning outcomes. Student learning outcomes in the experimental group were above average and better than student learning outcomes in the conventional group. These results indicate that there is an effect of the scientific approach on student learning outcomes and there is an interaction effect between the inquiry learning model and the scientific approach in influencing student learning outcomes. These results indicate an interaction that the inquiry learning model with a scientific approach has a better effect than conventional learning. This means that the inquiry learning model with a scientific approach affects student learning outcomes while studying with conventional learning does not affect significantly affect learning outcomes.

References

Teaching Modals through *Markobar* in the Ceremony of *Pabagas Boru*

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Abstract. The study aims to look into modality categories in Markobar's text from the ceremony of *pabagas boru* as teaching modals for 11th grade students at SMA Islam Plus Adzkia Medan. *Markobar* is a Mandailing tribe oral tradition. *Markobar* translates as “speaking.” A qualitative research was conducted. The data for the study came from 14 positions in *Markobar* in the ceremony of *pabagas boru*, as well as two atobangon (*Markobar* experts) in Padangsidimpuan. The participants were 11th grade students at SMA Islam Plus Adzkia. The study’s data consisted of 66 clauses containing modality that were delivered orally by participants. The modality theory proposed by Halliday was used (2004). Furthermore, the data obtained were analyzed in accordance with Miles, Huberman, and Saldana (2014), specifically data collection, data condensation, data display, and conclusion drawing/verification. Modalization and modulation categories were found *Markobar*’s texts in the *pabagas boru* ceremony. The dominant meaning in modalization was probability (39%) meanwhile usuality was only 1.5%. Then, in modulation category, the dominant category was obligation (49%) and inclination was only 10.5%. In conclusion, modals used by the participants means that the students had understood about modality categories.

Keywords: Modals, Modality, Markobar in the Ceremony of Pabagas boru, The Oral Tradition of Mandailing.

1 Introduction

*Markobar* is a Mandailing tribe oral tradition. *Markobar* is speaking in the local language. Speaking is one of the communication skills that involves expressing ideas, thoughts, or information through the use of sentences and words. As the skill of delivering a speech, it is the ability to transmit intention, thoughts, opinions, or specific information by organizing words and sentences. *Markobar* is an oral tradition that organizes itself and becomes a model for having a language. It also exemplifies courtesy in carrying out *tutar* manifestations based on the Dalihan na Tolu (*Mora, Kahanggi/Suhut, and Anak Boru*) (Zulkarnain, et al., 2021).

In the age of globalization, *Markobar* is considered nearly extinct (Lubis, 2014). Since then, the use of *Markobar* in Mandailing ceremony has declined, particularly among Mandailings who prefer to hold ceremonies using modern technology. Daulay (2021), a *hatobangon* in Padangsidimpuan, North Sumatera, stated that finding people who know how to organize the *Markobar* tradition is difficult. Since there are many values and norms that must be adhered to
when carrying out that tradition, particularly the arrangement of speakers relating to the *tutur of Dalihan Na Tolu* and the politeness used in that tradition. Meanwhile, *Markobar* is an oral tradition that has not been written down. Philosophically, this tradition can be preserved by keeping and making all generations aware of it.

Previous research has shown that in expressing an idea, both the writer and the speaker tend to use modal auxiliary verbs in realizing their ideas to show their attitude for a variety of reasons that can be identified through the use of modalization and modulation. As can be seen from the modality analysis conducted in some settings such as a website, teaching, social media, and political setting, it is important to see how the modality is used in different discourse. It is interesting to analyze it in a traditional setting where Indonesia is well-known for its diversity in terms of culture and tradition. The study conducted an investigation of modality categories in *Markobar’s* texts in the ceremony of *pabagas boru*.

Therefore, it is necessary to teach modals through modality for 11th grade students at SMA Islam Plus Adzkia Medan in order to make the teaching process contextually based on Mandailing oral tradition particularly *Markobar* in *Pabagas Boru* ceremony. As a result, the author was interested in conducting the study.

### 2. Review of Literature

#### 2.1 Modality

The modality of the speech reflects the speaker’s style and ideology. According to Palmer (1986:14), modality expresses the speaker's attitude or opinion. Furthermore, Halliday (1994) stated that modality expresses the speakers' perspectives or attitudes toward a proposition or suggestion. According to the explanation, modality is the speaker’s perspective or attitude toward a proposition or suggestion for others. The use of a modal in a language aims to exchange information or ideas, as well as the process of exchanging experiences based on the speaker's point of view.

Modality is usually expressed with modal auxiliary verbs use (can, could, may, might, must, ought to, shall, should, will, and would), adjuncts which are adverbs displaying attitudes (necessarily, possibly, unfortunately) or modal adjectives (unlikely).

Halliday (2004) categorizes modality which is specified with reference to the speech function. There are four speech functions such as, question, statement, offer, and command. Thus, based on the speech functions, modality is categorized into two which is shown in the table 1 below.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Information</th>
<th>Modality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods and Service</td>
<td>Giving</td>
<td>Proposition</td>
</tr>
<tr>
<td></td>
<td>Demanding</td>
<td>Modalization</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>Modulation</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Command</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Speech Functions and Modality
Based on the figure above, it can be seen that Halliday (2004) categorizes modality into modalization and modulation.

![Fig 1. Modality Categories](image)

The speaker's judgment to proposition is referred as the modalization. The reader of the text is given several options for expressing their judgment of likelihood and frequency of a statement through modalization. modalization entails the statement of two distinct meanings namely, probability and usuality. Additionally, the way a speaker or writer displays their judgment or opinions regarding acts and occurrences is known as modulation. There are two forms of modulation: inclination (the speaker's predisposition to do something based on his own feelings) and obligation (the speaker's obligation to do something based on his own feelings by giving a command).

### 2.2 Oral Tradition

Oral traditions imply current documents as well as the transmission of a message from the past (Vansina, 1965). Rosenberg (1987) stated that The transmission of cultural artifacts from one family member to another or others is known as oral tradition. Those elements are heard, remembered, and recalled when suitable at the time of later transmission. Hutomo (1986) stated that oral literature is characterized by: (1) anonymous; (2) collective story material, traditional, and function uniquely for the community; (3) having certain forms and variants; (4) relating to trust; and (5) living in a society that is not familiar with writing. In addition, Sastrowardoyo (1983: 2) that oral literature is characterized by unpretentiousness and straightforwardness in its outward form.

According to Lubis (2014), oral tradition refers to materials created by traditional communities in the form of speech, custom, or practice, such as rituals, traditional ceremonies, folklore, folk songs, dances, and games. Based on the explanation above, it is possible to conclude that oral tradition is a traditional tradition that is carried out orally without the use of a transcript or other documentation. As a result, it is passed down from generation to generation.

According to Ahmadi (cited in Lubis, 2014), research on oral literature is important to carry out because it is not only useful as a form of reflection of thoughts, knowledge, and expectations...
(Lutfi, 2010: 42), but it is also useful as a means of documentation, inventory, and exploring cultural values and their distinctive functions for the supporting community.

2.3 Markobar

Markobar is a traditional custom that organizes and serves as an example of how to have a language. It also exemplifies civility in performing tutur manifestations based on the Dalihan na Tolu social system, which serves as the foundation for the Mandailing traditional rituals' procedure. As a result, social norms are established as a set of regulations governing the Mandailing traditional ceremonies' traditional speech and language patterns (Lubis, 2014). In Mandailing culture context, Markobar is a ceremonial speech spoken during Mandailing traditional ceremonies, such as the siriaon (celebratory party) or sililitun (religious ceremony or a party in the sorrowful atmosphere). Siriaon ceremony refers to a ritual to commemorate a happy occasion, such as a traditional wedding ceremony. Sililitun ceremony is held to honor the family in a sad situation, for example, the nature of sadness as death.

According to Lubis (2014), Markobar has its own allure. For some people who do not understand Mandailing customs, do not understand the variety of Mandailing languages, and do not understand Mandailing social and kinship relations, this Markobar event may be considered very boring, a waste of time, especially when some topics are reviewed only once and that's it. However, that is how olong (love) is used in the Mandailing custom. All family members who are considered important relatives must be identified. It will be unnecessary for those who do not understand, but those who do understand his position and position will be very offended if he is not placed in the customary density or given the opportunity to speak in traditional negotiations, even causing internal conflict in a relationship.

Based on the result of interview toward Daulay (2021) as atobangon in Padangsidimpuan, in wedding ceremony particularly pabagas boru event, Markobar has some participants such as, suhut, mora, kahanggi, hobar suhut/pareban, anak boru, pisang raut, atobangon, and araajaon.

2.3 Markobar in Pabagas Boru Ceremony

The most important activity in the Mandailing wedding ceremony, which is held in the bride's parents' home, is markobar in pabagas boru. It is an afternoon activity before the bride leaves her parents' house for her husband's parents' house. It is sacred during the adat process.

3 Research Method

The qualitative research was used in this study. The total number of participants who spoke in Markobar 14 participants. The participants were 11th grade students at SMA Islam Plus Adzkia Medan. The technique of data analysis used Miles, Huberman, and Saldana (2014) such as, Data collection, condensing data, displaying data, and drawing/verifying conclusions.
4 Findings and Discussion

The categories of modality in the texts of Markobar in pabagas boru ceremony showed in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Modalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- High</td>
<td>11</td>
<td>16,5</td>
</tr>
<tr>
<td></td>
<td>- Medium</td>
<td>5</td>
<td>7,5</td>
</tr>
<tr>
<td></td>
<td>- Low</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>26</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>b. Usuality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- High</td>
<td>1</td>
<td>1,5</td>
</tr>
<tr>
<td></td>
<td>- Medium</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- Low</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>1</td>
<td>1,5</td>
</tr>
<tr>
<td>2</td>
<td>Modulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Obligation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- High</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>- Medium</td>
<td>5</td>
<td>7,5</td>
</tr>
<tr>
<td></td>
<td>- Low</td>
<td>14</td>
<td>21,5</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>32</td>
<td>49%</td>
</tr>
<tr>
<td></td>
<td>b. Inclination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- High</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- Medium</td>
<td>7</td>
<td>10,5</td>
</tr>
<tr>
<td></td>
<td>- Low</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>7</td>
<td>10,5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

It was found that the categories of modality (probability, usuality, obligation, and inclination) were found in Markobar’s texts in the ceremony of pabagas boru. In modalization, high (16.5%), medium (7.5%), and low (15%) probability were found. However, only high usuality (1.5%) was found. In modulation, high (20%), medium (7.5%), and low (21%) obligation were found. Meanwhile, there was only medium inclination (10.5%) in Markobar’s texts in the ceremony of pabagas boru. Thus, obligation was dominant modality with the proportion 49%.

4.1 Modalization

Modalization is the speaker’s judgment to proposition. Modalization gives some options for the reader of the text in expressing the judgement of probability and the frequency of a proposition. Modalization involves the expression of two kind of meanings (Halliday and Matthiessen, 2004: 147).
**Probability.** Probability indicates the commitment or opinion to the truth of the clauses delivered by the speaker.

For instance:

Data 2:

Urak Kaya: “….. *Boti i ma*”.

(……It is likely that)

*Boti i ma* which was delivered by *urak kaya* used likely (as adverbial phrase) means that it is probability to support the previous clause namely, *aso leng malo hai mangatur on* (In order that we can arrange the ceremony : Data 1). After analyzing it, it could be categorized as high probability because the speaker (*urak kaya*) was sure what he uttered as well as the indication of probability namely commitment or opinion to the truth of the clauses delivered by the speaker.

Data 22

Kahanggi: “*Tar boti ma hata tai maaf*”.

(Perhaps, it’s only from me, sorry)

*Tar boti ma* (Perhaps) was delivered by kahanggi used perhaps (as adverbial phrase) means the probability to end his speech in *markobar*. It was categorized as medium probability because he was not really sure in ending his speech so he apologized to audience in *markobar* of *pabagas boru* itself.

Data 33

Anak Boru: “*Anggo au songoni majolo na dapot…….*”

(Maybe it is only I can do……)

*Anggo* (maybe) which was delivered by *anak boru* means probability to end her speech however she used *anggo* (maybe) categorized as low probability because it showed that she was not really sure with her decision or she didn’t know what she could deliver again.

**Usuality.** Usuality is expressed when the speaker expresses judgment as to the frequency with which something happening/being or how frequently it is true or both “yes” or “no”. Furthermore, in this research there was only one clause used usuality type which was in high value.

Data 48

Alim ulama: “*Na tarsadia be hata sian hami abenna madung selalu disampeon dalihan natolu dot hatobango*”
nakkin, cukup sekian ma hata ngen ami”.

(I can not say more because it’s always told by dalihan na tolu and hatobangon just now. That’s all from us)

_Selalu_ (always) which was delivered by alim ulama (region scholar) while delivering his speech in _markobar of pabagas bora_ ceremony. It showed that the frequency of providing suggestion to the bride and groom was “always” from the previous speakers. Thus, he only followed others. This modality was categorized as high usuality because the speaker directly stated it in his clause.

### 4.2 Modulation

Modulation is the way speaker/writer expresses the judgment or attitudes about actions and events.

**Obligation.** Obligation occurs when the speaker or writer gives command, suggestion, demand, and advice to the listener or reader. For instances:

**Data 7**

_Suhut_ (bride’s mother) delivered her speech by using the word “akkon” means must in English. It’s an obligation to her daughter to follow religion and her husband. Thus, it’s categorized as high obligation.

**Data 3**

_Suhut_ (bride’s mother) delivered her speech by using the word “malo” means can in English. It means that she wanted her daughter to be able to adapt with her new family. It was categorized as medium obligation because the speaker only used “malo” once which didn’t make a negation toward her statement. Philosophically, adapting to new family can be slowly. Meanwhile, following religion is a must because it is an individual obligation.

**Data 18**

_Kahanggi_ : “…… sehingga dapot menuntun kehidupan rumah tangga yang lebih baik.”
The clause above was delivered by kahanggi. She stated dapot which implied an obligation to a new couple so groom can guide the bride for their better family life. It was kind of an obligation as husband’s duty in a family. Then, the speaker tended to select the word dapot in obligating the groom in low value.

**Inclination.** Inclination represents the tendency of writer/speaker in doing something and capability from his or her own feeling. In this research, it was only found medium inclination in *markobar* of *pabagas boru* ceremony. For instance:

Data 58

Groom: *Mudah-mudahan nian markesehatan sude dah tulang dot koum namu sasudena dot nattulang sudena dison.*

(Hopefully, all of us are healthy, aren’t we tulang? And all of our family and nantulang here.)

While responding all the speeches from participants of *markobar*, the new couple was obligated to respond. Thus, while responding *markobar*, the groom delivered his speech by stating “*mudah-mudahan*” in English hopefully. It was as his hope toward all his family including his wife’s family by stating tulang and nantulang (father and mother in law). It expressed his willingness. Thus it’s categorized as medium inclination. It was not categorized as high inclination because he didn’t directly state “want” in his speech which expresses high inclination.

As a result of the research, speakers used probability and usuality to express modality, while obligation and inclination were used to express modulation. The modality categories discovered were also relevant with modality values such as high, medium, and low. The dominant meaning in modalization was probability (39%) meanwhile usuality was only 1.5%. The meaning expressed was in different value or degree such as, in probability, it was also found that there were probability in high (11), medium (10), and low (5) value. Then, for usuality was only found in high value (1). Thus, the dominant meaning was probability (96%). Furthermore, The dominant type in modulation was obligation (49%) and inclination was only 10.5%. Additionally, there were high (13), medium (5), and low (14) value of obligation found. Meanwhile, it was only medium inclination (7). Therefore, the dominant meaning expressed in modulation was obligation (82%). In conclusion, the speaker used modulation type dominantly. The finding was relevant with previous study conducted by Rahmasari (2020) analyzing modality on the official website of Indonesian tourism which showed that the author used probability, usuality, obligation, and inclination. However, that study didn’t explain about the value of modality specifically.

**5 Conclusion**

Modalities used in Markobar's texts for the pabagas boru ceremony were classified as (1) modalization, which was divided into probability and usuality, and (2) modulation, which was
divided into obligation and inclination. Modulation was the most commonly used category, accounting for 59%, while modulation accounted for 49%.

Based on the finding, it could be concluded that modals used by the participants means that the 11th grade students at SMA Islam Plus Adzkia Medan had understood about modality categories.

**Authors’ Contributions.** The authors’ contribution in the study was doing some steps in conducting a research such as, collecting data, analyzing data, displaying data, and drawing the result of research or making a conclusion.

**Acknowledgments.** Praise be to Allah SWT for His Great Blessing, Health, and Luck, which have been continuously poured on the researcher as she completes her studies and this piece of academic writing. Praise is also given to our Prophet Muhammad SAW, who has led us to a better life. In the process of completing this study, the authors must express her profound gratitude to many people for their generous guidance and assistance.

**References**


The Effect of Think Pair Share Cooperative Learning Model on The Learning Outcomes of Class V Students at SD Negeri 097522 Siantar

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Abstract
Cooperative Learning Think Pair Share and interest in learning to student learning outcomes. Students in the fifth grade at SD Negeri 097522 participated in the study. This research was a Quasi Experimental Design type. Data analysis using SPSS 22.0 with 2x2 factorial. The instruments used are Civics learning outcomes tests and learning outcomes instruments. This study aims to analyze: (1) The model of shared learning has more of an impact than the more traditional method of individual instruction; (2) Students with higher learning outcomes also demonstrate greater growth in their civics knowledge than students with lower learning outcomes (3) cooperative learning model interactions and (4) student learning outcomes in influencing student Civics learning outcomes. The study's findings indicate: (1) Grade 5 SD Negeri 097522 Siantar students' civics knowledge is improved through the use of the cooperative learning model; (2) Students who show a strong motivation to learn fare better than those who don't when it comes to acquiring knowledge of civics; (3) Student learning outcomes in Civics at SD Negeri 097522 Siantar are influenced by the cooperative learning model.

Keywords: learning outcomes, cooperative learning model, TPS

1 Introduction

The place where human resources can be developed and improved is in the educational environment. Human minds, hearts and hands can be prepared for a brighter future through learning. The education system of a nation is one of its most valuable assets. The field of education has received a lot of focus in recent years as a means of raising the standard of teaching provided to students. Better educational processes can help raise standards and quality.

Education in accordance with Law No. 20 of 2003, which stipulates the National Education System, is “a deliberate and integrated effort to create a learning atmosphere and learning process” that helps students “actively develop” traits such as “religious spiritual strength”, “independence of control”, “personality”, “intelligence”, “noble”, and “skills needed by himself, society, nation and state”. According to the definition of education contained in Law Number 20 of 2003, education is a deliberate and planned effort, where the teaching and learning process in schools is not a process that is carried out haphazardly but strives for everything that is done by teachers and students. student. directed to achieve learning objectives.
There are several causes for the low academic achievement of students. Students themselves are internal factors, while the learning environment, teachers, and school physical plants are all external factors. The teacher's skill in applying an effective learning model is one of the external factors that can affect student progress in the classroom. Teachers are critical to the success of the learning process in this setting. The teacher's role in learning management is to foster an attractive classroom climate in which students are not bored or discouraged by the material being discussed. It is possible to see one of the teacher's responsibilities as engaging in some kind of activity with the class which has the dual purpose of teaching and inspiring its students.

According to Muchith (2017: 73), constructivism theory, which is defined as the process of building knowledge through a series of experiences, defines an innovative, inspiring, and interactive learning process. The Think-Pair-Share-Type Cooperative Learning Model is a teaching and learning approach that relies on student collaboration and is considered to improve academic performance. This educational approach places emphasis on activities that foster a sense of student agency in a caring and supportive environment. Students are expected to actively participate in learning as a group by conducting independent research for relevant content. The Think Pair Share learning model prioritizes creating a classroom where every student feels valued, safe, and comfortable so that they can achieve their full academic potential in the classroom.

2 Method

The design of this study is experimental and uses a 2x2 factorial layout. The think-pair-share collaborative education model is the independent variable here. Student learning outcomes classified as high or low become the moderator variable in this study. Observing the tendency of student learning outcomes in learning during the learning process can reveal students' interest in learning.

The purpose of the test is to ascertain how well students have internalized the subject matter. The learning outcomes test refers to the Civics subject with the theme "Globalization". Learning outcomes test in the form of multiple choice as many as 10 questions. If the answer is correct, it receives 1, and if it is incorrect, it receives 0. Validation, reliability, difficulty, and other tests of varying power are performed before the actual test questions are distributed.

The sample in this study was taken as a whole population, namely a total of 54 students, evenly divided between classes IV-A and IV-B (27 each). Class IV-A acted as the research experimental group, and they were instructed to use the think pair share cooperative learning model, while class IV-B served as the research control group and was guided by a direct teaching style.

In conducting this research, the writer will do the following things:

1. Carry out Preliminary Study

Conduct a preliminary study to obtain the problems that are being experienced by teachers and students and determine the research sample. Next, arrange a schedule with the class teacher to conduct experiments.

2. Carry out pre-test (initial test)

A pre-test is given before starting the lesson in the class to be sampled. The purpose of this exercise is to ensure that all students start at the same level and to measure their level of understanding in the Freedom of Expression material.

3. Conducting teaching treatment for both classes

Learning using the Cooperative TPS model in the experimental class while in the control class is learning by using a direct teaching model.

4. Carry out post-test (final test)

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A post-test is administered after the instruction has concluded to determine how well students have internalized the concepts covered. In addition, the results of subsequent examinations are fed into a statistical procedure known as hypothesis testing.

Testing the truth of a study requires the right method to analyze the data. These data were analyzed using inferential statistics. In this study, the hypothesis was tested using Two Way Anova (also known as ANOVA) at a significance level of 5%. Before we run the two-way ANOVA, the normality and homogeneity tests of the data which are part of the requirements analysis check are run first.

To ensure that the data were normally distributed, the Shapiro-Wilk test was used, and the significance level was set at 0.05. If the significance level of the normality test is greater than 0.05, the data is considered normally distributed. The data are not normally distributed, if the significance level is less than 0.05. At the same time, Levene's test was performed on the data to ensure the data was consistent, setting the significance level at 0.05. If the significance level of Levene's test is greater than 0.05, the data is assumed to be homogeneous. On the other hand, inhomogeneous data are indicated by the sign sig. value < 0.05. SPSS version 23 was used to check whether the data were normally distributed and otherwise homogeneous. After verifying that SPSS can handle the data, a two-way ANOVA is performed.

Measurement of student learning outcomes using pretest and posttest with the same questions but different time spans for the distribution of tests. In the control group, students obtained an average score of 51.11 in the pretest for Civics learning outcomes, while in the experimental group the average was 54.07. Students in the control group had significant learning outcomes as measured by the pretest. H0 is accepted because (=0.059) is greater than (=0.05), and sig. (=0.073) is greater than (=0.05) in the experimental class students. That is why the Control and Experiment groups are normally distributed.

Significance indication, both data sets of student learning outcomes. Because the value (= 0.861) is greater than the threshold (= 0.05), H0 is accepted. This indicates that the variance of the two samples is homogeneous. The average post-test score of student learning outcomes in the Control Class is 57.04 and in the Experiment class is 64.81.

The post-test results of the control group students showed significant learning outcomes. H0 is accepted because (=0.059) is greater than (=0.05), and sig. (=0.073) is greater than (=0.05) in the experimental class students. Both sets of information on student learning outcomes on the assessment have a significant value. Based on the results of the prerequisite tests that have been carried out and it is stated that, the average learning outcomes and therefore, it can be concluded to test the statistical hypothesis with two ANOVA.

Based on the SPSS output, it is obtained that F_count (=2.068) > F_table (=4.03) and sig. (=0.00) < (=0.05). The results of the analysis of variance are in Table 4.11. The learning model has a significance value of 0.00. shows that students who are taught Civics using a cooperative learning approach learn higher than their peers who are taught using a direct instruction approach. This is because at the 5% significance level, the results of hypothesis testing can reject H0 or accept Ha, depending on the sig value. 0.00 < 0.05.

3 Result and Discussion

The learning model is a stage, plan, process designed in shaping the curriculum carried out in educational resources designed to be used in the long term, and guides learning that is used as a reference for teachers in achieving educational goals. Learning models are things that must be prepared before doing learning.
Saragi (2014:119) The purpose of constructivist theory is to explain in depth how children learn art through play, and how constructivism relates to play theory in children's learning. According to Khairani (2013:3) "learning can be defined simply as any effort or pursuit with the ultimate goal of changing individual characters by influencing their thoughts, feelings, and actions".

The above point of view shows that learning is a mental process that culminates in the acquisition, storage, and application of information to bring about changes and improvements in one's behavior. Students who do not master a subject or who have not mastered certain concepts in TPS Learning can explain it by their partner. If students still don't understand, try to explain it to them in a straightforward, everyday manner. TPS training can increase a person's capacity to articulate thoughts and evaluate them based on the thoughts of others. Educate students to respect themselves and others while accepting their flaws and those of others. Students can learn to test their knowledge and understanding and improve with the help of teachers and peer feedback.

Specifically, the TPS method divides learning into three stages:

Step 1 – Thinking: The teacher asks questions about the central government system, for example the definition of government, and state institutions. Each student is given one minute to find a solution or analyze their own problem.

Step 2 – Pairing: Next, the class is asked to form pairs or small groups to discuss the topic being discussed. In this step, students and their partners can exchange ideas about the central government, as well as state institutions. If a question is asked or a problem is identified, the group can work together to find a solution during this time. Teachers usually give students 4 or 5 minutes to pair up.

Step 3 – Sharing: The final step is to divide the class into pairs, and the teacher asks them to collaborate for the whole class on government materials and components of government in Indonesia. The most efficient way to achieve this is for teachers to move from pair to pair throughout the class, allowing at least one member of each pair to report.

At this sharing stage, the pairs read their partner's opinion in front of the class and the other pairs will listen to the opinion read by the pair or respond, in addition to responding to the partner who can also provide input to the pair who reads it.

The skills and knowledge acquired by students are known as learning outcomes obtained after following a learning process. Because this knowledge is now embedded in the student's way of life, it will follow them throughout their lives. Whether it's a business venture, personal endeavor, or anything else, the end result of your work will always be evaluated. This applies not only to the work you do for your business, but also to the work you do in class. Changing one's behavior is the end result of a learning process, while the activity or effort needed to bring about that change is learning itself.

According to Hamalik (2014: 30) suggests that when someone has learned, they will change their behavior in several ways, moving from ignorance to knowledge or confusion to understanding.

Written, oral, and performance assessments are several forms of planned assessment that can be used to measure learning outcomes, as stated by Sudjana (2013: 276).

So it can be concluded from the discussion above that what students actually learn are abilities and knowledge that are measurable as a direct result of engaging in learning activities that cause them to adjust their way of thinking and which can be measured quantitatively through the provision of appropriate tests. The extent to which students demonstrate mastery of a topic can be measured in terms of the learning outcomes assigned to that material.

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According to the author, theoretical and abstract strands dominate in the cognitive domain, which means that knowledge will eventually become the universal criterion used by educators to evaluate students' mental abilities. A sub-taxonomy of cognitive domains expresses mental activity that typically begins at the knowledge level and progresses to the highest level of the domain, evaluation. Attitudes and interests, motivations, feelings, emotions, and moral characteristics are all important components of a well-developed student, and this is what the affective domain focuses on. Students will show various behaviors that show the characteristics of affective learning outcomes.

### 4 Conclusion

Research and discussion of previous research resulted in the conclusion that students who used the Think-Pair-Share cooperative learning model achieved better learning outcomes than students who used the direct learning model. Statistically, there is no significant learning model above 0.00. Therefore, the Think-Pair-Share cooperative learning model is superior to direct learning, as sig. Alternative (Ha) is accepted and the null hypothesis (H0) is rejected if the p value is less than 0.05 at the 5% significance level.

### References

Development of LKPD Based on Local Wisdom to Improve the Learning Outcomes of Grade 6 Students at SDN 040460 Berastagi

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Abstract. The research objectives to be achieved are the process of making LKPD based on local wisdom, the level of validity, the effectiveness of LKPD implementation of LKPD based on Local Wisdom in increasing student interest in learning and the use of LKPD in improving learning outcomes. The results of the research obtained are that the LKPD that has been developed has been very valid (very feasible) to use and does not require any more improvement according to BSNP standards, with an average calculated value of 4.93. The increase in student learning outcomes using LKPD based on local wisdom was higher than the learning outcomes of students who used conventional books, namely 68.35% > 23.55%. The results of hypothesis testing student learning outcomes obtained a calculated price of > ttable, namely 30.04 > 1.708 with a degree of significance (α = 0.05) so that Ha was accepted.

Keyword: Thematic Learning, LKPD, Local Wisdom, Learning Outcomes, Interest in Learning

1 Introduction

Education is a form of learning process that is integrated with the stages and concepts taught by the teacher to find and synthesize science and knowledge into science. In education, learning is a very common process with a form of learning. The learning process is a gradual process that must be supported from one's surroundings. In the process, learning is done by observing, understanding, and living. Thus, the results in these stages are used as knowledge that is conditioned by the construction of understandable knowledge.

The 2013 curriculum that is currently being implemented emphasizes learning with high-level and creative thinking processes. The high-level learning process is introduced from an early age so that in the process students not only know, but can observe, analyze and try or make something that can be used by the wider community.

The key to a structured and directed learning process is to comply with and develop learning signs that are aligned with the state of the school environment. In addition, the need for school facilities and infrastructure in the form of compulsory reading books and exercise books is also an important reference in the success of learning methods. Included in these important needs is the Student Worksheet (LKPD). In general, the LKPD obtained by students focuses more on the
facts of the field situation of the book publisher or the author of the exercise book. Coupled with the teacher rarely gives examples of questions that are developed and harmonized with the environmental conditions of students. Thus, students do not get an overview of the material being asked in real terms in accordance with the student's environment.

Local wisdom is one of the characteristics of a nation in showing identity and life. Indonesia itself has different local wisdom and is adapted to regional conditions, adaptation processes, and human experience to survive. Indonesia is an archipelagic country that has high ethnicity and local wisdom. Thus, the diversity of local wisdom makes it one of the wealth that should be studied. In this context, an understanding of local wisdom needs to be emphasized.

Based on the identified issue, the problem of this research is:

1. Are the Letters of the Clan Clan Policy League based on a local sub theme building a society of prosperity that has developed according to the BSNP standard? Two. Is the Letters of the Clairvoyant Clan of Local Arabic theme that built a society of prosperity that has developed can increase student interests? 3. Are the League of Editor-based Editor-based Cub with Sub Theme Building a health society developed can increase student studies? The Advised Advisors' Law is one of the tools or test forms given to students by teachers by way of testing the results of the learning results by taking care of material adjustments. The editor's Law Registration was given with a few questions that the students had to have had to give the matter what they had to give the students to answer the matter in accordance with the experience of learning that he had.

The development of the Student Worksheet is of course based on the part of the student material submitted by the teacher to the students. Part of the learning material must produce Student Worksheets (LKPD) so that it is one of the learning materials that can be provided and arranged by the teacher. Prastowo reports that LKPD is a printed learning material in the form of sheets of paper containing modules, summaries, and guidelines for implementing learning tasks that must be completed by teaching participants, which refers to predetermined targets. That way, the LKPD itself is a summary file and a summary of the modules that have been given and there is an assignment as a form of developing the LKPD itself.

Adaptation process that prioritizes the use of environmental recognition. Humans basically have mindsets and thoughts based on human experience with their environment. Culture and local wisdom are very close and of course produce external relationships between humans and nature, between humans and reciprocal relationships that prioritize the process of understanding each other.

Wardiyanta, et al reported that local wisdom is the use of creativity or local insight to improve local communities, thus creating new tools of insight. Local virtues can be classified into 4

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types: 1) things that are abstract and related to beliefs, 2) abilities that save people, 3) structures of insight, 4) sources of thought. The Karo people are one of the people who inhabit the highlands between Mount Sibayak and Mount Sinabung in the province of North Sumatra. Agricultural land in Karo Regency is very suitable for vegetable and fruit types. Moreover, these vegetables and fruits are important agricultural products of the Karo people, which are consumed by the people of North Sumatra.

The people of Berastagi are almost entirely Karo people who still carry out the Karo cultural system in their daily lives. The use of the Karo language, customs such as wedding ceremonies, deaths, births and celebrations of Karo cultural festivals can still be found in Berastagi City. Discovering the local history of Karo Culture can be found at the Karo Heritage Museum in Berastagi City. Community organization systems, arts, agricultural systems, etc. can be used as material for knowledge and skills in the learning process that takes place in schools. Local wisdom in the city of Berastagi in the development of this research focuses on the cultural results of the karo community in the city of Berastagi and its surroundings. The local wisdom discussed is about the potential that protects the community including the potential that protects the Karo community starting from customs, folklore, marriage systems, split eye systems, technology systems and social systems and organizations that exist in the Karo community in Berastagi City and its surroundings. The body of knowledge in the Karo community in the surrounding Berastagi city refers to knowledge of the family system, survival, arts and organizational social systems. The process in the body of knowledge that has been obtained will become intellectual capital or knowledge that is applied by the people of Berastagi City to become a discourse of knowledge.

The application of local wisdom in the implementation of the learning process in elementary schools can be developed and adapted to the KI/KD that has been regulated by the government. Teachers are very active in the development of teaching materials such as LKPD. The creativity and innovation of teachers in learning methods and relying on information systems that are easily accessible and accessible by teachers to students by utilizing culture. The form in a culture that is integrated with local wisdom is made with an understanding that is easy and can be understood by students. Does not eliminate the essence of KI/KD in learning and becomes a strengthening of regional education.

With the existence of learning in education that is integrated with local wisdom, it does not leave the essence of the core learning material. This will also be based on the development of Student Worksheets based on local wisdom as a form of strengthening our nationalism in the nation and state.

1.1 The Nature of Learning Results

In carrying out the learning process, of course there are hopes and desires to be achieved. In this case, of course, the main thing to do is to provide learning strategies and the application of models and forms of tests by showing the learning outcomes expected by the teacher to students. According to Supardi, et al. states that the learning outcomes are cognitive, affective or psychomotor competencies or special skills that are achieved or understood by students after exploring learning activities. Learning outcomes are student attitudes as a result of changes after

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learning. This transformation is attempted in the way of learning in order to achieve learning objectives. Transformation of people's attitudes, the impact of learning activities is not singular, each way of learning affects the transformation of attitudes in students, related to the desired transformation, conformity with learning objectives. Learning outcomes are skills that students acquire when they gain experience from these activities.

The process of changing the desired in terms of both cognitive, affective and psychomotor depending on the learning needs of students who are expected by the teacher to be achieved. Of course, achieving these learning outcomes requires a learning process and an assessment of the expected learning. Nana Sudjana explains that method is an activity that students try to achieve teaching goals, on the contrary, the results of practice are skills that students have after they get experience from the learning.

Thus, the learning process in Thematic learning in Elementary School Thematics in achieving the desired learning outcomes depends on concepts, methods, strategies, learning models and forms of assessment or assessment that measure cumulatively in order to obtain learning outcomes that are adjusted to educational standards at the unit level. elementary school education. By providing the form of learning outcomes, of course departing with Bloom's taxonomy thinking in terms of achieving learning outcomes based on the Cognitive, Affective and Psychomotor domains.

The process of learning outcomes can be measured by measuring learning outcomes. Supardi states that the measurement of learning outcomes is to compare reality or measurement objects to values in order to ensure the amount of quality or amount of achievement of learning objectives by teaching participants. Activities related to measuring learning outcomes are based on the realm of Bloom's taxonomy of thought in the learning achievement process.

Based on Piaget's theory, grade VI Elementary School children aged 7 (seven) to 11 (eleven) or 12 (twelve) years are at the stage of Concrete Operations development. At this stage, children develop skills to maintain, classify carefully, carry out ordering, and overcome value schemes. The way the child's view in this step is shown in real events that can be observed by the child.

In developing the current curriculum, of course, elementary schools generally provide a revised 2013 curriculum in accordance with the needs of educators and the development of the times which focuses on the need for technology that is tailored to the abilities of students at each level. In terms of the development of a renewable curriculum that is based on the state of the pandemic and the need for more renewable education, it demands the latest output in terms of providing a driving curriculum. Of all these curricula, of course also based on the school and home environment as a benchmark for student learning in the process of observing, classifying and providing an evaluation process in terms of social life both theoretically and in practice.

Local wisdom is one manifestation in Social Sciences. This can be actualized by the process of adaptation, community habits which include mindset, family, environment and economic

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5 Supardi, *Op Cit*, pp 17
problems. Problems in human life to the environment are part of thematic learning. Thus, in strengthening the material taught in elementary schools, emphasis and understanding of thematic learning is developed by making LKPD teaching materials as a form, process and implementation of interest and learning outcomes obtained by students.

In improving learning products by paying attention to development models in order to determine their quality, the use of learning material development models in a systematic way and in accordance with the principle will ensure the quality of the content of learning materials. The form of development is intended as a conceptual design in an effort to increase the role of the existing form or the latest form formed, through the accumulation of learning parts that are thought to be able to improve the quality of achievement.


In determining the learning outcomes, the main factor that becomes the benchmark for student success is the ability of teachers to develop teaching materials prepared by loading Student Worksheets as a benchmark for student success in the classroom. With the provision of the Student Worksheet, the teacher must be able to provide directed and focused learning materials that are in accordance with the syllabus so that the development of the Student Worksheet can be packaged properly. With things based on local wisdom, students become richer in information and can further explore the learning outcomes obtained. The assumption obtained in the learning outcomes is to see the effectiveness in answering the questions of the Student Worksheet so that the questions can be developed properly and correctly.

2 Method

This type of research is research and development (Research and Development). R&D research is a method used to improve and validate learning products. The results of development research are not only related to developing existing products but also creating insights or responses from practical efficient cases. In this study, what will be developed is LKPD based on local wisdom to increase students' interest and higher-order thinking skills. The final product is evaluated for feasibility and effectiveness so that this research can produce a product, namely Student Worksheets based on local wisdom that can be used by teachers, students and other parties who need it. This research was conducted at SD Negeri No. 040460 Berastagi. The research was carried out in an educational program in Semester 2 of 2022. The subjects in this research were students of class VI semester II, totaling 2 local students in one school, namely SDN 040460 Berastagi, totaling 25 students for class VI A and 26 students for class VI B.
The object of this research is the development of local wisdom-based Student Worksheets on the theme "Towards a Prosperous Society" in the second sub-theme on "Building a Prosperous Community" to increase student interest in learning and learning outcomes.

This research is development research transformed from the Borg and Gall development learning forms. Development research is used to create specific outcomes and test the effectiveness of the resulting outputs. The product that is made in this research is a Student Worksheet based on Local Wisdom at SDN 040460 Berastagi. Previously, Student Worksheets used in schools were conventional Student Worksheets which were general in nature which sometimes did not match the facts that occurred in a particular area. While the Student Worksheets that will be developed in this study are Student Worksheets that adapt to local wisdom.

The research design was carried out in research on the development of Student Worksheets based on Local Wisdom. Research on Student Worksheets based on Local Wisdom begins with the development of innovative teaching materials. Then standardize the Local Wisdom-based Student Worksheet which was developed using a questionnaire in accordance with the BSNP standard which was validated by the lecturer. In the final stage, Local Wisdom-based Student Worksheets were distributed to students, to test student motivation, responses to Local Wisdom-based Student Worksheets, and the effectiveness of using the innovative Local Wisdom-based Student Worksheets.

In conducting this research, a limited trial was applied to sixth grade elementary school students. Students participate in learning activities using the Local Wisdom-based Student Worksheets that have been developed.

### Table 2. Research Design

<table>
<thead>
<tr>
<th>Class</th>
<th>Pre-test</th>
<th>Treatment</th>
<th>Post-Tes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment (trial)</td>
<td>$T_1$</td>
<td>$X_1$</td>
<td>$T_2$</td>
</tr>
<tr>
<td>Control</td>
<td>$T_1$</td>
<td>$X_2$</td>
<td>$T_2$</td>
</tr>
</tbody>
</table>

Information:
X1 = Learning using Student Worksheets based on Local Wisdom according to the 2013 curriculum
X2 = Learning using Conventional Student Worksheets
T1 = Pre-Test (Pre-Test)
T2 = Final test (Post Test)
Research Techniques The steps for collecting data carried out in this study, namely the development of LKPD based on local wisdom will be presented in the following table:

<table>
<thead>
<tr>
<th>No</th>
<th>Activities</th>
<th>Method</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LKPD design validation based on Local Wisdom</td>
<td>Assessment questionnaire addressed to Media Expert Lecturers and Material Experts as Expert Validators</td>
<td>LKPD Media Assessment Rubric Questionnaire</td>
</tr>
<tr>
<td>2</td>
<td>Trial is limited to students and teachers</td>
<td>Cognitive ability test based on students' local wisdom and teacher's questionnaire</td>
<td>Cognitive ability test based on local wisdom on students' ability to learn. The LKPD eligibility questionnaire is reviewed from the teacher's assessment.</td>
</tr>
<tr>
<td>3</td>
<td>Implementation of LKPD based on Local Wisdom</td>
<td>Cognitive test based on local wisdom</td>
<td>Pre Test and Post Test</td>
</tr>
</tbody>
</table>

The instruments used in this research include: 1. Cognitive ability test based on local wisdom as much as 2 times the initial test and the final test. 2. Expert judgment sheet, in order to get evaluation and input or recommendation from construction, didactic and technical experts on LKPD based on Local Wisdom.

2.1 Validity

According to Sugiyono⁶, he explained that validity is the level of accuracy between the information that takes place on the research subject and the power that can be reported by researchers. According to Sugiyono, the validity test can use the Product Moment Correlation method as follows:

Information:

To interpret the magnitude of the correlation coefficient is as follows:

- $R_{xy}$ 0.00 invalid
- $0.00 < R_{xy} 0.20$ very low validity (poor)
- $0.20 < R_{xy} 0.40$ low validity (less)
- $0.40 < R_{xy} 0.60$ moderate validity (enough)
- $0.60 < R_{xy} 0.80$ high validity (good)
- $0.80 < R_{xy} 1.00$ very high validity (very good)⁷

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2.2 Reliability

According to Sugiyono\(^8\) states that reliability is a series of measuring and measuring equipment that remains consistent if the measurement is carried out repeatedly. The purpose of the test reliability experiment is to measure the level of confidence and the stability of the test in measuring information. Test reliability experiments can be used with the Cronbach alpha method as follows:

\[
 r_{11} = \frac{k}{k-1} \left(1 - \frac{\sum b_i^2}{t} \right) \tag{1}
\]

Information:
- \(r_{11}\): Instrument Reliability
- \(k\): Number of questions
- \(2/b\): Number of variants of questions
- \(2/t\): Total variance

To make an interpretation of the magnitude of the correlation coefficient is as follows:
- \(r_{xy} \leq 0.00\) no reliability
- \(0.00 < r_{xy} \leq 0.20\) very low reliability (poor)
- \(0.20 < r_{xy} \leq 0.40\) low reliability (less)
- \(0.40 < r_{xy} \leq 0.60\) moderate reliability (enough)
- \(0.60 < r_{xy} \leq 0.80\) high reliability (good)
- \(0.80 < r_{xy}\) very high reliability (very good)

2.3 Difficulty Level

The level of difficulty according to Arikunto\(^9\) states that the number that represents the difficulty or ease of a question is known as the difficulty index (difficulty index). This difficulty index ranges from 0.00 to 1.00. This difficulty index represents the degree of difficulty of the questions. Questions with a difficulty index of 0.0 indicate that the question is very difficult, whereas an index of 1.0 indicates that the question is very easy.

2.4 Grain Difference

The item discriminating power according is the ability of the questions in separating high-ability students from low-ability students.

The formula for distinguishing power according to Arikunto\(^10\) is as follows:


\[ D = \frac{BA}{JA} - \frac{BB}{JB} = PA - PB \]  

(2)

Where:

\( J \) = total test participants
\( BA \) = total lower group participants with correct answers
\( BB \) = total participants in the upper group with correct answers
\( JA \) = total group participants
\( JB \) = total participants in the lower group
\( PA \) = proportion of upper group participants with correct answers (P as index of difficulty)
\( PB \) = proportion of lower group participants with correct answers with discriminating power classification

\[ D = 0.00 - 0.20 \text{ bad} \]
\[ D = 0.20 - 0.40 \text{ enough} \]
\[ D = 0.40 - 0.70 \text{ good} \]
\[ D = 0.70 - 1.00 \text{ very good} \]

The results of calculations using the above method can describe the level of question ability in separating between teaching participants who have mastered the module. The criteria for each question are as follows:

- Negative – 9% = very bad (discarded)
- 10% - 19% = bad (should be discarded)
- 20% - 29% = quite good (revised)
- 30% - 49% = good
- 50% and above = very good

30 whether or not the choice or function of the dictator is working

3 Result and Discussion

The data analysis technique used to analyze the results of the LKPD validation is descriptive qualitative, namely by looking at the feasibility of the LKPD from the results of the validation instruments used to assess the LKPD products. This questionnaire is used to collect validation data from validators consisting of validation, construction, didactic and technical experts. The results obtained will be used as guidelines for improving LKPD and analyzing the LKPD that has been prepared. Developed teacher assessment questionnaires and student interviews obtained from individual, small group and field group tests on the appearance and presentation of the developed LKPD. According to Sugiyono 11 stated that the statistical method used to analyze sample data and the results applied to the population. Inferential statistics are used for hypothesis testing.

The data analysis technique used to analyze the results of the LKPD validation is descriptive qualitative, namely by looking at the feasibility of the LKPD from the results of the validation of the instrument used to start the LKPD product. This questionnaire is used to collect validation

data from validators consisting of validator experts consisting of construction, didactic and technical validation experts. The results obtained are used as guidelines for improving the LKPD and analyzing the level of validity of the developed LKPD.

Individually, student learning outcomes are obtained by the following equation:

\[ NP = \frac{\text{score obtained by students}}{\text{maximum score}} \times 100\% \]  

(3)

Where:

NP = Percentage value sought

Criteria:

0% PPH ≤ 70% Students did not complete

75% PPH 70% Students complete

3.1 Research Subject and Object

The Process of Making LKPD Based on Local Wisdom. Development research to produce products in the form of LKPD based on local wisdom on the theme "Towards a Prosperous Community" in the sub-theme "Building a Prosperous Community" is carried out in several stages. According to the Borg and Gall development model. So, the stages carried out are Research and Information Collection, Planning, Develop Preliminary Form of Product, Preliminary Field Testing, Main Product Testing, Final Product, Dissemination and Implementation. In this stage, only 5 stages will be carried out.

The results of the research are descriptions related to the data obtained from the research that has been carried out. The data presented in this research consists of: (1) Analysis of LKPD based on local wisdom that has been developed with a questionnaire, (2) Validation by lecturers on LKPD based on local wisdom that has been developed, (3) Description of validation The question instrument used for the limited test is (4) a description of students' interest in learning and, (5) a description of the learning outcomes.

LKPD Analysis of Validity Results as Media and Teaching Materials. This study begins by analyzing the LKPD used as teaching materials for publishers A and B for the 2013 curriculum in elementary schools in general, especially in Berastagi and Karo Regency. The LKPD analysis was carried out based on a modified BSNP assessment questionnaire that had been validated by an expert validator. The analysis of book publishers A and publisher B consists of assessing the feasibility of content, language, presentation and graphics. The assessment is done by giving a score using the following criteria: 5 (very good), 4 (good), 3 (poor), 2 (not good), 1 (very not good).

Based on the data in general, it can be identified that the deficiencies contained in LKPD publisher B have similarities with publisher A's book, which lies in the aspect of presentation feasibility, which consists of less specific learning objectives to be achieved. Improvements are also very much needed from the aspect of presenting the basic theory, introduction to learning through problem questions, and less integration of learning models in its implementation. In contrast to LKPD publisher A, which has a valid content validation level, while publisher B's book is still within a fairly valid range, such as the aspect of language eligibility. Both aspects of the assessment can still be improved to be very valid such as the graphic aspect through an innovative development process.
The most important thing that becomes the main consideration in developing LKPD is based on problems that arise during observations when teachers and students use LKPD from publishers A and B, namely students are not actively involved in the investigation and exploration process in accordance with the character of learning which requires students to actively analyze the natural phenomena that occur.

**LKPD Development Based on Local Wisdom.** After analyzing the LKPD which is used as a learning guide, then the development of LKPD based on local wisdom is carried out. The reference used as consideration for the development of this LKPD is the weakness of the LKPD that has been analyzed previously.

The LKPD development stage is carried out by reviewing the basic competencies and indicators as well as the target objectives of the even semester VI class theme according to the revised version of the 2013 curriculum syllabus. After that, learning topics that support learning objectives are designed and developed from conventional LKPD.

The innovation made in the development of this LKPD is to integrate the LKPD with local wisdom in the school area that is the target of the research. This innovation was carried out to help students better understand the concept through local wisdom learning. In accordance with the problems that have been found through the analysis of publisher books A and B. This LKPD is also compiled by adding introductory pictures for each theme/topic so that the form is attractive in order to increase students' interest in learning the learning material.

**LKPD Analysis Based on Local Wisdom**

Local wisdom-based LKPDs that have been developed in accordance with the 2013 curriculum are then standardized or validated using an assessment questionnaire that has been modified in accordance with the needs of the LKPD assessment from the National Education Standards Agency (BSNP) eligibility questionnaire by a basic education lecturer at the State University of Medan (UNIMED).

The assessment of LKPD based on local wisdom is based on the responses of respondents (teachers and lecturers) to four aspects, namely the feasibility of content, language, presentation and graphics with criteria 1 = very bad, 2 = not good, 3 = good enough, 4 = good, 5 = very good. The results of the responses of lecturers and teachers to LKPD based on local wisdom class VI are as follows.

**LKPD Validation Results Based on Local Wisdom by Lecturers.** The results of the assessment of the LKPD based on local wisdom by a lecturer at the State University of Medan which has been developed for class VI SD for even semesters can be seen in the diagram in Figure 1.

![Fig. 1. The results of the validation of the feasibility of LKPD based on local wisdom that have been developed in accordance with the BSNP by the Lecturer](image-url)
From the results of the validation of the LKPD feasibility test based on local wisdom by the lecturer, it can be observed that the validation range for each aspect of the feasibility assessment is in accordance with the BSNP questionnaire. For the feasibility of the content, the average value obtained is 4.62, for the feasibility of the language obtained an average of 4.50, for the feasibility of the presentation an average of 4.46 is obtained, and for the feasibility of the graphic the average result is 4.80. Respondents also submitted recommendations, such as clarifying the quality of the images in accordance with the theme being studied. Based on the results of the validation based on the feasibility of content, language, presentation and graphics, it was stated that the LKPD based on local wisdom for sixth grade elementary school even semesters was very valid and very feasible to be implemented in a limited trial of students.

Data Analysis of Research Instruments on the Implementation of LKPD Effectiveness Based on Local Wisdom. Before carrying out the research, a research test instrument was first tested which aims to determine the level of validity, reliability, level of difficulty and discriminating power. This trial was carried out on sixth grade students at SDN 040460 Berastagi.

From the testing of the test instrument, it is known that:

**Test Validity.** Of the 40 questions tested, there were 23 valid questions and 17 invalid questions. Valid questions have the probability of being used as instruments in research, but invalid questions cannot be used as tools in research. The questions used in this research are 20 questions from valid questions, on the other hand 3 questions are not used because the questions have met each indicator.

**Test Reliability.** A reliable test is used to obtain the stability of the measuring instrument, so if the measuring instrument is used it always produces data that does not change. After selecting 23 valid questions to be used as research instruments, the reliability experiment was then carried out. All questions were tested for reliability using the Kuder and Richardson 20 (KR-20) test, obtained $r_{count} = 0.71$ of the questions that were categorized as valid where $r_{table} = 0.325$

**Difficulty Level.** A good question is a question that is not very difficult and not very easy. From the calculation of the level of difficulty (Appendix 20) there are questions that are declared heavy ($P=0.00-0.30$), moderate ($P=0.31-0.70$) and easy ($P=0.71-1.00$). There are 2 of the 20 questions used, which are declared difficult, 14 questions are declared moderate, and 4 questions are declared difficult.

**Differential Power Test.** Of the 20 questions used as research instruments, there is 1 question with very good discriminating power, 8 questions with good discriminating power and 11 questions with sufficient discrepancy.

**Distractors.** Of the 20 questions used as research instruments, there are answer choices that must be replaced, including answer choice A on item number 12 and answer choices A and D on item number 22. Based on the analysis of these instruments, it can be seen the criteria for the questions used as research instruments as shown in Table 4.1. the following:

**Learning Outcome Hypothesis Testing.** After getting the results if the data is normally distributed and homogeneous, then hypothesis testing is carried out using statistical tests, namely one-party t-test (right-hand test) through the use of SPSS independent t-test. This
experiment is used to obtain information whether the hypothesis in this research is accepted or rejected. The test parameter if tcount > ttable then the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected.

From the hypothesis test that has been carried out, it is obtained that the price > ttable is 8.18 > 1.708 with a significance level (α = 0.05) so that Ha is accepted and it can be concluded that if the LKPD based on local wisdom is more in the learning process, it will affect higher student learning outcomes, compared to the use of conventional LKPD.

**LKPD Implementation in Improving Student Learning Outcomes.** The results of the limited trial of student learning outcomes showed that there were significant differences in the data acquisition of students' pretest and posttest scores, as shown in Figure 4.13 below for the control class:

![Fig. 2. Distribution of Gain Pretest and Posttest Control](image)

Overall, the average pretest score for the control class was 35.20 and the average posttest score was 51.60. Meanwhile, for the experimental class, the difference in the acquisition of pretest and posttest scores can be seen based on Figure 4.14 below.

The average pretest value of the experimental class is 33.60 and the average posttest price is 78.60. Based on the acquisition of these scores, it can be identified a significant difference in the improvement of learning outcomes. The increase in learning outcomes in the experimental class is 0.68 or 68.35% so that it meets the moderate criteria, where the gain price is <0.7, while the increase in learning outcomes for the control class is 0.23 or 23.55% with low criteria, where gain < 0.3.

The development of LKPD based on local wisdom for learning the theme towards a prosperous society for even semesters has been successfully developed in accordance with the revised 2016 syllabus. The assessment of the LKPD based on local wisdom that has been developed in this study was carried out using a modified BSNP book assessment questionnaire in the form of LKPD assessment. The basis for developing LKPD based on local wisdom is based on the results of the analysis of the teacher's perception of the LKPD which is used as a guide to carry out learning from two different publishers, where students are not directly involved in the exploration and investigation process which is the main character of learning.

Furthermore, in the assessment of LKPD based on local wisdom, the aspects assessed are the feasibility of content, presentation, language and graphics. Based on the results of the assessment that has been carried out, the average LKPD based on local wisdom is 4.93 which means it is very valid (very feasible) so that it does not require further revision. This value is higher than the conventional books that have been analyzed, namely publisher A with a
validation result of 3.38 with quite valid criteria and does not require improvement and publisher B with a validation assessment of 3.25 with the same criteria, which is quite good and does not require improvement. Although the results of the analysis stated that the two books do not need improvement, they still need to be developed so that they have very good assessment criteria (very feasible) to use.

After developing the LKPD based on local wisdom, then a trial was carried out on the experimental and control classes. Hypothesis testing is the step of data analysis of learning outcomes carried out. The results of the hypothesis test show that the learning outcomes of students who use LKPD based on local wisdom are greater than the results of practicing students who are taught by conventional LKPD. The percentage increase in learning outcomes for the experimental class is 68.35%, this figure is greater than the average number of control class students, which is 23.55%. This proves that LKPD based on local wisdom that has been developed is efficient in improving student learning outcomes. So with the development of innovative local wisdom-based worksheets, it can improve student learning outcomes.

4 Conclusion

Based on the results of research that has been done, it can be concluded that: LKPD based on local wisdom that has been developed in the theme of learning towards a prosperous society class VI even semester has been very valid (very feasible) to be used and does not require further improvement, with an average value of 4.93. The conventional LKPD used by schools has met the criteria of being quite valid according to the BSNP standard, but improvements are still needed in several respects, which obtained 3.38 for publisher A and 3.25 for publisher B on average.

The application of LKPD based on local wisdom in learning affects student learning outcomes in developing towards the effectiveness of developing LKPD based on Local Wisdom, where based on the results of hypothesis testing student learning outcomes, the value of tcount > ttable is 8.18 > 1.708 with a significance level (α = 0.05 ) so that Ha is accepted and it can be concluded that student learning outcomes taught by LKPD based on local wisdom are higher than student learning outcomes taught using conventional LKPD. The increase in student learning outcomes using LKPD based on local wisdom is higher than student learning outcomes using conventional books, which is 68.35% > 23.55%. The theoretical learning required of students should be adapted to the local wisdom of the area. This is done so that students' interest in learning increases so that they can achieve learning objectives. The use of an attractive Student Worksheet (LKPD) is highly recommended, in order to attract students to learn.

References

Teacher ways to Engage Students in Learning Descriptive Text Through Online Learning

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Abstract. Online learning is learning that takes place over the Internet for a variety of learning purposes. The objectives of this study is to find out the ways of engaging students in learning Descriptive text through online grade VII of Junior High School students. A qualitative descriptive research design was applied and the data were gathered from the teacher and students' sentences during online learning. This study followed the theory of Young (2006) about the effectiveness ways of engaging students in online learning. The data of this study were collected by observation technique. Furthermore, the result showed that there were seven ways to engage students in learning descriptive text through online learning. They were: a) Adapting to student needs, b) Using meaningful examples, c) Motivating students to do their best, d) Facilitating the course effectively, e) Delivering a valuable course, f) Communicating effectively, and g) Showing concern for student learning.

Keywords: online learning, engagement, ICT, descriptive text

1. Introduction

Learning that takes place online does so via the Internet. There are two types of online learning: synchronous and asynchronous [1]. Participants in synchronized forms must communicate in person, connecting teachers and students through chat rooms or streaming audio. Asynchronous learning, on the other hand, enables students to access prepackaged software whenever they want, work at their own speed, and interact with a teacher or even other students via email or social media. Many applications, like Zoom, Google Meet, and others are already available without charge to promote effective learning processes. A good internet network and the use of those programs as online learning tools are two key components of effective online learning.

Engagement is crucial to student learning and satisfaction in online courses. According to [2], the goal of engagement techniques is to give students good learning experiences, which include possibilities for active learning including taking part in collaborative group projects, having students lead presentations and discussions, etc. Beside, teaching techniques have main role in engaging students during the learning process. Teaching technique is the implementation execution of what happens in the classrooms, [3]. It is a specific trick, plan of action, or tool that used achieve a certain goal. In other words, technique is a way to reach the idea in teaching. Good teaching techniques will aid instructors in presenting their content, and students will be more eager to learn.
The Nature of Online Teaching

Teaching online, according to [4] is delivering a course partially or fully through the internet, either through the Web or through mobile apps. It is delivered using platform which is connected to the internet network. Online is used to provide all types of topic information, as well as for communication, teaching, and test. Several applications, such as Google Classroom, Google Meet, Zoom, and Social Media can help this online teaching system.

The online teaching environment separates students and teachers physically. Physical separation means the learners and teachers are not in the same room. In fact, they can be at great distance geographically. Therefore, as [1] states that communication and interaction between teacher and students takes place through various technologies e.g., by e-mail, video, telephone, etc.

Engagement and Online Teaching

Because of the perceived lack of options for connection with the institution among online learners, student participation in online learning is crucial. Therefore, it is crucial to establish a variety of chances for students to engage in the online environment.

The engagement principle is simple and clear-cut: students learn more about a subject the more they study it, and students develop a better understanding of what they are studying the more they write and solve problems collaboratively and receive feedback from faculty and staff [5]. According to this concept, when students participate in learning activities like having a discussion or working together to solve a problem, it improves their understanding and encourages further participation in course activities.

Teacher’s Ways of Engaging Students in Online Teaching

There are 7 ways in engaging students of effective online teaching [6]. They are as follows:

1. Adapting to student needs
   At the most basic level, learners needs efficient equipment, such as computer, laptop, tablet, smartphone, which has access to the internet connection in order to complete the course. Besides, easy and convenient application is also students need during online learning. Besides, students need technical support from teachers when they experience problems while studying or doing assignments, as well as comfort with technology and good reading and writing abilities.

2. Using meaningful examples
   Meaningful examples help students in making connections between the concepts presented and their personal experiences. The example can be meaningful if the concept presented can be associated with the knowledge the students already have. Such knowledge is called prior knowledge or schemata. The meaningfulness of the example is resulted from the ability of the students to make association between the example and their schemata.

3. Motivating students to do their best
   Motivating the students to do their best can make them more engaged. Some ways to do this are encouraging students to speak up, to think or to share ideas, keep trying and learn to correct mistakes, and giving student’s rewards.

4. Facilitating the Course Effectively
   Facilitating the course is a teacher's strategy to assist students in acquiring, retaining, and applying knowledge and skills to achieve learning objectives. In order to engage
students in learning activities, the teacher must create a direct relationship with them. Teachers can utilize an appropriate application which is simple to use to carry out this activity. They can use group discussion or activities like role playing to help the students learn more effectively. Furthermore, teacher can create some questions to keep the discussion going, giving clarification, and assist online learners in connecting theories to practice.

5. Delivering a valuable course
An online teacher must design the course in advance, preparing materials, schedules, evaluations, and even discussion topics for the course. Teachers work hard to involve everyone in the learning activities. This includes creating an organized and pleasant classroom atmosphere as well as engaging with students on a consistent, thoughtful, and personal way. When students get a lot of benefit from an online course, its considered effective.

6. Communicating effectively
Two or more people sharing facts, ideas, views, or emotions is referred to as communication. Good communication between teacher and students in an online classroom has a big influence on student satisfaction and willingness to study. Giving clear and complete message is one way of making effective communication because such message enables the students to understand what were they expected to do as well as enable them to respond correctly.

7. Showing concern for student learning
Showing concern is a way to get students’ participation so that they can be more effective in learning. This concern refers to a teacher’s care of his students’ understanding of a lesson. It can be realized by giving short summary at the end of lesson. Giving summary is believed to enable the students to get more understanding. Besides, teacher can provide opportunity for students to ask questions and work together in group in order to complete the task given by the teacher.

2. Method
A descriptive qualitative research design was used to carry out this investigation. The data of this research are the teacher’s and students’ utterances in learning Descriptive text, the teacher’s ways to engage students in online learning. These data came through teacher and student communication over the internet. Observational technique were used to get the data. In the meantime, field notes and videotaping were utilized to capture any material that was important for the study. In analyzing the data, the researcher used the theory that proposed by [7] which are data condensation, data display and verifying, and conclusion.

3. Result and Discussion

Table 1. The Percentages of the Teacher’s Ways to Engage Students in Teaching Describing People and Describing Thing.

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<th>Numb</th>
<th>Ways</th>
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<th>Teaching describing</th>
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Based on the data analysis of two topics, it was found that when teaching topic of describing people, the teacher applied those 7 ways. They were adapting to students’ needs (6.25 %), using meaningful examples (18.75 %), motivating students to do their best (12.50 %), facilitating the course effectively (18.75 %), delivering a valuable course (6.25 %), communicating effectively (25 %), and showing concern for student learning (12.50 %). Meanwhile, when teaching describing thing, the teacher also applied those 7 ways. They were adapting to students’ needs (6.25 %), using meaningful examples (12.50 %), motivating students to do their best (21.88 %), facilitating the course effectively (15.62 %), delivering a valuable course (9.37 %), communicating effectively (28.13 %), and showing concern for student learning (6.25 %).

From the result, it could be stated that the seven ways of engaging students during the learning are very good to be applied in online learning. Those ways were completing each other. Every way provided some activities that can be done to make the students more engaged or more participated as long as the teaching learning process. Then, the teacher needs to be more imaginative. So that students are not bored while learning, the online instructor needs to use a range of strategies, methods, and approaches. By mixing amusing images, music, vibrant colors, and other engaging elements, teachers can create engaging learning materials.

**4. Conclusion**

Based on the analysis, it was found that there were seven ways of engaging students in learning descriptive text through online learning. Those ways were (1) adapting to student needs, (2) using meaningful examples, (3) motivating students to do their best, (4) facilitating the course effectively (5) delivering a valuable course, (6) communicating effectively, and (7) showing concern for students learning.

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References

Teachers Manipulate the Descriptive Text Elements in Teaching the Students’ Language Skills

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Abstract. This research deals with teacher’s manipulation of descriptive text elements. This research investigated the way the teacher manipulate descriptive text elements in teaching language skills. This research applied qualitative descriptive method. The participants of the research were three teachers at SMK Negeri 1 Kisaran. The techniques for collecting data were through recording three teachers in teaching descriptive text elements and interviewing three teachers. The result of the research found that the teacher used verbal behavior for manipulating the student by giving questions to the student. There are seven verbal behaviors found in this research, such as initiating 32.40%, informing 21.34%, directing 21.72%, listing 12.00%, checking 4.50%, nominating 6.92%, repeating 1.12%.

Keywords: manipulation, verbal behaviors, descriptive text elements

1. Introduction

Manipulation has meaning to manage or to utilize skillfully. It is the way to handle and control the situation and condition skillfully as we want to achieve the goal. So, it also can define as skillful management or skillful utilization of situations and conditions in order to achieve a certain goal. The management or the utilization can be realized in verbal behavior. [1] The teacher sometimes can manipulate the students when the teacher cannot get a response or reaction for her or his students. This statement implicitly conveys that manipulation is something that the teacher utilizes in order to obtain his or her goal which is to get the students’ response. Verbal manipulation is a way that teachers usually do to liven up the learning atmosphere of students. It makes the teacher able to communicate with students and can master the classroom well because students’ attention is driven by the teacher’s manipulation. [2] Manipulation is the crucial things that can encourage and help students to learn under teachers’ control. The way the teacher’s suggests students to the instructions by using verbal behavior. Successive questions asked to the students, like it or not, the students have to answer it. It makes manipulation happening in the classroom when the questions have been asked to the students. It can help the students to understand the teacher’s teaching because the instruction comes from the teacher as initiator. In this situation and condition, the teacher will not give space to the students to quite, but it is the way of the teacher to push the students more activate than before. The manipulation in the classroom becomes a must to do in the passive interaction, because it is necessary and it can support the students’ their comprehension in the learning process.
1. Teacher’s Manipulation in verbal behavior of teaching descriptive text

Teacher’s teaching behavior happens in the process variable as the implementation of the teacher’s teaching plan and of the implementation of the teacher’s thought in the form of his teaching behavior as well as the implementation of teacher’s thought to respond to the students’ thought represented in the students’ learning behavior. The teacher’s teaching behavior is represented in verbal behaviors, namely (1) initiating, (2) nominating, (3) informing, (4) directing, (5) checking, (6) listing, and (7) repeating.

a. Initiating defines an act followed by a response that produces questions in the teaching process.

For instance:

T: Can you tell me why do you eat all that food?
S: To keep you strong.

T: To keep you strong. Yes. To keep you strong. Why do you to be strong.

From the example above is the conversation between student and teacher, it happens when the teacher begins the lesson. Initiating is teacher’s question form that can be hoped getting a response from the students. And after the students’ response, the teacher gives feedback to the students as like a correction to the students. It can be seen when the teacher started the question with can you tell me why do you eat all that food? It is a teacher’s question to begin the interaction to the students. From the question, the students gave a response to the teacher with to keep you strong. And then the teacher gives again a question as feedback form to the student’s response.

b. Nominating defines an act to invite or allow a student to participate in the discussion. It is realized by a closed class made up of all the students’ names, contrastive stress, ‘you’, ‘anybody’, ‘yes’ and one or two peculiar elements like ‘who has not spoken anything yet?’.

c. And then Informing defines an act that serves to transmit ideas, facts, opinions, and information and to which proper response is just to recognize that is listening. For instance, ‘Let me tell you the new information’. ‘The fact is sea game 2018 was in Indonesia’.

d. Directing defines an action that asks for a response. In the classroom this can entail ‘opening books, gazing at the whiteboard, writing, or listening’.

e. Checking defines an action to examine if the students can understand the lesson and do the tasks well. The teacher starts to check the students by asking the students one by one. For instance, ‘do you understand? , finished Joan, how about you? Finished? Are you sure? Really? Right? Is it clear for you?’

f. Listing defines an act to get more than one variety of answers. The teacher sometimes will wait until they have two or three responses before giving an evaluation. They sometimes check to see if more than one student knows the answer, and other times they ask a series of questions. For instance, please mention kinds of fruit! Durian, Miss! And what else? And then? What about the others? Anything else?

g. Repeating defines an act of repetition. There will be occasions when the students and the teacher do not hear about something. And there is a misunderstanding between speaker and audience. So, here to prevent the misunderstanding, the speaker or audience can say ‘repeat, please’ ‘pardon’, you what’, ‘eh’, ‘again’. What do you say?

These verbal behaviors are performed to achieve the goal that the teacher predetermined. It communicates or teaches the content in order to obtain the goal of teaching. In this research, the goal of teaching descriptive text is to enable the students to give information in the form of the
description and to ask for information dealing with the descriptive text. For this purpose, the teacher may manipulate the elements of the descriptive text. Elements of the descriptive text refer to all aspects of the descriptive text as proposed by [4], namely (1) social function in the descriptive text is to describe a particular person, place, thing, or animal. It officially characterizes detailed phenomena from a technical standpoint. (2) generic structure of descriptive text consists of classification and description. Classification is general, precise, in a forward position. The description is formally describing groups’ things into several types of knowledge; the ordering process operates in a various way. Initially, it gives the object a basic name, and then it classifies it. The last, deals with attributes, behaviors, and functions. (3) linguistic features of descriptive text, it uses the predominantly present tense, but it also can use past tense.

2. Method

This study was conducted by using descriptive qualitative research design. The data of this research are the teacher’s and students’ utterances in teaching Descriptive text elements. The source of these data was teachers’ manipulation in verbal behaviors of teaching descriptive text elements. The data were collected by using observation techniques. Meanwhile, video recording and field notes used to avoid miss information that needed for the research. In analyzing the data, the researcher used the theory that proposed by [5] which are data condensation, data display and verifying, and conclusion.

3. Result and Discussion

Table 1. The Percentages of the Teacher’s manipulation in verbal behaviors in teaching descriptive text.

<table>
<thead>
<tr>
<th>Verbal behavior</th>
<th>Quantities</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating</td>
<td>173</td>
<td>32.40 %</td>
</tr>
<tr>
<td>Informing</td>
<td>114</td>
<td>21.34 %</td>
</tr>
<tr>
<td>Directing</td>
<td>116</td>
<td>21.72 %</td>
</tr>
<tr>
<td>Listing</td>
<td>64</td>
<td>12.00 %</td>
</tr>
<tr>
<td>Checking</td>
<td>24</td>
<td>4.50 %</td>
</tr>
<tr>
<td>Nominating</td>
<td>37</td>
<td>6.92 %</td>
</tr>
<tr>
<td>Repeating</td>
<td>6</td>
<td>1.12 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>534</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

From Table 1. it can be seen that there are 534 data. The highest data were initiating. It got 173 data and the percentages of initiating were 32.40 %. Initiating was highest because to manipulate
the students the teacher should be stimulated the students by using questions. The second verbal behavior is informing. It got 114 data and the percentages 21.34%. It was in the second stage because every explanation that teacher delivered to the students, it was knowledge for the students that can be the information for the students. The explanation of descriptive text elements makes the teacher should be explained too much. While directing got 116 data and the percentages 21.72%, the way teachers manipulate the students also same with the way teachers direct the students. It aims so that the students can follow what the teacher wants. The fourth verbal behavior was listing with total 64 and with percentages 12.00%. Listing took many data in teacher’s utterances because in teaching descriptive text the teachers asked the students to describe person, things, and animal. The teachers also pushed them to mention where adjective, verb, and verb is. The fifth verbal behavior was checking that got 24 data and with percentages 4.50%. To check the students’ comprehension, the teacher should be checked it. It also checked from the students’ answers. The sixth verbal behavior was nominating that got 37 data and with percentages 6.92%. Teachers’ manipulation here also pushed the students to be more active so to make it comes true, the teacher can points the students directly in learning process. And the last verbal behavior was repeating. It got 6 data and with percentages 1.12%. Repeating also can help the teacher to get the students’ responses. From the result, it could be stated that the seven verbal behaviors are teachers’ manipulation in teaching especially in descriptive text elements. Those verbal behaviors can influence classroom interaction and it also can push students to participate in teaching process. So it hopes manipulation can flow students to the teachers’ purpose. It is because sometimes in the middle of teaching process something can be happened. Even though the plans of teachers have organized well, it does not mean all the steps can run well. Something can be missing from a well-arranged plan. And as the good teacher, she or he can solve it well at the same time even the problem is out of expectation.

4. Conclusion

Based on the analysis, it was found that there were seven verbal behaviors in teachers’ manipulation of teaching descriptive text. Those were (1) initiating, (2) informing, (3) directing, (4) listing (5) checking, (6) nominating, and (7) repeating.

Acknowledgments. The appreciation is dedicated to her first thesis adviser, Prof. Dr. Berlin Sibarani, M.Pd. and her second adviser, Dr. Immanuel Prasetya Ginting, M.Hum. for all of their valuable advice and guidance in the process of finishing this thesis.

References

Agile Methodology in Educational Leadership: Scrum

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Abstract. Education world experiences evolution and revolution adjacent to the development of environment and technology. The actors participating in education world are now facing a future challenge which is volatile, uncertainty, complexity, and ambiguity (VUCA) due to the rapid change in environment and disruption of technology. This paper is a literature review on Scrum, a framework for growing and strengthening complex product adapted from software development and particularly expressed in educational leadership. Scrum is one of agile methodologies worth of implementing with servant leadership. The theory of Scrum as an agile methodology such as transparency, inspection, and adaptation are described and the map of agile manifesto is defined in educational leadership context.

Keywords: Agile Methodology, Education, Leadership, Scrum

1 Introduction

An adjustment with the times should be carried out by the leaders because the world is changing quickly. The current educational system is, regrettably, out of date. We continue to administer education like we did throughout the industrial era, which used to make perfect sense but is now out of date [1, 2]. Due to the fact that we now need to train leaders and highly adaptable thinkers in addition to employees, this results in a mismatch between the educational offer and market demands. This transformation is supported by the following three principles:

1. Less emphasis should be placed on testing students' ability to retain knowledge and more should be placed on helping them acquire 21st-century abilities including teamwork, communication, critical thinking, creativity, and ICT proficiency.

2. The shifting needs of society. Knowing your strengths and shortcomings becomes even more crucial as your time at work comes to an end and more emphasis is placed on teamwork and collaboration.

3. Moving beyond merely imparting knowledge to assist students in growing as people and fostering the development of their unique talents. The source of knowledge is no longer the teacher.
Students' attitudes must also alter and we must work with students to help them shed their previous teaching methods' attitudes [3, 4]. Many students recline as if watching a movie in a theater. This movie mentality must be left behind by students. With Scrum, students collaborate in teams actively, effectively, and efficiently while also having more fun [5]. Giving the students control over their own learning processes and, most importantly, having faith in them will help achieve this [6, 7]. Due to the freedom and room provided, the students assume responsibility for their actions. Students as a result are more involved, more productive, and achieve higher achievements and they come to terms with their identities and skills.

One of the most popular frameworks for software development processes is agile. It is built on some fundamental ideas and principles, such as those found in the Agile Manifesto, and aims to make the traditional, linear waterfall approach more adaptable to the real world, where requirements and solutions are always changing [8, 9]. Agile strives to minimize resource, development, and labor waste by favoring an iterative and team-based approach [10, 11]. Several approaches, including eXtreme Programming and Scrum, have been developed within the Agile culture, extending and executing its values and principles [12, 13].

The fact that Agile lays more emphasis on human aspects, concentrating on the talents and skills of individuals, is one of its most pertinent consequences for leaders implementing Agile [14, 15]. If a project's team members are talented enough, they can complete their task using practically any method. Agile encourages people to collaborate effectively, using their unique skills in teams to effectively accomplish shared goals [16, 17].

These problems need to be briefly discussed especially in educational leadership. For this reason, this study aims to give illustration of Scrum in education, particularly in education leadership. The cutting-edge aspect of this paper is that there is less special study explains briefly the implementation of Scrum in education leadership.

2 Method

The four steps in writing this review include seeking for literature, interpreting the findings of a literature search, and creating a literature review. This study is based on the literature and the article is built on a system of earlier articles on leadership and agile approaches in education in order to provide a theoretical framework and present an agile methodology in education using Scrum. The main focus is on using resources from the Web of Science databases, Scopus, Google Scholar, and Researchgate. Based on the study by the authors Sojka and Lepk [18], the review process depicted in the following picture was created. This justification, in our opinion, is crucial for comprehending and modeling leadership style serving the educational sector, particularly in least-developed and emerging nations where leaders need to apply leadership theories to foster the growth of public organizations.
3 Results and Discussion

Jeff Sutherland, the creator of Scrum, asserts in the book "The Art of Doing Twice the Work in Half the Time" [19] that Scrum, a well-known agile process for software development, can be multi-faceted and helpful in many areas of life, not just the business world. Sutherland also describes how Scrum is applied in education, citing a Dutch chemistry class as the origin of eduScrum.

Mark Reijn, a software programmer at the Dutch company Schuberg Philis, introduced Scrum to the author while she was a science instructor at Ashram College in Alphen aan den Rijn. Excited by the Scrum concepts, he started applying a modified version of Scrum with his kids in 2011, getting amazing results. His students ranged in age from twelve to eighteen. His kids learned valuable life lessons including accepting responsibility for their work and how to be motivated, focused, and hardworking, and they grew eager to collaborate on team projects. The author established eduScrum and created the eduScrum handbook to help other instructors apply that unique version of Scrum that was tailored especially for educators in their schools.

Empiricism, or empirical process control theory, is the basis for both Scrum and eduScrum. According to empiricism, knowledge is derived from experience and decisions that are based on what is known. eduScrum is an incremental, iterative methodology to reduce risk and maximize the attainability of learning objectives. Every application of empirical process control is supported by the three pillars of learning objectives, transparency, inspection, and adaptability.

Scrum in Education

Numerous scholars investigated how to modify Scrum for use in educational settings. The "eduScrum" [20] guide, which translates the Scrum process, roles, and responsibilities in pedagogical terms and may be used to teach any subject at any educational level, is one pertinent approach.
The instructor takes on the job of the product owner, determining what needs to be taught and supervising, processing, and grading the students. His or her major objective is to deliver the greatest value in terms of hard skills like planning, organization, collaboration, and teamwork, as well as discipline-specific learning objectives.

The student team is independently organized with the goal of incrementally and iteratively obtaining (delivering) learning results. The team performs at its best with the aid of an eduScrum master, who is selected by the product owner or the class.

The sprints themselves are mapped within the context of schooling. The tasks are thought of as time-boxed events with a maximum runtime that are intended to permit vital transparency and inspection. Therefore, the sprints are groups of work that are purposefully organized to accomplish the learning objectives and typically last no more than two months. Ceremony participants in eduScrum can expect:

- the 5-minute stand-ups that take place at the start of each class to coordinate activities and organize the following meeting;
- a review of the previous sprint's activities to highlight what members learnt;
- a retrospective to develop a strategy for improvement and planning the following sprint.

The following are eduScrum's most crucial features:

- It specifies "Why" and "What," but it leaves out "How" (processes, techniques)
- Students are autonomous and accountable for their own learning. The teacher transfers responsibility to the students.
- Students learn how to interact more effectively, learn more effectively, and learn more about themselves while using eduScrum.
- Along with enhancing learning outcomes, eduScrum also teaches students how to collaborate in teams and identify their areas of strength.
- For teachers, an essential component of eduScrum is adopting an agile mentality that allows them to trust their students and give them the freedom to decide how they will meet the learning objectives.
- As a result of ownership and a continual improvement process, the caliber of students' accomplishments is continuously changing during the academic year.
Regarding the use of Scrum to educate software engineering, the literature lists numerous instances in which it was successfully applied [21, 22, 23]. Both undergraduate and graduate courses use Scrum to manage the creation of academic projects. Small teams of students are set up, and they carry out the projects in accordance with Scrum guidelines. One of the team members serves as the Scrum master for each team, while the teacher typically assumes the role of product owner.

Scrum was also successfully used as a management and instructional technique for transdisciplinary education [24, 25, 26]. Gestwicky and McNely collaborated with designers of user interfaces, artists, and programmers to create six different educational gaming projects [27]. They collaborated with one or more academic mentors and community partners from outside the university. The students were from a variety of degree programs.

According to several studies [28, 29, 30, 31, 32], Scrum has been used to teach various disciplines. In a university course on discrete mathematics, Duvall et al. implemented certain Scrum-based classroom management strategies in an effort to encourage students to take more ownership of their education [33]. The teams of pupils took pleasure in organizing and directing their own learning.

Teams could choose from traditional or interactive online textbook reading, lecture-based learning, online video learning, or a combination of these. The professor could monitor the team's progress toward self-selected milestones since they each maintained a project management progress board. Along with the solo work, there were a few standard lecture sessions that felt more like group conversations to the students. Grimheden also looked into using Scrum to teach mechatronics, which is an integration of software engineering, mechanical engineering, electrical engineering, and control engineering [34]. They demonstrated that, when compared to other methodologies, Scrum enables students to provide results more quickly, consistently, and with superior quality.
Transparency

Those in charge of the outcome must be able to see important components of the process. In order for spectators to have a shared understanding of what is being viewed, transparency necessitates that those elements be defined according to a common standard. For instance:

- All participants must speak the same language when referring to the procedure; and,
  The definition of "Done" must be the same for both individuals doing the labor and those receiving the finished output.

- The goal of eduScrum is to add value, which is the culmination of each student's individual learning outcomes, personal growth, and group accomplishments. The goal of the eduScrum framework is to support learning by bringing transparency to the aforementioned topics. For students to maximize their learning potential, transparency is vital to assist them in making the best judgments during the learning process.

Inspection

Users of eduScrum must often review the software's artifacts and their progress toward Learning Objectives in order to spot any undesired deviations. Their examination shouldn't be conducted so frequently that it hinders their ability to do their job. When teachers and students actively carry out inspections at the place of the work itself (the classroom or practice area), they are most beneficial.

Adaptation

The planning or approach must be changed if a student (or teacher) concludes that one or more process elements pose a risk of deviating outside of acceptable bounds and/or that the outcomes will be unacceptable. As quickly as feasible, a correction needs to be done to reduce additional departure. According to the eduScrum Events part of this paper, eduScrum specifies six formal events for inspection and adaptation:

- Team Formation;
- Sprint Planning
- Standup (at the beginning of each class)
- Sprint Review (experiment, test, oral or written presentation, or a mix of these); (functioning of team and team members)
- Self-Reflection (personal)
4 Conclusion

The world of Agile techniques is investigated, with a focus on how well they fit into the educational setting. The concepts, ideas, and best practices behind Agile and its derivatives, such as eXtreme Programming and Scrum, are also upheld in the classroom, where the importance of people is highlighted.

According to the stated experiences, Agile can be successful, particularly in situations where active and project-based learning can be used. Agile may be used to educate a variety of subjects in addition to software engineering courses. Kanban boards and other Agile tools, for example, can be used as learning aids.

When Agile approaches are used for learning and teaching, information transfer is transformed into knowledge produced through extensive collaboration and experience. For students who are self-directed learners, teachers take on the roles of facilitators, coaches, and motivational servant leaders. Instead of placing an emphasis on rigid planning, flexibility is needed to account for students' input and their various abilities, interests, difficulties, and experiences in order to uncover their untapped talents and passions. Delivering the highest value is prioritized in terms
of discipline-specific learning outcomes as well as soft skills like collaboration, planning, organization, and cooperation.

Willy Wijnands developed the eduScrum framework in 2011 to provide students control over their own learning. They are given the responses to the questions "Why?" and "What?" but are given the opportunity to discover "How" they will accomplish their learning goals. Transparency, Inspection (Review), and Adaptation to Learn are the three pillars of eduScrum, which is built on Scrum and founded on empirical research. The Teacher (Product Owner/eduScrum Master), The Team Captain, and The Student's Team are the eduScrum positions. Sprint, Sprint Planning (Team formation, Learning Objectives, Work Planning), Standup, Sprint Review, and Sprint Retrospective are the ceremonies/events that make up eduScrum (Team evaluation, Personal Reflection). The Flap - eduScrum Board, the assignment's content (stories with Celebration requirements), Definitions of Doing, Communicating, and Having Fun

This analysis of the literature demonstrates that there is significant interest in both studying and using Agile learning approaches to enable students to collaborate in a positive, focused, and efficient way. Researchers are actively working to formalize agile approaches in the context of education, such as eduScrum.

References


The Principal's Leadership Style and Teachers' Performance at UPT SMP Negeri 2 Medang Deras

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Abstract. The goal of this study was to analyze the leadership tendencies of the principal at UPT SMP Negeri 2 Medang Deras. This study uses a descriptive methodology and a qualitative design. Interviews, observations, and documentation studies were used to get the data. Data reduction, presentation, and narrative interpretation were used in the data analysis process. The findings demonstrated that the UPT SMP Negeri 2 Medang Deras principal preferred to use democratic and participatory leadership. The principal used a democratic and visionary leadership style throughout the planning phase, and a democratic and participatory leadership style during the organizing phase. The implementation process typically involves a task-oriented leadership style, human relations that emphasize cooperative relationships, general and individual direction, and guidance, while the supervision process typically involves a delegative leadership style, which involves conducting direct supervision and establishing subordinates' ability to carry out supervision. This study supports the notion that when creating an organizational structure, opportunities for subordinates to take part, grow, and assume responsibility for a job that has been delegated to them must always be provided.

Keywords: Principal’s leadership, Leadership style, Teachers' performance

1 Introduction

According to Republic of Indonesia Regulation No. 16 of 2009 for Administrative Reform and Bureaucratic Reform, a teacher is a professional educator whose primary responsibility is to educate, teach, guide, direct, train, assess, and evaluate students in early childhood education, formal education, basic education, and secondary education [1]. As a professional educator, there should be professional development in order to develop teacher competence which is carried out according to needs, gradually and continuously or what is often referred to as performance appraisal. The work that educators do in relation to the duties they are responsible for is referred to as their "teacher performance."

As stipulated in Law No. 20 of 2003 on the National Education System, Chapter 1, Section 1, Section 1, education means learning in which pupils can actively develop their potential in order to enhance their mental capacities. It is a conscious and deliberate effort to create environments
Schools play a significant part in the intellectual life of the country as educational institutions. High-quality educational institutions are considered to be actively involved in the country's intellectual life. If there are leaders who are capable of leading, accountable, competent, and morally upright, it is one of the markers. Leadership is the capacity to persuade, inspire, motivate, and steer people or organizations toward the achievement of predetermined objectives.

The principal, who oversees all school activities, is the institution's chief administrative officer. The growth of a school is greatly influenced by the principal's leadership, according to Ministry of Education Regulations No. 13 of 2007 regulating the Standards of Principals/Madrasahs. According to national education policy, school principals have seven basic responsibilities: 1) educator; 2) manager; 3) administrator; 4) supervisor; 5) leader; 6) cultivator of the work environment; and 7) entrepreneur. Aside from that, school administrators must also possess the following competencies: social, management, entrepreneurial, and personality competencies.

Principals must possess sufficient management abilities to be able to make the best choices or take the necessary steps in the face of change. The principal's management and leadership need to be emphasized more in coordination, communication, and supervision, since the weaknesses and barriers to education often caused by lack of coordination, communication, and supervision causing different perceptions among implementing components in the field (Head of Service, Supervisors, Principals, Teachers, and other Education Personnel). The four guiding concepts of management are: organizing, acting, planning, and controlling.

Based on the phenomena or issues circulating in the Baleendah sub-district community UPT SMP Negeri 2 Medang Deras is the flagship, favorite and best school in the Medang Deras sub-district. This is because behind a good organization there are leaders (principals) who have management skills and leadership skills to run the organization's wheels in achieving goals. The truth reveals that UPT SMP Negeri 2 Medang Deras has operated efficiently under the principal's guidance for a number of years. The success of the principal in performing his duties and activities serves as proof of this. Due to several accomplishments, both academic and extracurricular, UPT SMP Negeri 2 Medang Deras has become one of the most renowned and well-liked schools that offers primary school graduates in the Batubara Regency a great choice for junior high school. One of them is the 98 point "A" accreditation score. The success of the principal's leadership may be attributed to the way all aspects of management work together to advance the values and goals agreed upon by the group or organization while overcoming obstacles to advance the objectives of the school they oversee.

2 Method

Batubara Regency was selected as the locus of this study. This district is the result of the division of Asahan Regency and has a capital city in Lima Puluh sub-district. Batu Bara Regency consists of 12 sub-districts, one of which is Medang Deras District. The investigation was conducted in March 2022. The location of this study is in a strategic position because is located on the side
of the road in Medang Deras District, so that it can make it easier for the school to progress and develop. The researchers selected this site to investigate the impact of the principal's management style on the performance of the teachers at UPT SMP Negeri 2 Medang Deras.

The qualitative technique was preferred as the research design in this study. [8]. A qualitative approach is a methodology and research procedure that looks into social phenomena and human problems [9]. The researchers did a natural study, constructed a complex picture, looked at words, reported in-depth from the respondent's point of view, and reviewed reports. The principal of UPT SMP Negeri 2 Medang Deras, Batubara Regency, the vice principals of curriculum affairs, students affairs, facilities and infrastructure, and public relations, as well as subject instructors and education personnel, participated in this study. This study used observation, interviews, and documentation studies to acquire data [10]. The data analysis method employed is qualitative data analysis, depending on the issue under investigation [11]. To ensure that the data was saturated, Miles & Huberman recommended that qualitative data analysis activities be carried out in an interactive manner and continued until they were finished [12,13]. Reducing the data, displaying the data, and concluding or drawing/verification are the stages of the Miles and Huberman interactive model used in the data analysis technique. [14, 15, 16] as is shown in Figure 1 below.

![Fig. 1. Qualitative Data Analysis](image)

3 Result and Discussion

3.1 Planning Function

Planning at UPT SMP Negeri 2 Medang Deras was prepared based on the considerations of all relevant personnel. Implementation of planning begins with an evaluation meeting with the principal and the drafting team in order to compile a school program in annual academic year. The drafting team is the management team or planning team called curriculum development team and school development team, vice principals, school committees, administrative staff and
all stakeholders in UPT SMP Negeri 2 Medang Deras. However, the policy remains with the principal referring to upper structural policy, namely the Education Agency. The process of preparing the school program of UPT SMP Negeri 2 Medang Deras was then continued with the submission of programs by each vice principal namely curriculum, infrastructure, student affairs and public relations. However, the programs created by the vice principals and their staff are programs that adhere to the relevant curriculum and are required to be used, therefore there are always programs that are consistent from year to year. Having compiled the program, the program is then submitted to the school principal. The principal will examine properly the programs that have been proposed. Then the principal excludes the programs that are less supportive in the learning process of students. There are also additional programs from the local education department that must be done. The final stage in the planning process is that all programs that have been prepared and known will be signed by the principal. All programs then will be combined into a single file by the administration staff for documentation. To be clear, the planning process is to evaluate the program that has been carried out in the previous year, then formulate it by the vice principal and his staff in each field by submitting a proposal which will be revised by the principal and if it is appropriate it will be approved by the principal.

In the process of planning the program at UPT SMP Negeri 2 Medang Deras, The principal frequently leads with a democratic and visionary mindset. This is evident from the principal's actions in developing the school's vision and mission, which are informed by the national education goals. The principal presents a vision, persuades the image or target for the school to be attained in the future, and involves teachers, staff, and other employees. "Of course, the school's ideal vision and purpose are by the leadership of the principal, assembling the vice principals and employees, then writing down the vision and mission," as stated by the vice principal of public relations. [16, 17] Using principal as a guide, teachers, staff, and other personnel are involved from "get to go" in the setter position, which involves the principal presenting a vision, ensuring an image or aim for the school, to be realized in the future [18]. As a leader, the principle communicates the vision, inspires teachers, staff, and other workers, and persuades them that what he is doing is the right thing. He also fosters involvement at all levels and at all stages of future endeavors [19, 20]. In essence, the principal's ability to determine direction is manifested in conveying the vision, communicating the vision, motivating teachers, staff, and other employees, as well as convincing teachers, staff, and employees to carry out their duties and responsibilities.

3.2 Organizing Function

It can clearly be seen the responsibilities and authorities of each position in the organizational structure. In the process of organizing, the principal gives responsibility to personnel according to the educational background and expertise possessed by the teacher. Based on the results of the interviews, it can be concluded that the organizing process always involves teachers and employees. By delivering the information to the principal first, communication is established and the information is made clear to the instructors and staff. When it comes to organization, the principal always puts cooperation first, like when vice principals are chosen through joint deliberation. As stated by the vice principal of public relations who stated that "every position is occupied by teachers who are merit and have the expertise and the principal prioritizes cooperation because they cannot stand alone in executing the program. Meanwhile, technical matters should be given to the vice principals". The principal reminded all personnel in the
program, then making relevant programs that were in accordance with the applicable curriculum which are adjusted to the needs of students. He stated that based on the outcomes of his conversation with the vice principal of curriculum, "the decision-making process in the meeting always involves all participants, and discusses by means of deliberation and consensus so that the participants are free to express their opinions". Vice principal of facilities and infrastructure also said that "the decision taken is a joint decision".

In preparing the organizational structure at UPT SMP Negeri 2 Medang Deras, principals tend to use a democratic and participatory leadership style. This is demonstrated by the principal, who consistently gives all teachers the chance to engage in any activity and participate in it. As stated by the vice principal of student affairs "In the process of organizing, the principal involved all components in the UPT SMP Negeri 2 Medang Deras environment and carrying out an election". According to the accepted notion, opportunities for subordinates to engage, develop, and assume responsibility for a position that is assigned to them must always be provided while creating an organizational structure. The second management function of organizing is a strategic action in carrying out an organizational plan. Organizing is a process where the work that already exists is broken down into manageable components and activities coordinate the outcomes obtained in order to reach specific goals [21]. According to this definition, organizing is the process of establishing explicit task relationships between employees so that everyone can cooperate effectively to achieve organizational goals [22]. Effective organizational management will be able to: (1) identify who will do what; (2) identify who leads whom; (3) specify the methods of communication; and (4) concentrate data sources on objectives [23]. The division of work among teachers and employees participating in activities is another indication of the principal's democratic leadership style [24]. According to the idea now in use, organizing is a series of actions taken by a member of the organization, moving the available organizational components, and holding a division of tasks in an effort to achieve set goals [25]. These circumstances ought to be preserved because an organization will function as a unit to accomplish the required goals with the division of jobs, authorities, and responsibilities among teachers and other personnels. Additionally, decisions made by the principal usually involve the staff and teachers [26].

3.3 Actuating Function

The UPT SMP Negeri 2 Medang Deras principal's method of acting on a function entails: providing direction, providing motivation, coaching and monitoring. The briefing is carried out at the meeting at the beginning of the school enrollment period. The direction given is more general in nature, meaning that the direction is carried out together with all teachers and staff. Furthermore, briefings are also carried out prior to program implementation. In addition, the principal also provides guidance. Coaching is given to all personnel. Together, general advice is carried out, for instance by hosting training sessions and inviting speakers who are professionals in the area of the moral and intellectual growth of teachers and staff. The principal offers personal coaching to teachers and staff who are struggling with the educational process or issues in their personal lives, such as coaching for effective teaching or a lack of excitement in the classroom. The principal will provide personal guidance by calling the teacher to the principal's office by seeking information, then calling the teacher and staff for an explanation. These interviews' findings lead to the conclusion that the actuating process is carried out by the principal focuses on directing, coaching, and monitoring which is carried out at meetings and
during briefings by approaching personally and in groups so that some teachers and employees feel cared for and close to the principal. The principal's communication is felt by teachers and employees, especially the vice principal, who is very communicative and open so that there is no distance between the teacher and the principal. The principal reminded teachers and employees who were not disciplined in a polite and humane way. The implementation of the program in general run properly and the principal carried out coaching both in groups and personally, by giving awards to teachers who show better performance, and are serious but humanist in giving sanctions to teachers and employees who are less disciplined.

When acting on human resources, which are realized through cooperative relationships, principals frequently adopt a task-oriented manner and apply human relations techniques. This is demonstrated by the fact that the principal pays close attention to each employee and every teacher so that their individual tasks are completed effectively. Activities that encourage teachers and all staff to do a good job, such leading and coaching members so they can improve their performance and reach goals, can also be considered as examples of the principal's leadership style with a cooperative relationship pattern [27]. Organizational objectives that are set in accordance with the target and the organization's mission and vision. Effective leaders, according to the belief, do not perform the same duties as their subordinates [28, 29]. They each have different responsibilities, including organizing activities, setting work schedules, and supplying the required resources [30]. Additionally, they devote time to helping subordinates develop ambitious yet doable objectives. The principal coordinated the efforts of all participants in a methodical manner that prioritizes collaborative partnerships. It serves as a catalyst for employees to carry out their duties properly and accurately as well as to issue warnings in a respectful and compassionate way so that teachers who get them do not feel burdened or intimidated and instead are inspired to perform better in the future [31]. The principal also appreciates teachers and employees, by giving awards to teachers and employees who are showing better performance, so that all school communities can work more enthusiastically and school goals can be achieved [32]. As revealed by the vice principal of curriculum who stated that the principal really appreciates teachers who excel by facilitating teachers with achievements to participate in representing schools in the district by giving motivational greetings, award and certificates.

3.4 Supervising Function

The UPT SMP Negeri 2 Medang Deras principal uses both direct and indirect methods to carry out his supervision of the faculty and staff. Direct supervision is by seeing directly the activities of teachers and staff, for example conducting supervision in the classroom during the learning process, going around the school seeing or checking school infrastructure, and monitoring every activity. Most days, direct supervision takes place in the morning by walking around the school complex with the aim if a class is found with absent teacher, a solution can be immediately taken by looking for a substitute teacher so that students can always be served well, and do not disturb other classes. As stated by the vice principal of student affairs who said that: "supervision is carried out by the principal almost every morning by walking around and seeing the condition of the class and the environment around the school". The principle typically exercises indirect oversight by asking the vice principal of curriculum for information, for instance, regarding the management of teaching equipment. The vice principal of curriculum revealed this by stating
that, "the principal asks teacher whose task is not complete or not yet completed". After receiving complete data, the principal will remind teachers whose administration is not complete, for example syllabus, lesson plans, student grades, and completeness. Another. Based on the findings of these interviews, it is clear that the principle regularly supervises students. The principal's supervision will help him or her assess the performance of the instructors and staff. According to the findings of an interview with the vice principal of public relations, "From the results of supervision, school principals can evaluate teacher performance. If they know everything, they will follow up by conducting evaluations, for example calling the teacher concerned, and reminding them at meetings or briefings every morning and then giving awards for those are better". The interviews' findings indicate that the supervisory procedure was successfully carried out. In the process of supervision, principals tend to use a delegative leadership style, which is to directly provide supervision to members and decide for themselves for the implementation of these tasks. However, the principal also gives confidence to senior teachers and vice principal to provide supervision to other members. As revealed by the vice principal of curriculum who stated that "The delegation of principal tasks in supervision is given to senior teachers in order to foster younger teachers". As stated by the vice principal of public relations, "Supervision is carried out by the principal with two ways, namely direct dialogue (dialogue and direct observation) and indirectly delegated to the vice principals." In line with the theory of delegative leadership leaders give responsibility to subordinates and provide opportunities for them to decide problems [33, 34, 35]. Routine supervision of the principal expressed by the vice principal of facilities and infrastructure "The principal every morning often supervises by entering the classroom to check the presence of teachers and around the school such as checking the state of facilities and infrastructure such as laboratories, counseling office, teacher office, staff office, libraries, canteens, and toilets". The principal of UPT SMP Negeri 2 Medang Deras oversees the performance of the faculty and staff in accordance with his or her management style, which may involve direct or indirect monitoring. Direct supervision involves being present in class, observing how teachers instruct during the learning process, monitoring the accuracy of the administration of teachers and staff, and walking around the school grounds to examine the efficiency and state of the infrastructure and facilities. Conducting impromptu monitoring is an indirect form of supervision. This oversight tries to gauge how well teachers and staff are performing so that school administrators may evaluate their effectiveness and raise teacher performance [36, 37]. Additionally, this oversight aims to ascertain the discipline and integrity of every school employee in the performance of their respective duties [38, 39]. This supervision is also carried out in order to measure the work effectiveness of all personnel so that it can be used to determine the work morale of members (the level of good or bad school members towards work shown by work ethics, discipline, and responsibility) [40, 41]. The UPT SMP Negeri 2 Medang Deras principal's oversight has gone smoothly and is consistently carried out. The success of all educational programs will be greatly aided by proper monitoring.

4 Conclusion

The findings from the research that researchers conducted regarding the analysis of principal leadership styles in carrying out management functions at UPT SMP Negeri 2 Medang Deras, as the findings in the field are compared with relevant theories with research focuses on school
principals’ leadership style in carrying out their functions. planning, organizing, implementing and supervising at UPT SMP Negeri 2 Medang Deras.

The principal of UPT SMP Negeri 2 Medang Deras frequently employs a democratic and visionary leadership style in the planning function, this can be seen from the indications that the principal in making school plans plays a role as a determinant of the direction or target of the school, to be achieved in the future, school administrators are honest about school finances so that the program formulation team can plan programs in accordance with funding. They are always willing to communicate school difficulties with teachers that are connected to work programs that will be carried out in schools. The design of work programs is done in collaboration with teachers and staff, and the principal provides clear instructions to staff members. The planning team is given the go-ahead by the principle to create curriculum-aligned programs. Before discontinuing programs that are thought to be less supportive of the school development program or discontinuing them altogether, the principal also consults with the formulation team.

Principals tend to use democratic and participatory leadership styles. This is demonstrated by the fact that the principle consistently offers opportunity for all teachers to take part in and manage activities. According to the accepted notion, opportunities for subordinates to engage, develop, and assume responsibility for a position that is assigned to them must always be provided while creating an organizational structure.
References

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Student Response to TikTok Application as a Science Biology Learning Media for Middle School Students

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Abstract. This study aims to analyze the perceptions of junior high school students towards learning media using the TikTok application. Learning media is a means that greatly affects the learning process of students in the classroom. During the pandemic and towards the new normal, teachers are very confused about determining the right learning media to give to students. Ideally, learning media should be fun, very close to students and can be used anywhere and anytime. The TikTok application is a social media application that is much favored by junior high school students. The subjects in this study were students of SMP Negeri 6 Tebingtinggi City. Data from this study were collected using Google Forms to see student responses to science-biology learning. The results of the study of student responses to the TikTok application as a science-biology learning medium are: stating the quality of the display of learning media using the TikTok application is attractive, fun and easy to operate as much as 92.14%, states that learning media using the TikTok application increases students' knowledge in learning as much as 87.97%, stated that students' motivation to learn increased by using the TikTok application as much as 85.88%, and stated that learning activities became fun by using the TikTok application as much as 86.56%. It can be concluded that the feasibility of using the TikTok application as a learning medium is 88.13%, meaning that the use of the TikTok application as a learning medium is very feasible.

Keywords: student responses, TikTok application, science-biology learning media.

1 Introduction

The use of teaching aids during the pandemic has a significant function in helping students master biology modules in an abstract way. The change in learning methods from face-to-face (offline) to online (online) is a challenge for teachers in educational institutions, especially the biological research aspect, to change teaching strategies and learning features. [1].

The impact of Covid-19 on efficient learning innovation provides a new perspective for educational
institutions that no longer explain how to study compulsory face-to-face in the room [2]. A significant role in learning is played by online remote technology data systems, which must be ready for home learning. An alternative that can be applied by using Android as an area in the learning process. Using Android as a learning tool can be a substitute as well as a solution so that students become more active in the way of learning. Students who are more active will affect the results of the learning process. Learning outcomes are also closely related to students' scientific literacy [3,4].

Technology has advanced, but the teaching and learning process has not been able to utilize technology media optimally, and teachers still need to provide learning materials. Teachers play an important role in online learning, especially during the Covid-19 pandemic [5]. Teachers must be able to motivate students to learn. In addition, teachers should carefully review the assignments given to their students and remember to reward their achievements in online learning during the pandemic. [6] Science learning can foster cognitive, psychomotor, and social thinking skills through direct experiences given to students scientifically about the natural surroundings. However, in a pandemic like this, science learning is carried out online and independently by junior high school students.

It should be noted that students are currently listed in the digital generation. [7] The digital native generation is a digital generation since birth. This means that this generation is introduced to PC technology from an early age. Nowadays, internet applications are widely used in all countries, there are e-learning plans or distance learning plans, where teachers and students can practice outside of school or campus. There is also an online learning plan, meaning that learning takes place without face-to-face communication, but only using applications such as Android. The advantage of learning on the Android platform is that the system can be done very flexibly, both in place and in time.

The Tebingtinggi science teacher in the Tebingtinggi MGMP community, faces obstacles including: 1) students' lack of interest in learning due to ineffective use of teaching aids; 2) Teachers only use science textbooks, power point presentations and educational videos that are only owned by teachers, and only a few students understand them. This is because the ability to master the lessons of each student is different. Some students understand only with one study. Many students need to study repeatedly to understand the learning material. This is because students do not understand the material being studied. The use of learning devices is still classified as classic (it can only be used in one place and is difficult to access for low-power androids).

Tiktok app is a Chinese network based music video platform. The social media service was launched in September 2016. The app authorizes users to create their own favorite short music videos (tik tok). Tik tok Positioned as the application downloaded up to 45.8 million times the first quarter (Q1) in 2018 [8]. Tiktok application users in Indonesia itself, of course, consists of teenagers who are still students. If used properly, the Tiktok application can be an interesting and fun learning medium for students. The use of the Tiktok application as a learning medium is intended to make it easier for students to understand the science learning materials provided by the teacher. Through the tiktok application, Interactive learning media can support teachers in learning effectively and efficiently.
From the explanation above, we can see that the Tiktok application is very popular among students. Therefore, researchers are interested in making Tiktok as a scientific learning media. Researchers suggest that using the Tiktok application can help students feel happier when learning science material. Developing learning media with the tiktok application can attract students' attention, make them feel happy while learning, and succeed in achieving their learning goals. So that the use of the Tiktok application as a scientific learning medium can provoke student responses to various learning materials provided by the teacher.

2 Research Methods

This research method uses descriptive qualitative. The sample for this study was high school students who were randomly selected (random sample). The survey data was collected through Google Forms using a questionnaire to ensure student responses to the Science-Biology learning media using the Tiktok application. The number of respondents was 88 students of SMP Negeri 6 Tebingtinggi who were randomly sampled. In addition, the data were analyzed in stages, data reduction, data presentation, and drawing conclusions.

3 Results And Discussion

Based on research conducted on junior high school students, several important points were obtained regarding the results of junior high school students' responses to science-biology learning media using the tiktok application. The research results are explained starting from the respondent's data to the discussion based on the relevant literature references with various points of view being studied. A complete explanation of the results of junior high school students' responses to the science-biology learning media using the tiktok application from several questions concerning various aspects studied with direct answers from students. The results of the study of student responses to the TikTok application as a science-biology learning medium consisted of aspects, namely: appearance, media effectiveness, learning motivation, and learning activities.

3.1 Tiktok Media Display

The results of the display quality of the TikTok media in learning using the TikTok application are interesting, fun and easy to use in learning. A total of 92.14% of video views attract attention, Feedback or feedback on practical issues is clearly presented, The layout of menus, text, images and other content is clear. The appearance of the TikTok application can attract the interest of students because of its various features that can be realized in the learning process.

3.2 Media Effectiveness

The results of student responses as much as 87.97% stated that learning media using the TikTok application increased students' knowledge in learning. This means that students give a very positive response to the learning media. This is corroborated by previous researchers stating that the TikTok application can be used as an effective learning medium [9]. The TikTok application meets the
learning needs of students, can attract the interest of students because of its novelty and has many features that can be implemented into learning, and finally the TikTok application is equivalent to the development of maturity and experience as well as the characteristics of students who are the millennial generation, who are attached and close with the digital world.

3.3 Motivation to learn

The results of student responses as much as 85.88% of students stated that students' motivation to learn increased by using the TikTok application. The results of the previous thesis research also showed that social media tiktok had a very significant positive effect on learning achievement [10]. The positive response given by students stated that TikTok-based biology learning media made students motivated in studying motion material in living things, plant structure and function, food digestive system, and human blood circulation system. The importance of using learning media to increase students' learning motivation. Because basically student learning activities are influenced by motivation. If students are motivated in learning activities, automatically students will be more interested in learning concepts that are abstract and will increase activity and learning outcomes [11]. It can be concluded that the tiktok application can motivate students in learning science-biology.

3.4 Learning activity

The results of student responses as many as 86.56% of students stated that learning activities were fun using the TikTok application. The TikTok application can be useful as an interesting and interactive science learning media. Wisnu Nugroho Aji's research on Tiktok Applications as Indonesian Language and Literature Learning Media which obtained the results of a study, namely through the TikTok application, teachers can easily create interactive learning, so that it can be adapted to the environment, situation, and conditions of students [12]. It can be concluded that the response to the use of the TikTok application as a science-biology learning medium in SMPA 6 Tebingtinggi students is 88.13%, meaning that the use of the TikTok application as a learning medium. The TikTok application meets the learning needs of students, can attract the interest of students because of its novelty and has many features that can be implemented into learning, and finally the TikTok application is equivalent to the development of maturity and experience as well as the characteristics of students who are the millennial generation, who are attached and close with the digital world. The main thing that must be done by teachers in using appropriate learning media is to find, select, and find learning media that attract students [3].

4 Conclusion

It can be concluded that the feasibility of using the TikTok application as a learning medium is 88.13%, meaning that the use of the TikTok application as a learning medium is very feasible.
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References

The Development of Mobile Learning-Based Digital Learning Comic in English Subject of Class VIII of SMP Muhammadiyah 16 Lubuk Pakam

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Abstract. This study aims to: (1) determine the feasibility of mobile learning-based digital learning comics used for learning English for class VIII (2) to determine the effectiveness of mobile learning-based digital learning comics in English learning of class VIII. This type of research is research and development that uses the ADDIE product development model. This research was conducted on eighth grade students of SMP Muhammadiyah 16 Lubuk Pakam. The research sample was 30 students. The feasibility of mobile learning-based digital learning comics is measured by data analysis based on validation questionnaires by media experts, design experts, material experts, and field trials. While the effectiveness of digital learning comics based on mobile learning is measured by data analysis using n-gain scores based on learning outcomes tests (pretest and posttest). The results of the validation of mobile learning-based digital learning comics by media experts were obtained by 80.56% in the appropriate category, by design experts it was obtained by 92.22% in the very feasible category, and by material experts it was obtained by 93.61% in the very feasible category. The results of field trials on students amounted to 93.13% with a very decent category. The results of the pretest and posttest learning outcomes in the field trial obtained an average n-gain value of 0.70 in the high category with a percentage of 70% in the quite effective category. So it can be concluded that mobile learning-based digital learning comics are very feasible and quite effective to use in learning English for class VIII SMP Muhammadiyah 16 Lubuk Pakam.

Keywords: Digital Learning Comic, English Learning Outcomes, Mobile Learning.

1 Introduction

The rapid development of information and communication technology towards digital has led to changes in new habits and lifestyles for the community. This change to the digital era is known as the industrial revolution era 4.0. This is marked by the widespread use of the internet in all aspects of life, known as the Internet of Things (IoT). Almost all aspects of life cannot be separated from the use of information technology, including education.
The UN (United Nations) special agency which handles education, UNESCO formulates that education in the era of the industrial revolution 4.0 must be able to build a knowledge-based society that has: (1) skills in ICT and media literacy (ICT and media literacy), skills), (2) critical thinking skills, (3) problem-solving skills, (4) effective communication skills, and (5) collaborative skills (collaborative skills).[1]

The use of information and communication technology in education, especially in the learning process, is needed so that learning can run effectively, efficiently, and attract the attention of students. Mekhlafi [2] states that the use of information and communication technology in learning has a positive impact on student performance and learning achievement.

Learning media is one of the supporting components of the success or failure of a learning activity. This is inseparable from the importance of the media in instilling understanding of the material to students. According to Arsyad [3] learning media can also help students to improve understanding, present data in an interesting and reliable way, facilitate data interpretation, and condense information.

The use of comics as a learning media can help students to more easily accept the material presented in the learning process because it can describe facts that are less understood if they are not visualized.[4] In addition, according to Sudjana & Rivai [5] comics are also able to make students improve language skills, artistic activities, and innovative statements in communicating, writing, reading, painting, or dramatizing and being able to help interpret and remember material.

In learning English, there are four aspects of skills that must be mastered by students, namely listening, speaking, reading and writing. Reading is one of the most important literacy skills. However, based on the results of a survey conducted by the Program for International Student Assessment (PISA) released by the Organization for Economic Co-operation and Development (OECD), the Indonesian people have a very low literacy level. This low interest in reading certainly affects student learning outcomes.

Learning English in Indonesia has not been carried out optimally. The factors that influence the process of learning English as a foreign language are that the process of learning English is still conventional, namely the lecture method and less use of media so that students feel bored, besides that learning English is still teacher centered. In addition, less available learning facilities and media make the learning process less attractive and reduce student learning motivation which has an impact on not achieving learning objectives.[6]

The high use of mobile devices in the form of smartphones in daily life can facilitate work. The use of mobile devices in the learning process is known as mobile learning. According to Ally et al [7], mobile learning is the delivery of electronic learning materials on mobile computing tools to be accessed from anywhere and anytime.

Responding to this reality, students can use smartphones for various learning purposes regardless of the old paradigm that learning only takes place in school but learning can be done anywhere and anytime. However, in reality, English teachers still do not use mobile devices optimally in the learning process.

Initial observations made at the Muhammadiyah 16 Lubuk Pakam Private Junior High School (SMP), it was found that the school had adequate learning facilities. Facilities that support the
learning process include the availability of projectors, computer laboratories, and also the availability of a wifi network to access the internet network that can assist teachers and students in finding information and knowledge in accordance with current technological developments. In addition, it was also found that the English learning outcomes of class VIII students were still low.

Based on the description above, the researchers will develop a digital learning comic based on mobile learning that is fun and can support independent learning because it can be accessed from anywhere and anytime so that it is expected to improve student learning outcomes in English subjects.

The formulation of the problems contained in this study, namely: (a) Is the mobile learning-based digital learning comic that was developed suitable for use in learning English for class VIII SMP Muhammadiyah 16 Lubuk Pakam?; (b) Is the mobile learning-based digital learning comic that was developed effective in learning English for class VIII SMP Muhammadiyah 16 Lubuk Pakam?

2 Theoretical Description

Learning outcomes are abilities obtained by individuals after going through the learning process. According to Hamid [8], learning outcomes are all effects that can be used as indicators of the value of using learning methods under different conditions. Learning outcomes can be classified into three, namely: (1) Learning effectiveness; (2) learning efficiency; (3) The attractiveness of learning.

In learning English there are four skill competencies which are the learning objectives, namely reading (reading), speaking (speaking), writing (writing) and listening (listening). Reading is the main skill that a person must have, because without reading a person will never know anything. Finochiaro & Bonomo [9] defines reading as picking and understanding the meaning or meaning contained in written material. Reading (reading) in learning English aims to make students able to understand various meanings in written texts.

Some definitions of media by experts and international organizations are: (1) Association for Education and Communication Technology (AECT) defines as all forms used for the process of distributing information. (2) Blake and Haroldsen [10], said the media used to carry or convey a message where this medium is a path or a tool in which a message runs between the communicator and the communicant. (3) Gerlach & Ely [11] states that the media, if understood in broad terms, are human, material, or events that build conditions that make students able to acquire knowledge, skills, or attitudes. (4) Arsyad [3] suggests learning media are everything that can be used to convey messages or information in the teaching and learning process so that it can stimulate the attention and interest of students in learning.

McCloud [12] defines comics as placing one image with another image side by side (juxtaposed pictorial) and intentionally so as to form a series/sequence to convey information or achieve a response from the reader. Meanwhile Munadi [13] said that comics have a simple nature in their presentation, and has a story element that contains a big message but is presented in a concise and easy-to-digest manner, moreover, it is equipped with a dialogical verbal language. This combination of verbal and nonverbal language speeds up the reader's
understanding of the content of the intended message, because it helps the reader to stay focused.

Visual media are media that involve the sense of sight. There are two types of messages contained in visual media, namely verbal and nonverbal messages. Sriadhi [6] states that the principle of multimedia emphasizes learning that it will be better if it is through visuals and words rather than just through words. Learning activities and achievements will increase if there are additional graphics or visual images in the text. In addition, learning will be better when related text and images are presented integrated rather than separated.

According to McQuiggan, et al [14] mobile learning is an experience and opportunity provided by the evolution of educational technology. Learning anywhere, anytime, provided instantaneously, on-demand access to a personal world filled with the tools and resources we love to create our own knowledge, satisfy our curiosity, collaborate with others, and develop unattainable experiences.

3 Method

This research uses research and development type. Research and development methods are research methods used to produce certain products, and test the effectiveness of these products. The development research model used is the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE model is an easy-to-implement model where the process used is systematic with a clear framework to produce effective, creative, and efficient products [15].

Data collection techniques in this study used test and non-test techniques. The test technique is used to collect data on learning outcomes, while non-test is used to collect product data. To measure the feasibility of the developed digital learning comics, data analysis was carried out based on a multimedia assessment questionnaire compiled by Sriadhi [16], in the form of an expert validation questionnaire consisting of material experts, design experts, media experts, and user acceptability. The processing of the questionnaire data in this research and development is for calculating the validity of the media with the percentage of answers using formula (1). Descriptive analysis of the percentage [17] with the following formula:

\[
x = \frac{\text{Total score obtained}}{\text{Total number of ideal score of all items}} \times 100\%
\]  

(1)

Meanwhile, as a basis for making decisions to revise mobile learning-based digital learning comics products, the eligibility level criteria are used as written in Table 1 below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Very Feasible</td>
<td>85 ≤ X ≤ 100</td>
</tr>
<tr>
<td>2.</td>
<td>Feasible</td>
<td>75 ≤ X &lt; 85</td>
</tr>
<tr>
<td>3.</td>
<td>Less feasible</td>
<td>65 ≤ X &lt; 75</td>
</tr>
<tr>
<td>4.</td>
<td>Not feasible</td>
<td>55 ≤ X &lt; 65</td>
</tr>
<tr>
<td>5.</td>
<td>Very Inappropriate</td>
<td>0 ≤ X &lt; 55</td>
</tr>
</tbody>
</table>

**Table 1. Product Eligibility Level Criteria**
To measure the effectiveness of the developed digital learning comics, data analysis was carried out based on the students' pretest-posttest using the N-gain score [18]. Data analysis of the pretest-posttest results to determine the increase in learning outcomes was carried out using formula (2) as follows:

$$N - \text{gain score} = \frac{\text{Posttest score} - \text{Pretest score}}{\text{Maximum score} - \text{Pretest score}}$$  \hspace{1cm} (2)

After obtaining the results from the data managed using the formula (2), the results are matched with the N-gain score criteria in Table 2 below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>High</td>
<td>N-gain score ≥ 0.7</td>
</tr>
<tr>
<td>2.</td>
<td>Middle</td>
<td>0.3 ≤ N-gain score &lt; 0.7</td>
</tr>
<tr>
<td>3.</td>
<td>Low</td>
<td>N-gain score &lt; 0.3</td>
</tr>
</tbody>
</table>

The criteria for interpreting the effectiveness of n-gain [19] can be seen in Table 3 below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Effective</td>
<td>&gt; 76</td>
</tr>
<tr>
<td>2.</td>
<td>Quite effective</td>
<td>56 - 75</td>
</tr>
<tr>
<td>3.</td>
<td>Less effective</td>
<td>40 - 55</td>
</tr>
<tr>
<td>4.</td>
<td>Ineffective</td>
<td>≤ 40</td>
</tr>
</tbody>
</table>

**4 Results and Discussion**

The development of digital learning comics goes through 5 stages, namely analysis, design, development, implementation and evaluation. The results of the analysis of the data obtained show that the mobile learning-based digital learning comics that have been developed are declared feasible and effective for use in learning English with simple present tense material.

**4.1 Product Eligibility**

Based on product validation through a series of trials and revisions that have been carried out, digital learning comics based on mobile learning are declared very feasible. The experiment was carried out in 4 stages, namely: (1) evaluation of learning media experts, learning design experts, and learning materials experts; (2) individual trials, (3) small group trials, and (4) field trials.

The validation of learning media is carried out by media experts on mobile learning-based digital learning comics. Learning media experts carry out product validation on aspects of guidelines and information, programming, systematics, aesthetics, language and typography.
Based on the results of the validation of learning media experts in Table 4, it can be seen that mobile learning-based digital comics learning in English subjects received an assessment in every aspect, with an average score of 80.56% with a "feasible" interpretation.

The validation of learning design is carried out by design experts on mobile learning-based digital learning comics. Learning design experts carry out product validation on aspects of information design and learning design.

Based on the results of the validation of learning design experts in Table 5, it can be seen that mobile learning-based digital comics learning in English subjects received an assessment in every aspect, with an average score of 92.22% with a "very feasible" interpretation.

The validation of learning materials is carried out by material experts on mobile learning-based digital learning comics. Learning material experts validate products on aspects of guidelines and information, the materials, and evaluation.

Based on the results of expert validation of learning materials in Table 6, it can be seen that mobile learning-based digital comics learning in English subjects received an assessment in every aspect, with an average score of 93.61% with a "very feasible" interpretation.

Based on the results of the acceptance of learning media by students in individual trials, it can be seen that mobile learning-based digital comics learning in English subjects received an
assessment in every aspect, with an average score of 93,6% with a "very feasible" interpretation.

Based on the results of the acceptance of learning media by students in small group trials, it can be seen that mobile learning-based digital comics learning in English subjects received an assessment in every aspect, with an average score of 92,76% with a "very feasible" interpretation.

Based on the results of the acceptance of learning media by students in field trials, it can be seen that mobile learning-based digital comics learning in English subjects received an assessment in every aspect, with an average score of 93,13% with a "very feasible" interpretation.

Validation results based on data that have been described by media experts, design experts, material experts, individual trials, small group trials and field trials are in the range of 85% ≤X≤ 100% with a very feasible category. Thus, it can be concluded that the mobile learning-based digital learning comic that was developed is very suitable for use in English subjects for class VIII SMP Muhammadiyah 16 Lubuk Pakam.

The use of digital learning comics based on mobile learning in English learning is considered very feasible because it is able to attract the attention and interest of students in the learning process, which can be seen from the positive responses of students to the data from field trials. The above statement is supported by the results of Hidayah [20] which shows that digital comic media attracts the attention and interest of students in the learning process, which is in line with the opinion of Levie & Lentz in Arsyad [21] which suggests four functions of learning media, especially media visual, namely (1) the function of attention, (2) the affective function, (3) cognitive function, (4) compensatory function. In other words, visual learning media serves to accommodate students who are weak and slow to accept and understand the content of the lesson presented by text or presented verbally.

This mobile learning-based digital learning comic is also able to provide convenience for students to understand the learning material presented in the form of digital comics. This is in line with research by Aeni & Yusupa [22] which shows that students like the e-comic learning model and feel learning is like reading comics in digital format.

### 4.2 Product Effectiveness

The data normality test was carried out to find the normality of the sample under study. The normality test conducted in this study uses the chi square formula, provided that the data is normally distributed if it meets the criteria for \(X^2_{\text{count}} < X^2_{\text{table}}\). The results of the pretest and posttest normality test can be seen in Table 7.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data</th>
<th>n</th>
<th>Mean Score</th>
<th>S</th>
<th>(X^2_{\text{count}})</th>
<th>(X^2_{\text{table}})</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pretest</td>
<td>30</td>
<td>54,27</td>
<td>7,20</td>
<td>7,20</td>
<td>9,49</td>
<td>Normal</td>
</tr>
<tr>
<td>2.</td>
<td>Posttest</td>
<td>30</td>
<td>85,60</td>
<td>6,58</td>
<td>7,84</td>
<td>9,49</td>
<td>Normal</td>
</tr>
</tbody>
</table>

From the table of normality test results above on the pretest data, it is known that \(X^2_{\text{count}} = 7,50\) and \(X^2_{\text{table}} = 9,49\) which meets the criteria for \(X^2_{\text{count}} < X^2_{\text{table}}\), so it can be said that the pretest...
data is normally distributed. In the posttest data, it is known that $x^2_{count}$ is 7.84 and $x^2_{table}$ is 9.49 which meets the criteria for $x^2_{count} < x^2_{table}$, so it can guarantee that the posttest data is normally distributed.

Homogeneity test was conducted to determine the distribution of the data to be analyzed came from the same population (homogeneous) or not. The homogeneity test carried out in this study used the F test, provided that the data was homogeneous if it met the criteria $F_{count} < F_{table}$. The results of the homogeneity test can be seen in Table 8.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data</th>
<th>$S$</th>
<th>$F_{count}$</th>
<th>$F_{table}$</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pretest</td>
<td>7,27</td>
<td>1,08</td>
<td>1,86</td>
<td>Homogen</td>
</tr>
<tr>
<td>2.</td>
<td>Posttest</td>
<td>6,69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table of homogeneity test results above on the pretest data and posttest data it is known that $F_{count}$ is 1.08 and $F_{table}$ is 1.86 which meets the criteria $F_{count} < F_{table}$, so it can be concluded that the pretest and posttest data are homogeneous.

Gain score is the difference between the posttest score and the pretest score. After all the data is collected to determine the increase that occurs before and after this learning is calculated with the n-gain formula (normalized-gain). The results of the n-gain calculation can be seen in Table 9.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data</th>
<th>$n$</th>
<th>Mean Score</th>
<th>N-Gain Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pretest</td>
<td>30</td>
<td>54.27</td>
<td>0.70</td>
<td>High</td>
</tr>
<tr>
<td>2.</td>
<td>Posttest</td>
<td>30</td>
<td>85.60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the results of the data analysis above, it is known that the average n-gain in the field trial is 0.70 in the high category or with a percentage of 70% which is included in the quite effective category. From the data from the students’ pretest and posttest results in the field trial, it is known that there is an increase in student learning outcomes after using mobile learning-based digital learning comics.

The increase in student learning outcomes is caused by the direct interaction of students with teaching materials, in addition to the digital learning comics developed to overcome the limitations of space and time so that students can access teaching materials anytime and anywhere which is in line with the research of Wirawan [23] which says that mobile learning can make it easier for users to access learning content anywhere and anytime, without having to visit a certain place at a certain time.

Research conducted by Pranata, Sariyatun, & Ardianto [24] also revealed that the application of comic media in the classroom is not only described in printed form, but through digital access so that students can independently access digital comics and are closer to reading and capturing messages in comic stories. In other words, this developed mobile learning-based digital learning comic can support independent learning.
From the explanation above, it can be concluded that mobile learning-based digital learning comic in English subject of class VIII of SMP Muhammadiyah 16 Lubuk Pakam is feasible and quite effective because it has been compiled based on existing theories so that mobile learning-based digital learning comic can be used in learning.

4 Conclusion

Based on the results and discussion of the development of mobile learning-based digital learning comic in English subjects, it can be concluded as follows:

The product in the form of a digital learning comic based on mobile learning in the Class VIII English subject at SMP Muhammadiyah 16 Lubuk Pakam has worthy results as a final product that can be disseminated and implemented to users. This is supported by several stages, namely the validation of learning media experts (80,56%), learning design experts (92,22%), learning materials experts (93,61%), individual student trials (93,6%), testing student group trial (92,76%), and field trial (93,13%) with the "Very Feasible" category.

Based on the results of data processing, the average value of student learning outcomes using mobile learning-based learning comics that were developed was quite effective. This is indicated by the results of the calculation of the n-gain score of 0.70 in the high category or with a percentage of 70% which is included in the quite effective category. So it can be concluded that there is an increase in students' English learning outcomes after using mobile learning-based digital learning comics.

References

Development of Arabic Textbooks With The Application of The Station Rotation Type Blended Model

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Abstract: This research and development aim to produce a station rotation blended learning (SRBL) model for learning Arabic courses; know the validity of the SRBL in learning Arabic courses; know the practicality of the SRBL model in learning Arabic courses, measure the effectiveness of the SRBL in learning Arabic courses, analyzing student responses to the SRBL learning process. This research method is research and development with the Plomp model. The results showed; the material expert test is on very good criteria and is suitable for use, the learning design expert test is on the very good criteria and is suitable for use, the learning media expert test is on the very good criteria and is suitable for use, the learning media expert test is on the very good criteria and is suitable for use, individual trials are on very good criteria, small group trials are on very good criteria, and field trials are on very good criteria. The effectiveness of learning with the developed model shows more effective student learning outcomes in Arabic.

Keywords: learning model, station rotation, blended learning, Arabic textbooks

1 Introduction

In the XXI century it brings different challenges with the rapid development of technology, many universities respond to challenges, and pressures and some are starting to adapt to new technologies through the web. The rapid evolution of the web has challenged higher education to prepare graduates who are capable of adapting to the technology of the future [1]. Because at this time the world has entered the era of disruption, an era where there are many new products, with new logic, and completely different ideas, and can eliminate old products. Chronologically its development starts from the era where people have a pattern for hunting (society 1.0), continuing to the era of agriculture (society 2.0), industry (society 3.0), information (4.0), and (society 5.0). In today's digital era, two dominant paradigms running parallel were first developed in Germany and Japan, namely the industry 4.0 paradigm and the community 5.0
paradigm. These two paradigms have a significant dual effect on the education system, in terms of content, methodology, and learning models [2].

The main problem that will occur is a shift in values, models, and technological procedures that occur extremely and fundamentally. In industrial revolution 4.0, developing an internet-based system (IoT) model with various infrastructure approaches, both hardware and software [3]. Therefore, a balance is needed between meeting human needs and technology. The industrial revolution 4.0 opens up new opportunities in education as a supporter of carrying out learning activities in digital form.

Digital transformation can provide cost efficiency, increase productivity, and improve the quality of education into a better system. Teachers, governments, educational institutions, and parents must be able to adapt to the disruption of the industrial revolution 4.0. Nasir [4] explained that to face the industrial revolution 4.0, Indonesia is estimated to have a high potential in preparing skilled workers in every field. Skills that must be mastered by HR to be able to be competitive in life skills in the XXI century, such as having 4C abilities which include Critical thinking, Communication, Collaboration, and Creativity. Achievement can be done by learning innovations that are tailored to problems or project-based learning, encouraging collaboration, communication training, empowering metacognition, designing learning relevant to the real world, and being student-centered [5].

All Arabic learners and teachers, according to Utami [6], know that in learning Arabic there are at least four competencies that must be mastered, which are as follows: (1) Istima’ (Listening), (2) Kalam (Speaking), (3) Qiroah (Reading), (4) Kitabah (Writing). The four skills must be taught in various functions and learning contexts, so that to achieve this, models, approaches, methods, strategies, and learning media are needed to support the process of mastering the four skills.

In addition, according to Farooq and Javid [7] that blended learning also adheres to the learning theory of behaviorism, the theory of behaviorism is that in learning there is a behavior change. In blended learning, it provides a stimulus and response for students to be involved in learning both online and face to face with the physical involvement of students to learn.

Connectivism learning theory provides a new perspective on how learning occurs in the digital learning space. According to Horachek [8], online learning uses digital technology such as internet servers and web browsers to deliver online course materials. Therefore, online learning is bridged through internet technology that can be interconnected globally so that they can be connected.

Blended learning in practice can be applied as a supplement and complement or substitute in learning, which includes the content of teaching materials in the form of documents, videos, animations, simulations, and others. Therefore, blended learning for its application can be chosen as a supplement, complement and substitute. A proportion of blended learning is needed is by educational needs, of course taking into account the characteristics of the courses applied to the blended learning.
1.1 Blended Learning Model

Blended learning is a combination of online learning and face-to-face learning for classroom teaching or other training modalities to help develop new transferable knowledge and skills in the workplace environment. According to Bauk [9], Blended learning is the most popular educational model applied by universities for teaching and learning, this model combines online and face-to-face learning environments to enhance learning with the application of new web technologies and tools in the learning process.

The use of blended learning has grown globally both in educational institutions and universities. Universities and other learning institutions must continue to emphasize blended learning through the installation of learning management systems along with connected networks that enable effective learning using technology, especially in developing countries. It is therefore important that for the use of blended learning there is a need for appropriate management systems and competence in the use of technology.

To produce the effectiveness and efficiency of learning activities, a teacher must be able to apply appropriate learning models. Because the learning model has a role in achieving a goal. The demands and civilization of the teaching and learning process have transformed into a digital dimension, so the use of technology in learning is also needed. Therefore it is necessary how to integrate a learning model with the use of technology in it. The role of technology today uses blended learning which has broad implications for students.

Blended learning was developed to replace lectures and provide support for and complement courses. Blended learning to complement hands-on learning. According to Syarifah and Handayani [10], the function of e-learning in learning is only as a complement. Blended learning serves more of a supplementary or adjunct role. It is concluded that higher education institutions can use blended learning according to their functions and needs, both as supplements, complements, and substitutions depending on policies and needs and goals to be achieved.

The relationship between blended learning and educational practice is as follows:
Fig. 1. Blended Learning Model (Source: Staker & Horn [11])
The category of the blended learning model itself can be seen in Figure 1. below:

Fig. 2. Categories of Blended Learning Models
1.2 Arabic Learning

There are several types of materials related to Arabic Language Education materials, including:
(1) Writing Khot (Al-Imla) This lesson aims to achieve proficiency in Arabic writing and spelling. This material is the basic material in Arabic lessons, so students / santri must master this subject so that in the future it is easy to understand Arabic lessons; (2) Conversation (Al-Muhadastah) This subject is to teach speaking and listening skills. And it needs to be given in the form of sentence patterns and expressions that can be used in conversational language. Like a question and answer sentence; (3) Reading (Al-Qiro'ah) Al-Qiro'ah subjects have two objectives, including (a) The first objective is to recognize the basic Arabic letters that have been arranged neatly into words in a sentence and can express them properly and correctly. This goal can be achieved by reading aloud (Qira'ah Jahriyah). (b) The second goal is to understand what is read, related to Arabic subjects. This goal can be achieved through reading silently or what we usually know, namely (Al-Mutolla'ah); (4) Grammar (Al-Qowaid) As for what is meant by Al-Qowa'id is grammar which includes the science of Nahwu and the science of short. This material is to understand how to speak well, therefore students / santri must be able to understand the rules or grammar with Nahwu Science Subjects and Surf Science. So that this will have an impact on students/students in good and correct Arabic conversation; and (5) Composition (Al-Insya) Subject Al-Insya is the subject of composing or compiling an Arabic sentence [12]. To achieve proficiency in including thoughts or feelings in written or spoken form.

Arabic Learning Method is a level of comprehensive program planning that is closely related to the steps of delivering subject matter procedurally, not contradicting each other, and not contradicting the approach, in other words, the method is a general step in the application of theories that there is a certain approach.

The purpose of learning Arabic can be known through the learning objectives. In a narrow and concrete sense, the form of Arabic education is learning Arabic itself. The purpose of language learning theoretically means that the goal requires Arabic language skills. With continuous language learning, language skills can be obtained which are generally still known as four kinds of language skills, namely listening, speaking, reading, and writing.

The formulation of the problem in this research are: (1) how to develop the SRBL learning model in Arabic; (2) how is the feasibility level of the SRBL learning model in Arabic; (3) how is the level of practicality of the SRBL learning model in Arabic; and (4) how is the level of practicality of the SRBL learning model in Arabic; how the level of effectiveness of the SRBL learning model in Arabic.

2 Method

This research includes Research and Development. In this study, a valid, practical, and effective station rotation blended learning model was developed, and learning tools and instruments were needed for the model development process. The development process uses the Plomp model.

The place of this research is the Faculty of Tarbiyah and Teacher Training (FITK) of the State Islamic University of North Sumatra (UIN SU) Medan. The subjects of this research are lecturers and students who are registered as Arabic language lecturers and second-semester
students of the 2021/2022 academic year at the Faculty of Tarbiyah and Teacher Training UIN North Sumatra.

At the learning module development stage, targeting, in this case, is lecturers, learning experts, the field of study experts, and students who assess learning teaching materials that have been developed based on the following criteria: (1) evaluation of learning experts (expert judgment) is determined based on expertise owned, (2) the evaluator who carries out the evaluation is determined based on the ability of the lecturer with the classification of experts in the field of study.

Data collection in research and development is divided into three parts, namely preliminary research, development, and verification testing. At each stage of the study, certain data collection techniques were selected according to their respective objectives. In the preliminary study, in addition to the literature study, questionnaires, observations, and document recording techniques were also selected. Generally, these three technologies can be used simultaneously and complement each other.

The method used is a quasi-experimental method using a non-equivalent control group design. This design was used because of the limited population of the research sample and in this design the experimental group was not chosen randomly, then a pretest was given to determine whether there was a difference between the experimental group and the control group in the initial state.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>O₁</td>
<td>X</td>
<td>O₂</td>
</tr>
<tr>
<td>Control group</td>
<td>O₃</td>
<td>-</td>
<td>O₄</td>
</tr>
</tbody>
</table>

The arrangement of the scale used in this questionnaire or questionnaire is based on a Likert scale (interval 1 to 5) and the average score for each question item in the questionnaire and evaluation sheet will be calculated. After that, the average score is converted into scores on a scale of 5.

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
<th>Scoring</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Very Worthy</td>
<td>X &gt; Mi + 1,8 SBring</td>
<td>X &gt; 4,2</td>
</tr>
<tr>
<td>4</td>
<td>Worthy</td>
<td>Mi + 0,6 SBring &lt; X &lt; Mi + 1,8 SBring</td>
<td>3,4 &lt; X &lt; 4,2</td>
</tr>
<tr>
<td>3</td>
<td>Decent enough</td>
<td>Mi – 0,6 SBring &lt; X &lt; Mi + 0,6 SBring</td>
<td>2,6 &lt; X &lt; 3,4</td>
</tr>
<tr>
<td>2</td>
<td>less worthy</td>
<td>Mi – 1,8 SBring &lt; X &lt; Mi – 0,6 SBring</td>
<td>1,8 &lt; X &lt; 2,6</td>
</tr>
<tr>
<td>1</td>
<td>Very less worthy</td>
<td>X &lt; Mi – 1,8 SBring</td>
<td>X &lt; 1,8</td>
</tr>
</tbody>
</table>

Data collection techniques in this study use tests. The test is used for Pretest and Posttest.

Analysis technique with t-test. This analysis is measured based on the effectiveness of learning by using a question instrument and hypothesis testing using the t-test. The significant level used
is 5%. After the t-test, the two classes were compared with the number of students who experienced an increase in effectiveness between the two classes.

3. Results and Discussion

The product development of the station rotation blended learning model in Arabic against Arabic textbooks, Arabic learning models, and Arabic language course lecturer and student guidebooks show a high level of validity and feasibility so that the model product can be used in the learning process in the subject. Arabic course.

The next stage of the trial results of the blended-based learning model for students in learning language courses were carried out with 12 students as respondents with varying abilities (randomly). The selection of individual trial subjects is in collaboration with course lecturers. The purpose of the trial was to find out the extent of student responses to Arabic textbooks as learning media. The results of student respondents from the I/small group trial are as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Indicator</th>
<th>Score Rating</th>
<th>Total Score</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Face/Layout Aspect</td>
<td>4.02</td>
<td>5</td>
<td>80.4</td>
</tr>
<tr>
<td>2</td>
<td>Design Aspect</td>
<td>3.75</td>
<td>5</td>
<td>75</td>
</tr>
<tr>
<td>3</td>
<td>Content Feasibility Aspects</td>
<td>3.6</td>
<td>5</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>Aspects of Feasibility of Presentation</td>
<td>3.69</td>
<td>5</td>
<td>73.8</td>
</tr>
<tr>
<td>5</td>
<td>Language Aspects</td>
<td>3.73</td>
<td>5</td>
<td>74.5</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>3.77</td>
<td>5</td>
<td>75.3</td>
</tr>
</tbody>
</table>

Based on the results of the trial I/small group, the mean value was 3.77. With Good criteria. Overall, the results of the student assessments for the first trial obtained an average value of 3.77, which means that the blended model of Arabic textbooks is feasible to be used as a learning resource in learning Arabic.

The Effectiveness of Student Learning Before the Application of the Blended Model of Arabic Textbooks. To determine the effectiveness of student learning between the experimental class and the control class before being given treatment, the pretest data t-test was carried out. To find out t table use: dk = n1+n2 - 2. Criteria for acceptance of Ho and Ha are if t count > t table then Ho is rejected and Ha is accepted, and if t count < t table then Ho is accepted and Ha is rejected. The results of the pretest t-test calculation can be seen in table 7 below:

<table>
<thead>
<tr>
<th>Class</th>
<th>Mean</th>
<th>Variant</th>
<th>t count</th>
<th>t table</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>56.44</td>
<td>67.74</td>
<td>0.44</td>
<td>2.010</td>
<td>t count &lt; t table</td>
</tr>
<tr>
<td>Control</td>
<td>56.30</td>
<td>76.72</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on Table 7 above, it can be seen that the magnitude of the t count is 0.44. Then the t count score was consulted with the t table value at a significant level of 5% and dk 51. The t table score at a significant level of 5% and dk 51 was 2.01. This shows that the t table score is smaller than the t count score (t count = 0.44 < t table = 2.01). Based on the calculation results, it can be concluded
that there is no difference in early learning ability between the experimental class and the control class. If the student’s posttest results show differences, then the difference in learning outcomes is due to the treatment process using Arabic textbooks that have not applied the blended model.

The effectiveness of learning after applying the blended model of Arabic textbooks. To determine the effectiveness of student learning between the experimental class and the control class after being treated using a blended model of Arabic textbooks, the t-test was posttest data. To find out \( t \) table use: \( dk = n1+n2 - 2 \). Criteria for acceptance of Ho and Ha are if \( t_{\text{count}} > t_{\text{table}} \) then Ho is rejected and Ha is accepted, and if \( t_{\text{count}} < t_{\text{table}} \) then Ho is accepted and Ha is rejected. The results of the pretest t-test calculation can be seen in table 8. below:

<table>
<thead>
<tr>
<th>Class</th>
<th>Mean</th>
<th>Variant</th>
<th>( t_{\text{count}} )</th>
<th>( t_{\text{table}} )</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>76.55</td>
<td>92.49</td>
<td>4.02</td>
<td>2.01</td>
<td>( t_{\text{count}} &gt; t_{\text{table}} )</td>
</tr>
<tr>
<td>Control</td>
<td>69.30</td>
<td>70.02</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on Table 8. above, it can be seen that the magnitude of the \( t_{\text{count}} \) is 4.02. Then the \( t_{\text{count}} \) score was consulted with the \( t_{\text{table}} \) value at a significant level of 5% and \( dk = 51 \). The \( t_{\text{table}} \) score at a significant level of 5% and \( dk = 51 \) was 2.01. This shows that the \( t_{\text{count}} \) score is greater than the \( t_{\text{table}} \) score (\( t_{\text{count}} = 4.02 > t_{\text{table}} = 2.01 \)). Thus Ho is rejected and Ha is accepted. So that there is a significant difference in the value of student learning effectiveness after being treated using the module.

The use of the blended model of Arabic textbooks developed in learning Arabic for students overall shows its feasibility and can be used directly in the student learning process in Arabic courses. The results of the validation of learning design experts, graphic design experts, and Arabic material experts show a high level of feasibility so that the blended model of Arabic textbooks can be used in learning Arabic among students.

The quality of the blended model Arabic textbook product developed is related to relevant theories and research results that support the development of the blended model Arabic textbook product, so the strengthening of the blended model Arabic textbook product is very helpful and has an impact on student learning outcomes in language courses. Arabic for the better.

The success of student’s perceptions of the learning environment in various course modalities, and how to configure blended learning about the problem of Blended learning: the new normal and emerging technologies [13]. The findings of blended learning can increase student access and result in increased success rates for minority and non-minority students alike, and blended learning has an effect that offers the potential to improve the teaching and learning process in the educational environment which increases pressure to be more responsive to contemporary student lifestyles [14]. Suggestions in this study are important for establishing clear course objectives, creating an effective learning environment, and effective instructor communication.

The development of blended Arabic language textbooks also adds to the motivation of student learning outcomes. This research aims to determine the differences in motivation and achievement of learning outcomes of geography between before and after using the Rotation Model-based Blended learning model. The research design used Quasi Experiment with the
Non-Equivalent Control Group Design technique. The results showed that there were differences in students’ motivation and learning outcomes between the class that was given treatment using the Rotation Model-based Blended learning model and the control class that was not given any treatment. Motivation in the experimental class is higher than in the control class, then the learning outcomes in the experimental class are higher than in the control class. This supports research that the application of rotation-based blended can improve learning outcomes. Likewise, learning Arabic with blended.

Supported by the results of research conducted by Amin [15], the blended learning model is mixing conventional learning models with online learning. Students are expected to always be active and be able to find ways of learning that are suitable for themselves. The teacher only functions as a mediator, facilitator, and friend who creates a conducive situation for the construction of knowledge in students. This blended learning will strengthen the conventional learning model through the development of educational technology. In addition, the results of studies in journals can be concluded that the average results of blended learning research also influence learning outcomes.

The creative thinking ability outcomes of the students taught with this model were higher than those of the group II students who used the ordinary blended learning model. However, those with low thinking abilities taught with the ordinary model exhibited higher learning outcomes than the experimental group. These results show an interaction between the effect of the PjBL model and creative thinking ability on the learning outcomes of engineering students. Therefore, lecturers need to use a blended PjBL model to ensure improved outcomes, alongside enhancing students' creative thinking abilities to increase the model's effectiveness [16].

4. Conclusion

The feasibility of the blended model of Arabic textbooks is declared suitable for use in learning Arabic courses, based on the assessments of material experts, learning design experts, and graphic design experts getting good grades. The results of trial I and trial II got a very good average value. So based on the results of the data obtained from the assessment of material experts, media experts, lecturers, trial I, and trial II of the blended model of Arabic textbook media with Good criteria.

The effectiveness of student learning has increased in the experimental class that uses the blended model of Arabic textbooks than in the control class whose learning process does not use the blended model. The combination of the use of online and offline learning in blended is highly expected by students in the learning process on campus so that they can improve Arabic learning outcomes.

References


The Effect of SAS (Structure, Analytical, & Synthetic) Learning Strategies with Expository and Learning Styles on Dance Learning Outcomes

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Abstract: This study aims to determine the dance learning outcomes of students who are taught with SAS and expository learning strategies, the dance learning of students who have kinesthetic and visual styles, and the interaction between learning strategies and learning styles in influencing dance. Quasi-experimental research method with 2 x 2 factorial two-way ANOVA significance level = 0.05. The dance learning outcomes of students who are taught with SAS learning strategies are higher than those of expository, dance learning outcomes of students who have kinesthetic learning styles are higher than visual ones, and there is an interaction between learning in influencing dance. Students with a kinesthetic learning style have higher dance learning outcomes than those visually taught using the SAS learning strategy.

Keywords: learning strategy, structure, analytical & synthetic (SAS), expository, kinesthetic learning style, visual learning style, dance.

1 Introduction

The existence of dance in the context of education is very broad because the concept of education essentially creates positive added value. Therefore, dance in the context of education serves as a means that can provide added value to others. Recognizing such an existence, dance in the context of education means that both form and content must be by its function and purpose, which is to provide added value for those who study it. In institutionalizing the function of dance, Hadi once suggested dance about humanities education [1].

Knowing and understanding and preserving the culture of arts in Indonesia, one of which is the art of dance. The art of dance is a subject that is in the competency standard in the even semester of cultural arts learning, namely imitating and demonstrating dance movements, namely showing local dance arts in the form of the nine-lenggang broken dance, and in this material what will be studied is the local dance art, namely the lenggang dance. broken nine from Kuala
Art and education are like two things that cannot be separated from human life. Because both there are interactions between humans and humans with the natural surroundings. One of the goals of dance education as stated in the curriculum is that students are expected to have skills, knowledge, and be able to develop creativity about dance.

At the junior high school level, dance education is given to class VIII students. However, the ability of students in dance subjects is not evenly distributed. Some students can follow and enjoy dance lessons easily. However, some students difficult to learn the theory and practice of dance. This is understandable, given the diverse backgrounds of students' lives. Including differences in students' talents and interests in dance.

The most striking condition occurred in class VIII in the even semester of UPT SMP Negeri 30 Medan in the 2021/2022 academic year. Of the 32 students in each class, only a small proportion can master dance subjects well, while the rest have difficulty in learning. One indicator of the low achievement of students' dance learning is reflected in the value of dancing skills in semester 2 of the 2021/2022 academic year on the subject of demonstrating the Kuala Deli Lenggang Broken Nine dance, which only achieved an average score of 70.5 with classical completeness of 42.5 %. Even though the KKM limit that has been set is 75.

1.1 Learn Dance

Han, Eunice's study [2] is a business process carried out to obtain a change in attitude as a result of interacting on the environment to achieve certain goals. Art learning is carried out in a person in order to acquire attitudes and behaviors as a result of experiences and the existence of interactions with environmental culture in order to absorb certain objectives [3].

According to Wulandari [4], learning must develop students' appreciation of works of art, such as dance. Several principles allow art teaching to take place properly through an appreciative approach, namely: (1) Students can freely display their responses and reactions, (2) Students have the opportunity to personalize and crystallize their sense of the sense of artwork, artwork teacher can find examples among the students' opinions, (4) the teacher can encourage the explanations made by students in an inherent influence.

Dance is a part of art. Novitasari [5] means that Dance is a beautiful movement of the human body according to the rhythm and means to have a harmonious soul. The art of dance is like the expression of the human soul expressed in beautiful rhythmic movements and depicted in the form of wiraga, wirama, wirasa in harmony and harmony.

In general, the Lenggang Patah Sembilan dance movement is divided into three parts, namely lenggang in place, lenggang rotating in a circle, and lenggang forward or changing direction. These three movement models must be danced dynamically and gracefully to get an interesting dance presentation.

The Lenggang Patah Sembilan dance in the performance is danced by a pair of men and women. The two of them danced in unison and dynamically, accompanied by Malay music and songs. According to Malay dance artists, the Lenggang Patah Sembilan dance movement is almost the same as other Malay dances. However, the difference is when starting the movement, that is, the dancer on the left starts the movement with the left foot. Vice versa, the dancer on the right starts the movement with the right foot.
1.2 SAS Learning Strategies (Structure, Analytical, and Synthesis)

The SAS method is a new teaching method. Ropitasari [6] This method is used to teach dance. A method that pays more attention to the "inner working of dance" in which the teacher provides a complete dance structure at the beginning and the students imitate it, then repeat it again and then give the movement elementally.

The SAS learning strategy was originally applied to Indonesian language lessons, the SAS method is used to learn to read from the beginning of age in primary school. The SAS method is used in various areas of teaching. The steps of the SAS method are: (1) structural as a whole, (2) analytics according to the decomposition process, and (3) synthetics recombine to the original structural form. This will have a positive impact on children's memory and understanding [7].

The SAS method, which is this method, can be used as a basis for analytical thinking with steps that make it is easy to follow procedurally and easily understands the subject matter. Teachers must be creative, skilled, and patient with students. The SAS method has a principle, which is in line with the science of linguistics to communicate as a sentence. Which Sentences are formed with the language of words, syllables, and phonemes (letters), the SAS method considers the language experience of elementary school students, and the SAS method is found in Indonesian language lessons in general.

1.3 Expository Learning Strategy

Expository learning is the same as learning that occurs by learning to accept. Behavioral theory also tends to direct students to think linearly and convergently. As for the characteristics of expository learning: (1) it is done by conveying the subject matter verbally; (2) usually the material presented is in the form of data or facts, with certain concepts that must be remembered so that students do not rethink; (3) The goal is mastery of the subject matter [8]. Expository learning, with teachers presenting the material neatly and systematically so that they only need to listen and understand in an orderly manner” [9].

Steps in the application of expository learning: (1) preparation (preparation), which is related to preparing students to receive lessons: (2) presentation related to the delivery of subject matter by the preparations that have been made; (3) linking (correlation) relates to linking subject matter with student teaching or other things that students can concurrently relate to in the knowledge structure they already have; (4) conclude (generalization) related to understanding the core (core) and the subject matter that has been presented; (5) applying (Application) is related to the steps to show students' abilities after listening to the teacher's explanation.

1.4 The Nature of Learning Style

Then DePorter mentions that the way of learning a person tends to choose to quickly receive information from the environment and process that information. In terms of learning, each individual has advantages and disadvantages in absorbing the lessons given [10]. Therefore, in the world of education, there are various methods that teachers can use to meet the demands of individual differences. Teachers need learning design designs to bridge the relationship between students and teachers according to their learning styles.
According to DePorter, several other learning styles can be chosen to learn effectively. Some of the learning styles that may be found in students are Auditorial learning styles, Kinesthetic learning styles, and Visual learning styles. Everyone has a different way or style of learning. Many styles can be chosen to learn effectively. Furthermore, there are 7 (seven) learning styles that may be applied to students, namely: (a) learning with words, the style begins with inviting someone who tells stories and reads and writes. This learning style is very preferred because it can remember names, places, dates, etc., (b) learning through questions, this is more effective and useful if it is done by playing. Like curiosity by asking questions. Every time there is an answer, reach with questions to get the final result or conclusion, (c) learn with pictures, designs, and see pictures. This becomes a character for someone who has sensitivity in capturing images or colors. (d) learning with music, rhythmic beats, singing, and playing a musical instrument. [11].

Table 1. Differences in Visual and Kinesthetic Learning Styles

<table>
<thead>
<tr>
<th>Kinesthetic</th>
<th>Visual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likes active activities, both social, arts and sports.</td>
<td>Likes to read, watch TV, cinema, and pay attention to facial expressions.</td>
</tr>
<tr>
<td>Remember events; things that happen</td>
<td>Remembering people by sight, remember words by seeing, good at memorizing showing</td>
</tr>
<tr>
<td>Give and receive explanations directly</td>
<td>giving/receiving explanations prefer to use maps/pictures</td>
</tr>
<tr>
<td>Comfortable taste and taste. Material is more important than style.</td>
<td>Taste: appearance matters, color, An appropriate choice ordered or coordinated</td>
</tr>
<tr>
<td>Expressing emotions through body language, gestures/muscles</td>
<td>Expressing emotions through facial experiments</td>
</tr>
<tr>
<td>Using words such as feel, touch, deal, start over, put cards on the table, touch, hold, pluck strings, boil, join hands</td>
<td>Using words such as: seeing, watching, describing the point of view, perspective, revealing, visible to me, binoculars, bright focus, and brilliant.</td>
</tr>
<tr>
<td>Overcoming, holding back, sharp as a knife</td>
<td>Enthusiastic, short-sighted, likes to show off</td>
</tr>
<tr>
<td>Creative activities: handicrafts, gardening, dancing, exercising.</td>
<td>Creative activities: writing, describing, painting in the air</td>
</tr>
</tbody>
</table>

Source: Quantum Teaching

The research problems are: (1) is the result of learning dance with SAS higher than expository learning; (2) are the results of learning dance with the kinesthetic learning style higher than the visual learning style; and (3) is there an interaction between learning strategies and learning styles in giving a positive impact on dance learning outcomes?

2 Method

The sample objects in this study were class VIII students of UPT SMP N 30 Medan for the 2021/2022 academic year which consisted of 4 classes with a total of 122 students. Determination of the sample used a random group sampling technique (cluster random sampling). The sample class used is 2 experimental classes. The two classes that will be given treatment are: (1) Class VIII A: Class taught with the SAS learning strategy; and (2) Class VIII B: A class whose learning uses expository learning strategies.
Data analysis used the 2 x 2 factorial ANOVA technique with the F test. Starting from the requirements test using the normality test and using the Liliefors test with the homogeneity test using the F test and Bartlett test. When the third hypothesis is stated to be significant, it means that there is an interaction, then it is continued with the Scheffe test to test multiple comparisons between cells, because the sample size of each cell in the study design is not the same.

3 Results and Discussion

The description of the statistical data on dance learning outcomes based on variations in the learning model is as follows.

Table 2. Descriptive Analysis Calculation Results

| Variable | Learning model | | | | |
| --- | --- | --- | --- | --- | |
| | SAS | Expository | Total | |
| **Learning model** | | | | |
| **Learning Style** | | | | |
| **Kinesthetic (B1)** | | | | |
| n | 17 | n | 15 | n | 32 |
| \[ \bar{X} \] | 81.91 | \[ \bar{X} \] | 63.33 | \[ \bar{X} \] | 73.56 |
| \[ \sum X \] | 1393 | \[ \sum X \] | 950 | \[ \sum X \] | 2354 |
| \[ \sum X^2 \] | 114444 | \[ \sum X^2 \] | 60740 | \[ \sum X^2 \] | 176492 |
| S | 4.48 | S | 5.35 | S | 9.12 |
| **Visual (B2)** | | | | |
| n | 13 | n | 14 | n | 27 |
| \[ \bar{X} \] | 63.54 | \[ \bar{X} \] | 76.79 | \[ \bar{X} \] | 69.61 |
| \[ \sum X \] | 826 | \[ \sum X \] | 1075 | \[ \sum X \] | 1880 |
| \[ \sum X^2 \] | 53102 | \[ \sum X^2 \] | 82760 | \[ \sum X^2 \] | 132469 |
| S | 6.04 | S | 3.45 | S | 6.74 |
| **Total** | | | | |
| n | 30 | n | 29 | n | 59 |
| \[ \bar{X} \] | 73.23 | \[ \bar{X} \] | 69.26 | \[ \bar{X} \] | 71.25 |
| \[ \sum X \] | 2197 | \[ \sum X \] | 2009 | \[ \sum X \] | 4206 |
| \[ \sum X^2 \] | 164700 | \[ \sum X^2 \] | 141005 | \[ \sum X^2 \] | 305705 |
| S | 10.14 | S | 6.98 | S | 8.56 |

Based on the results of the normality test, the data showed that all groups of subjects were normally distributed, thus it can be concluded that the research sample came from a normally distributed population. And thus the group of subjects taught by SAS and those taught by expository learning strategies based on kinesthetic learning styles and visual learning styles had homogeneous variances. After testing the requirements of the analysis, it is necessary to obtain the results that all the data of the subject group are normally distributed and have homogeneous variance, thus the requirements relating to the two-way analysis of variance have been met.

Table 3. Summary of Two-Way ANOVA Test Results

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>JK</th>
<th>DK</th>
<th>RJK</th>
<th>F_{count}</th>
<th>F_{table}^{(1,0.05)}</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Strategy</td>
<td>5478</td>
<td>1</td>
<td>5478</td>
<td>413</td>
<td>4.02</td>
<td>Significant</td>
</tr>
<tr>
<td>Learning Style</td>
<td>14705</td>
<td>1</td>
<td>14705</td>
<td>34</td>
<td>4.02</td>
<td>Significant</td>
</tr>
<tr>
<td>Interaction</td>
<td>509</td>
<td>1</td>
<td>509</td>
<td>14</td>
<td>4.02</td>
<td>Significant</td>
</tr>
<tr>
<td>Between Groups</td>
<td>9490</td>
<td>3</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Group</td>
<td>3551</td>
<td>55</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>33732</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the calculation of 2x2 factorial ANOVA, $F_{\text{count}} = 413$, while the value of $F_{\text{table}} = 4.02$ for DK (1.55) and the significance level of $\alpha = 0.05$. It turns out that the value of $F_{\text{count}} = 413 > F_{\text{table}}$ so the hypothesis testing rejects $H_0$. Thus, it can be concluded that the learning outcomes of dance students who are taught with the SAS learning strategy are higher than those with expository learning strategies that can be accepted and proven empirically. This can also be seen from the average dance learning outcomes taught with the SAS learning strategy ($X = 73.23$) which is higher than the dance learning outcomes taught using the expository learning strategy ($X = 69.26$).

From the results using SAS Learning and Kinesthetic Learning Styles, it was obtained 81.91 with a standard deviation of 4.48 while learning outcomes with SAS and Visual Learning Styles were 63.54 with a standard deviation of 6.04 while the learning outcomes of Expository and Kinesthetic Learning Styles were 63, 33 with a standard deviation of 5.35 while the average Expository and Visual Learning Style learning outcomes are 76.79 with a standard deviation of 3.45.

The results of the interaction, where $F_{\text{count}} = 14$ and the value of $F_{\text{table}}$ with DK = (1.55) and $\alpha = 0.05$ is 4.02. These results indicate that $F_{\text{count}} > F_{\text{table}}$ (14 > 4.02), so the Alternative Hypothesis (Ha) is accepted and the Zero Hypothesis (Ho) is rejected, meaning that there is an interaction between dance learning strategies and learning styles in influencing the learning outcomes of Dance. Based on the results of there is an interaction between learning strategies and learning styles in influencing student dance learning outcomes, it is necessary to test the average difference between the two propositions, for this reason, Scheffe’s further test is used.

<table>
<thead>
<tr>
<th>No</th>
<th>Statistical Hypothesis</th>
<th>$F_{\text{count}}$</th>
<th>$F_{\text{table}}$ (3,61) $\alpha=0.05$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$H_0: \mu_{A1B1} = \mu_{A1B2}$</td>
<td>6.21</td>
<td>2.76</td>
</tr>
<tr>
<td>2</td>
<td>$H_0: \mu_{A1B1} = \mu_{A2B1}$</td>
<td>6.53</td>
<td>2.76</td>
</tr>
<tr>
<td>3</td>
<td>$H_0: \mu_{A1B1} = \mu_{A2B2}$</td>
<td>1.77</td>
<td>2.76</td>
</tr>
<tr>
<td>4</td>
<td>$H_0: \mu_{A2B1} = \mu_{A2B2}$</td>
<td>4.50</td>
<td>2.76</td>
</tr>
<tr>
<td>5</td>
<td>$H_0: \mu_{A1B2} = \mu_{A2B2}$</td>
<td>4.28</td>
<td>2.76</td>
</tr>
<tr>
<td>6</td>
<td>$H_0: \mu_{A1B2} = \mu_{A2B1}$</td>
<td>0.07</td>
<td>2.76</td>
</tr>
</tbody>
</table>

The study of $F_{\text{count}} > F_{\text{table}}$ the dance learning students who were taught with the SAS were higher than those of students who were taught the expository. Because in the SAS Learning Strategy group accommodate more of the potential possessed by students with this type. In the SAS-based learning strategy, students are involved in many classroom activities, such as brain exercises, making goal-setting cards, making mind maps, role-playing, simulations, activation
tasks, and demonstrations. Those with a kinesthetic learning style become more challenged, excited, and motivated to take lessons. Many activities involve them so that they do not feel bored.

On the other hand, students with this type will feel bored with expository learning strategies that are very much dominated by the teacher. Students listen more and there are not many class activities that arouse students' enthusiasm. They are not challenged to do something. Their nature is easily curious and wants to try something less accommodated in expository learning strategies. So that students become bored and not enthusiastic to follow the lesson. Therefore, it can be concluded that the Kinesthetic Learning Style will get higher dance learning outcomes if it is taught with the SAS learning strategy compared to the Expository learning strategy.

Regarding the results of the research conducted, Kurniawan [12] in his research on the Effectiveness of the SAS Learning Strategy on the Motivation to Learn Dance in Private Junior High School Students R.K Santo Petrus Medan, analyzed how the differences in the motivation to learn dance were viewed from contextual methods. And the results are known that (1) There is a very significant difference in the motivation to learn Dance in terms of the contextual method of the private junior high school students R.K Santo Petrus Medan. This result is evidenced by the coefficient of difference t-test = -5.957; p = 0.00. Thus, the hypothesis that has been proposed in this study is declared accepted. (2) The results of this study prove that the contextual method in the dance learning process greatly affects the students' motivation to learn dance. The process of learning dance, which is taught using this contextual method, can increase students' motivation to learn dance. It is proven that the average value of students' motivation to learn dance art taught using contextual methods is 152,396, while for students who are taught using conventional methods the average value of dance motivation is 143,724. In general, the results of this study illustrate that the students have a high motivation to learn Dance.

The solution to all the problems that occur is that the teacher must change the direct learning system that has been applied so far with more innovative methods. The learning method that is believed to be able to improve the learning achievement of class VIII C students of SMP Negeri 3 Dawan is the Structural, Analytical, and Synthetic Method (SAS). The SAS method pays more attention to the inner working of dance, whose implementation divides dance into a treasury of motion. Thus, it is easier for students to follow the dance movements. If students can master dance movements, their interest in dance lessons can automatically increase, which in turn can improve students' dancing skills.

The fact that the SAS learning strategy affects improving students' dancing skills can be seen from the advantages obtained in the study. The advantages obtained are: (1) It is easier for students to learn dance movements by using the pieces of motion that are applied. This data is strengthened from the results of interviews with students during the analysis stage. Where most of the students admitted that it was easier to follow the dance movements which were described in the form of fragments of motion. (2) The students' dancing skills have increased significantly, although they have not achieved classical completeness as expected. An explanation of the advantages of these two has been described in the explanation above. (3) The teacher can observe the students' ability to dance. This can be seen when learning using the SAS method enters the synthetic stage. In this case, the teacher uses a steaming formation by positioning students who are good at dancing in the front row, then followed by students with moderate abilities, and the last row is filled with students who have below-average dancing abilities. In
guiding students, the teacher can pay attention to groups of students who have below-average dancing abilities, while students who have intermediate abilities can see examples of movements shown by groups of students with advanced abilities. It is known that student learning outcomes with SAS are how the learning process becomes effective, efficient, and enjoyable [13]. So, it is clear that using SAS will have a better impact on dance learning outcomes than learning using Expository.

In this study, there is an interaction between learning strategies and learning styles on learning outcomes. If you look at the Kinesthetic Learning Style and given by using SAS it is higher than the Kinesthetic Learning Style and taught by SAS. Furthermore, the average learning outcomes of Visual Learning Styles and being taught with SAS are lower than learning outcomes in Visual Learning Styles and being taught using expository. It was concluded that having a higher Kinesthetic Learning Style was taught using SAS compared to using Expository. So there is an increase in the Kinesthetic Learning Style. This is because students can follow the lesson well, can solve problems, and foster student enthusiasm in learning. Whereas in teaching and learning activities both the SAS learning strategy and the Expository learning strategy can take place interactively because of the fun learning atmosphere where each student can work together in solving problems.

SAS learning for students with Kinesthetic Learning Styles can produce their potential. Students will more easily understand and solve problems. This is in accordance with the Kinesthetic Learning Style when taught using SAS. The interaction between learning strategies and learning styles is an indication that in addition to SAS learning strategies, student characteristics, in this case learning styles, have a positive impact on dance learning outcomes.

4. Conclusion

The conclusions in this case are: (1) The results of learning dance with SAS are higher than those with expository; (2) The results of learning dance have a higher Kinesthetic Learning Style compared to having a Visual Learning Style; (3) It was found that there was an interaction between SAS and learning styles on dance learning outcomes. Students who have a Kinesthetic Learning Style get higher results with SAS than Expository, while those who have a Visual Learning Style have higher learning outcomes when taught with Expository learning strategies than SAS learning strategies.

References

The Effect of STAD Type Cooperative Learning Model with TGT Type and Achievement Motivation on Economic Learning Outcomes

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Abstract: The purpose of this study is to produce economic learning using the STAD learning model and the TGT type learning model. It is known that students' economic learning outcomes have high and low achievement motivation, and know their learning outcomes. The interaction between these models can influence economic learning outcomes. This research method uses factorial 2 x 2 ANOVA. The results show that learning outcomes with the STAD learning model are higher than TGT. Learning outcomes with high achievement motivation are higher than those with low achievers, and there is an interaction between models in influencing economic learning outcomes.

Keywords: learning model, STAD, TGT, achievement motivation, economy

1 Introduction

Economics subjects have the characteristics of learning about phenomena that occur in society, or it can be said that studying economics is closely related to a scientific approach. Economics subjects have a sustainable nature, which means that in the process, sequential understanding is needed. Therefore, thoroughness and good understanding are needed in each discussion. Thus the teacher must familiarize students with working actively and stimulate students to think through the application of learning models that can involve students in discussing the material.

The results of observations made by researchers at XI SMAN 1 Rantau Utara in the 2020/2021 academic year in class XI, especially in economics subjects, information was obtained which stated that student learning outcomes were still relatively low. This is evidenced by the economic value of the daily exams for class XI students, which are much below the standard of completeness set by the school, which is 75.

Facts in the field, teachers are less precise in the selection of learning models. Most teachers use
conventional learning models such as the lecture method so that the learning carried out does not provide the widest opportunity for students to construct knowledge. As a result, students do not participate in learning so they are less able to develop achievement motivation. When the researchers made initial observations observing the student learning process at SMAN 1 Rantau Utara the teacher applied the group discussion learning model as an innovation in learning. However, there are still some teachers who still use the lecture method where students are only objects in the learning process. Students are only accustomed to taking notes, listening, and memorizing, rarely being trained to understand several economic concepts so that when in the learning process students lack the initiative in asking questions or expressing opinions. Of course, this makes students' thinking skills not too good, because there is no habituation to having opinions solving various problems that are being faced.

The main factor causing the problem of the low value of learning outcomes is thought to be learning still using conventional models. The conventional model is teacher-centered learning by combining the lecture method, question, and answer which causes students' motivation to study economics to decrease because the conventional model is boring learning so that student activity is embedded in the learning process. Students are increasingly passive in the teaching and learning process, there is no interaction between teachers and students. When the teacher asked the student, the student was unable to answer the question. This happens because in the learning process students are not accustomed to expressing opinions or collaborating with their friends in study groups.

Economic learning that is needed at this time is learning that can improve the mastery of the material and students' creativity. By actively involving students in learning. So that student learning outcomes can increase the better. With cooperative learning, the model provides opportunities for students to think, answer and help each other. The application of the cooperative learning model will make learning more interesting, fun, involve students, and increase student activity and cooperation. The cooperative learning model of the Student Teams Achievement Divisions (STAD) and Teams Games Tournament (TGT) types can be applied in the learning process of economics subjects.

1.1 Economic Learning

Learning outcomes from the interaction in the act of learning and teaching. The teacher's point of view says that the act of teaching must have an evaluation process. From a learner's point of view, learning outcomes become a learning process. One of its successes is to reflect the results of the learning process so that it is known to what extent students and teachers achieve educational goals. Learning outcomes are the result of the completion of the learning process, where through learning students can know, understand, and can apply what they learn [1].

In the world of education, economics is a compulsory subject for all students at the high school level. People choose how to use scarce resources and have several alternatives uses, to produce various commodities, and then distribute them, both now and in the future, to various individuals and groups in a society. Economics subjects need to function as a trigger to grow students' intelligence, abilities, and skills. Economics is often considered a difficult subject to understand [2].
Based on the description above, it can be concluded that the learning outcomes of economics are the students' ability to complete the tests that have been prepared the Economics teaching material for the XI grade high school level. Student learning outcomes are expressed by scores as the results of tests held by the teacher after the learning process takes place. Through this test, it can be seen the level of students' ability in mastering the subject matter that has been delivered to the learning process. The scope of the material includes: (5) Analyzing monetary policy and fiscal policy; (6) Analyzing APBN and APBD in economic development; (7) Analyzing taxation in economic development; (8) Describing international economic cooperation; and (9) Analyzing international trade concepts and policies.

1.2 Learning Model

Cooperative learning is learning that is taught together by helping each other as a group or a team [3]. Cooperative learning is learning in small groups with different skills, in this case working together to arrive at an optimal learning experience [4]. Slavin said, "In this method, students work together in teams of four with the aim of mastering the material that has been given by the teacher". This is in accordance with the learning model which is a system of learning and working in small groups consisting of 4 to 6 people collaboratively so that it can stimulate student behavior to be more enthusiastic about learning. Johnson & Johnson stated, "Cooperative learning is a way that uses small groups so that students work and learn from each other. To achieve group goals in cooperative learning, students discuss and help each other and invite each other to understand the content of the subject matter" [5].

There are five types of cooperative learning methods that have been successfully developed by educational researchers at Johns Hopkins University, namely: STAD, TGT, TAI, CIRC and jigsaw. Three of them, namely STAD, TGT, and Jigsaw, can be applied to almost all subjects, while TAI and CIRC are used in certain subjects and levels.

1) STAD (Student Teams Achievement Divisions). Student Teams Achievement Divisions (STAD) is the simplest cooperative approach. In this method, students are divided into groups of 4-5 people of different gender, ethnicity, and ability. Teachers deliver new academic information to students each week using verbal or text presentations. Individually every 2 weeks students are given a quiz. Quiz it on development scores.

2) Jigsaw Learning materials are given to students in the form of text. Each member is responsible for studying a given section. Jigsaw consists of five steps, namely students reading and reviewing teaching materials, expert group discussions, student group discussions (homogeneous), tests/quizzes, and teacher reinforcement.

3) TGT (Team Games Tournament) TGT is almost the same as STAD, but TGT doesn't use quizzes or Tanya crosses but uses weekly tournaments and competitions. In the competition, students competed with other team members to contribute points to their scores. TGT consists of four steps, namely identification of problems, discussion of problems in groups, presentation of the results of group discussions (tournaments), and reinforcement from the teacher.

4) TAI (Team Accelerated Instruction) This technique combines group learning methods with individual learning. Each group member will be given step-by-step questions that they have to do individually in their group. After that, their work is checked by other team members. If a student has been able to answer a question, then he has to rework the problem with the same level of difficulty before he moves on to a more difficult question.

5) CIRC (Cooperative Integrated Reading & Composition) This technique is similar to TAI,
but only emphasizes teaching reading, writing, and grammar. CIRC activities consist of students following the teacher's instructions, team exercises, team pre-assessments, and quizzes.

In addition to the five types of cooperative learning above, there are several other types of cooperative learning, namely Group Investigation, Learning Together, and so on.

STAD has been used in a wide variety of subjects, from mathematics, languages, and arts, to social sciences and other scientific disciplines, and has been used by sophomores to college students. This method is best suited for teaching well-defined subject areas, such as mathematics, numeracy, applied studies, language use and mechanics, geography and map skills, and scientific concepts [6].

The TGT model is a model easy to apply, involves the activities of all students by involving the role of peer tutors, and there are elements of play and reinforcement. In general, TGT is the same as STAD, but what distinguishes it is: TGT uses academic activities such as quizzes and individual assessments not in groups, such as students representing their groups to get assessments [7]. TGT is like learning in groups of 5 to 6 students who have different abilities, genders, syllables, or races [8].

1.3 Achievement Motivation

Motivation comes from the Latin "movere" which means to move or move, while Suriasumantri argues that motivation is a person's drive, desire, or need. Motivation as encouragement is in someone who moves to do something according to the impulse. The concept of motivation is explained as “the drive to fulfill or satisfy the need to stay alive” [9]. Hope is a temporary belief that an outcome will be obtained after a certain action is taken. One type of hope is achievement motivation is the hope to obtain satisfaction in mastering behavior [9].

Achievement motivation is a drive related to achievement, namely mastering, regulating the social or physical environment, overcoming obstacles and maintaining high-quality work, competing beyond past achievements, and influencing others. While achievement motivation itself is a motive that encourages individuals to achieve success and aims to succeed in competition with several measures of success, namely by comparing their previous achievements and the achievements of others. Individuals who have a high achievement motive have a motive to achieve success [7].

This difference in motivation levels is caused by several factors as mentioned below: (1) Individual factors: Students with intrinsic and extrinsic dimensions show that only students who tend to be competent in the academic field can have intrinsic motivation. Students who have high self-perception prefer challenging tasks and always try to satisfy their curiosity. On the other hand, students who have low self-perception prefer easy tasks and what they do is highly dependent on the teacher's direction; and (2) Situational factors: Class conditions tend to affect student motivation. Classes with a large number of students tend to be formal, there is competition, and there is control from the teacher. Conversely, in small classes, students will feel more free to recognize themselves. Small classes give the impression of being informal and make students freer [10].
Table 1. Achievement Motivation and its Comparison

<table>
<thead>
<tr>
<th>No</th>
<th>Indicators</th>
<th>High Achievement Motivation</th>
<th>Low Achievement Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Desire to excel in competition</td>
<td>Have responsibility for tasks</td>
<td>Lack of responsibility for tasks</td>
</tr>
<tr>
<td></td>
<td>Students Have a Desire to learn</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setting the Standard to be achieved</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Have the ability to accept explanations well</td>
<td></td>
<td>Less can accept explanations well</td>
</tr>
<tr>
<td>2</td>
<td>Completing tasks</td>
<td>Motivated, persistent, and active in finding creative ways to complete tasks</td>
<td>Less motivated, persistent, and active in finding creative ways to complete tasks</td>
</tr>
<tr>
<td></td>
<td>Satisfied with the results of your efforts</td>
<td></td>
<td>Satisfied with the results of other people's efforts</td>
</tr>
<tr>
<td>3</td>
<td>Rational</td>
<td>Seeing things rationally</td>
<td>Less able to see things rationally</td>
</tr>
<tr>
<td></td>
<td>Anticipation of possible failures or difficulties that will occur</td>
<td>Lack of anticipation of possible failures or difficulties that will occur</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Likes challenges to succeed</td>
<td>Students have the spirit to compete and compete</td>
<td>Students lack the enthusiasm to compete and compete</td>
</tr>
<tr>
<td></td>
<td>Able to make quick decisions and implement them</td>
<td>Slow to make decisions and implement them</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Personal responsibility for the success</td>
<td>Students are active and creative during the learning process</td>
<td>Students are less active and creative during the learning process</td>
</tr>
<tr>
<td></td>
<td>Likes to communicate</td>
<td></td>
<td>Doesn't like to communicate</td>
</tr>
<tr>
<td>6</td>
<td>Creative dare to take risks and feedback</td>
<td>Have greater curiosity</td>
<td>Very little curiosity</td>
</tr>
<tr>
<td></td>
<td>Have hope of achieving good learning outcomes</td>
<td>Les hope of achieving good learning outcomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Able to develop ideas</td>
<td>Less able to develop ideas</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Drive and hope to achieve learning outcomes</td>
<td>Have an inner drive to succeed</td>
<td>Lack of an inner drive to succeed</td>
</tr>
</tbody>
</table>

This study has the formulation of problems such as: (1) the results of studying economics with the STAD model are higher when compared with the TGT model; (2) students who have high motivation get high learning outcomes when compared to those with low motivation; and (3) there is an interaction between the cooperative learning model and achievement motivation in having an impact on students' economics learning outcomes.

2 Method

The object of this study was students of class XI (eleven) of SMAN 1 Rantau Utara as many as 8 (eight) classes, each class amounting to 32 people, thus the total population of 256 students. The sample is part of the population that is selected representatively, meaning that the characteristics of the population are reflected in the sample taken (Sudjana, 1992). Sampling was done at random clumps (cluster random sampling). From the population sample, 2 (classes) classes, each of which amounted to 32 people, will be selected as research samples. By using the sampling technique above, 1 (one) class was selected as treatment class I using the STAD
type cooperative learning model, and 1 (one) class as the second treatment class using the TGT type cooperative learning model. Thus, the entire research sample amounted to 64 people.

In this study, the analysis used the 2 x 2 factorial ANOVA technique plus the F test. First, the requirements test was carried out using normality tests such as the Liliefors test and homogeneity test using the F test and Bartlett test. Because the third hypothesis was stated to be significant, an interaction occurred and the study was continued by using the Scheffe test to test differences between cells, because the sample size of each cell in the study design was not the same.

The description of the statistical data on Economics learning outcomes based on variations in the learning model is as follows.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cooperative Learning Model</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STAD</td>
<td>TGT</td>
</tr>
<tr>
<td>Height (B1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>(\bar{X})</td>
<td>84.53</td>
<td>67.40</td>
</tr>
<tr>
<td>(\sum X)</td>
<td>1449</td>
<td>1019</td>
</tr>
<tr>
<td>(\sum X^2)</td>
<td>123953</td>
<td>69438</td>
</tr>
<tr>
<td>S</td>
<td>5.69</td>
<td>4.93</td>
</tr>
<tr>
<td>Low (B2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>(\bar{X})</td>
<td>60.62</td>
<td>61.71</td>
</tr>
<tr>
<td>(\sum X)</td>
<td>801</td>
<td>863</td>
</tr>
<tr>
<td>(\sum X^2)</td>
<td>49877</td>
<td>53821</td>
</tr>
<tr>
<td>S</td>
<td>6.42</td>
<td>7.03</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>(\bar{X})</td>
<td>74.17</td>
<td>64.66</td>
</tr>
<tr>
<td>(\sum X)</td>
<td>2213</td>
<td>1888</td>
</tr>
<tr>
<td>(\sum X^2)</td>
<td>168204</td>
<td>124236</td>
</tr>
<tr>
<td>S</td>
<td>13.42</td>
<td>6.59</td>
</tr>
</tbody>
</table>

The results of studying economics with the STAD method experiment were higher than those with TGT. If the economics learning outcomes of high achieving students are higher than the learning outcomes of low achievement motivation.

In the normality test, it produces data on all groups of subjects that are normally distributed, so that the study sample comes from a normally distributed population. And thus the group of subjects taught by STAD and taught by TGT based on high achievement motivation and low achievement motivation has a homogeneous variance. After carrying out the analysis requirements, the results obtained from all subject group data are normally distributed and have a homogeneous variance, then the conditions related to the two-way analysis of variance have been fulfilled.
Table 3. Summary of Two-Way ANOVA Test Results

<table>
<thead>
<tr>
<th>Sumber Variants</th>
<th>JK</th>
<th>DK</th>
<th>RJK</th>
<th>Fcount</th>
<th>Ftable (1.61)(0.05)</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative Learning Model</td>
<td>3387</td>
<td>1</td>
<td>3387</td>
<td>67.14</td>
<td>4.02</td>
<td>Significance</td>
</tr>
<tr>
<td>Achievement motivation</td>
<td>4399</td>
<td>1</td>
<td>4399</td>
<td>87.20</td>
<td>4.02</td>
<td>Significance</td>
</tr>
<tr>
<td>Interaction</td>
<td>4654</td>
<td>1</td>
<td>4654</td>
<td>92.27</td>
<td>4.02</td>
<td>Significance</td>
</tr>
<tr>
<td>Between groups</td>
<td>10160</td>
<td>3</td>
<td>3387</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Group</td>
<td>2774</td>
<td>55</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>25373</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of studying economics with the STAD Model and High Achievement Motivation get 84.53 with a standard deviation of 5.69 compared to learning outcomes using STAD. The STAD learning model with Low Achievement Motivation gets 60.62 with a standard deviation of 6.42 compared to the learning outcomes with the TGT type and High Achievement Motivation gets 67.4 with a standard deviation of 4.93 compared to the TGT type Model and Low Achievement Motivation gets 61.71 with a standard deviation of 6.64.

The calculation of between interaction data of learning strategies with learning styles, where $F_{count} = 92.27$ and $F_{table} = 4.02$ with DK = (1.55) and = 0.05. These results indicate that $F_{count} > F_{table}$ (92.27 > 4.02), so that the Alternative Hypothesis is accepted and the Null Hypothesis is rejected, this means that there is an interaction between learning strategies and Achievement Motivation in having an impact on Economics learning outcomes. states that there is an interaction between learning strategies and achievement motivation in giving impact to economic learning outcomes.

In accordance with the third hypothesis which results in an interaction between the Cooperative Learning Model and Achievement Motivation in having an impact on student economics learning outcomes, a test is needed to see the difference between the two propositions. then a further test was held using Scheffe's test.

Table 4. Summary of Scheffe's Test Calculation Results

<table>
<thead>
<tr>
<th>No</th>
<th>Statistical Hypothesis</th>
<th>Fcount</th>
<th>Ftable (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\mu_{A1B1} = \mu_{A1B2}$ vs $\mu_{A1B1} &gt; \mu_{A1B2}$</td>
<td>9.14</td>
<td>2.77</td>
</tr>
<tr>
<td>2</td>
<td>$\mu_{A1B1} = \mu_{A2B1}$ vs $\mu_{A1B1} &gt; \mu_{A2B1}$</td>
<td>6.81</td>
<td>2.77</td>
</tr>
<tr>
<td>3</td>
<td>$\mu_{A1B1} = \mu_{A2B2}$ vs $\mu_{A1B1} &gt; \mu_{A2B2}$</td>
<td>8.90</td>
<td>2.77</td>
</tr>
<tr>
<td>4</td>
<td>$\mu_{A2B1} = \mu_{A2B2}$ vs $\mu_{A2B1} &gt; \mu_{A2B2}$</td>
<td>2.15</td>
<td>2.77</td>
</tr>
<tr>
<td>5</td>
<td>$\mu_{A1B2} = \mu_{A2B2}$ vs $\mu_{A1B2} &gt; \mu_{A2B2}$</td>
<td>0.40</td>
<td>2.77</td>
</tr>
<tr>
<td>6</td>
<td>$\mu_{A1B2} = \mu_{A2B1}$ vs $\mu_{A1B2} &gt; \mu_{A2B1}$</td>
<td>2.52</td>
<td>2.77</td>
</tr>
</tbody>
</table>

Basic study of $F_{count} > F_{table}$ the economics of students who were taught with the STAD type were higher than those of students who were taught the TGT type. Because students in the STAD type group accommodate more of the potential possessed by students. In the STAD type, students are involved in many classroom activities, such as brain exercises, goal-setting cards, mind maps, role-playing, simulations, activation tasks, and demonstrations.
The application of the STAD type of cooperative learning model has a good influence on the learning process. The form of cooperation between students in solving a problem will increase confidence, and courage and bring up interesting ideas. This will certainly affect the interest in learning and student learning outcomes [11].

produce with the interaction between learning models with achievement motivation on economic learning outcomes. Seen in the learning outcomes of groups of students who have high achievement motivation given the STAD model is higher than the learning outcomes of groups of students who have high achievement motivation given the TGT model. Furthermore, the results of studying Economics in groups of students who have Low Achievement Motivation with the STAD Model are lower than the learning outcomes of groups of students who have Low Achievement Motivation using the TGT Model. Learning model. This shows that the average value of the group of students who have higher achievement motivation with the STAD type model compared to the TGT type model. Then there is the result of an increase in High Achievement Motivation.

In the same study by Santi, Suarman, and Indrawati [12], it was shown that using the NHT-STAD combination model in Economics subjects could increase students' average scores from 79.18 to 88.95 for the highest grade point average. In the lowest class average, the average score of students from 75.05 to 84.75. 2. The use of the NHT-STAD combination model in Economics subjects resulted in different critical thinking skills between students in the highest average class and the lowest average class, where students in the highest average class had students' critical thinking skills that were better than average.

Research conducted by Murdaningrum [1], uses observation to determine learning motivation, and tests to determine student learning outcomes. The results showed that the learning process using TGT was as follows; From 1 to 2, the percentage of students whose learning motivation is in the low category continues to decline 40.08% - 15.52%, the medium category is 35.34%, and the high category is from 27.58% - 49.14 %. Learning also increased from the initial conditions, cycle 1, and cycle 2 (41.38% - 62.07% - 86.21%). The action is said to be successful if the percentage of students whose learning motivation is above low is at least 80%.

The same study by Fauziyah, and Anugerah [13], showed that: (1) critical thinking skills using the TGT average value of 63.27. (2) critical thinking skills after using the TGT average value of 74.12. 3) the results of the one sample T-test data analysis using the one sample test technique obtained the results of t count 60,208 > t table 1,698 and a significance value < 0.05 (0.000 < 0.05).

Students' critical thinking skills before and after being treated in the form of the application of the What's In Here game based on the TGT model of this study can be said to be successful. With the increase in students' critical thinking skills before and after being given treatment in the form of the application of the game What's In Here based on the TGT model. The What's In Here game based on the TGT model has a positive influence on students so that teachers can apply it as an alternative way of learning that can improve students' critical thinking skills [14]. The research of Salmah, Relita, and Suriyanti [15], stated that the relationship between learning independence and strong student achievement motivation will encourage increased student learning outcomes, the school can take steps that can increase learning independence again,
namely by seeking conditions conducive to learning and schools as well as school facilities that support students to learn independently.

4. Conclusion

The conclusions are: (1) Economics of students who are taught with the STAD Model are higher than those of the students who are taught the TGT Model; (2) Economics of students who have high achievement motivation are higher than low achievement motivation; and (3) There is an interaction between the Learning Model and Achievement Motivation. Students who have high achievement motivation get higher if they are taught by using the STAD type than the TGT type, while students who have low achievement motivation get higher economics if they are taught using this model. TGT type than STAD Model.

References


The Effect of Contextual Teaching and Learning Strategies with Expository and Verbal Ability on English Learning Outcomes

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Abstract. This study aims to determine the English learning outcomes of students with higher CTL compared to expositories, see whether students with high verbal abilities can have higher English learning outcomes than low verbal abilities, and find out whether there is interaction between learning strategies and verbal abilities to influence English learning outcomes. The research methods used are such as quasi-experimental design with a factorial design of 2 x 2 by inferential statistics with a bidirectional ANOVA. The results showed that the results of learning English using CTL were higher compared to Expository, then the results of learning English with high verbal ability were higher compared to low verbal ability, and there was an interaction between CTL and verbal ability to English learning outcomes.

Keywords: contextual teaching and learning, verbal ability, English.

1 Introduction

English is a language that can be communicated orally and in writing. Communicating is a way of understanding and providing information, thoughts, and the development of science, technology, and culture. Communicating becomes the ability of discourse, which must be able to understand or produce spoken and or written texts in accordance with language skills, namely listening, speaking, reading, and writing [1]. This skill is used to create discourse in social life [2]. Thus, the application of English subjects is aimed at developing skills so that they can communicate.

Literacy in English such as performative, functional, informational, and epistemic. In performative, literacy includes the ability to read, write, listen, and speak with the symbols used. In functional, literacy such as the ability to use language as a necessity of daily life. In information, literacy such as being able to access knowledge with language skills, while epistemic is like the ability to express knowledge in language. In English language learning at
the junior high school / MTs level, it is aimed at students to be able to achieve functional, namely communicating orally and in writing to solve problems.

One of the main subject matters in the competency-based 2013 curriculum is English, and the competency standards that are expected to be possessed by junior high school graduates in learning English are: (1) being able to listen and understand various spoken English discourses, (2) can explain opinions, ideas, and feelings of various forms of English discourse orally, (3) can read and understand texts by reading written English, and (4) can express various thoughts, ideas, opinions and feelings in English writing.

The low ability in reading comprehension is also caused by several things: (1) Students are less enthusiastic about taking lessons. This can be seen when following reading lessons, students show an indifferent attitude and do not pay attention to the lesson completely, (2) Students have difficulty understanding English subject matter. This is because students think reading lessons are difficult and boring, (3) Students feel bored in English subjects which are monotonous and less interesting, (4) Teachers find it difficult to arouse students' interest during reading learning, and students show a lack of attitude, interested and less enthusiastic, (5) Teachers: find it difficult to find the right model in teaching reading comprehension material. So far, when teaching material on reading comprehension, teachers still use the lecture and assignment method so it is still the old method.

1.1 Contextual Teaching and Learning (CTL)

Contextual Teaching and Learning (CTL) is a learning concept to combine the material taught with the student's circumstances [3][4]. This concept has a constructivist philosophical and perspective that learning will mean if the student "discovers" what is learned, not "knows" from others. So, learning outcomes are expected to be meaningful for students, because the learning process takes place naturally in student activities, namely work and experience from teacher to student [5]. Afriani [6] mentions that the elements of contextual learning are: (a) Activating Knowledge; (b) Acquiring Knowledge; (c) Understand knowledge; (d) Applying Knowledge; and (e) Reflecting Knowledge.

The Contextual Teaching and Learning learning strategy consist of 7 (seven) components, namely: (1) constructivism as a learning philosophy, (2) there is always an element of questioning, (3) knowledge and experience are obtained from finding activities, (4) forming and creating society, learning, (5) there is a model that is imitated, (6) carry out reflection activities, and (7) there is an actual assessment. A class can successfully use the CTL approach if it has implemented the CTL learning component.

1.2 Verbal Ability

Thurstone, stated that verbal intelligence is an understanding of word relationships, vocabulary, and mastery of communication. Mardiati [7] states that verbal intelligence is the ability to communicate that begins with the formation of ideas through words, and directs the focus of the problem on mastering language or words, which will determine whether or not the understanding of the ideas conveyed is clear.
Experts argue verbal ability is not the same for everyone. In addition, the level or degree of this verbal ability develops or increases according to a person's interaction with his environment [8]. Basically verbal is a talent, while the aptitude test is intended to predict a person's success in following certain lessons can be predicted [9]. In this study, to measure students' verbal ability, DAT was used, which was completely collected by psychologists.

The problems is: (1) Whether english with CTL with strategies are higher than expository learning strategies; (2) Do students with high verbal ability get higher results than low verbal ability, and (3) any interaction with learning strategies and verbal skills that has an impact on English learning outcomes?

2 Method

This research was conducted at MTs Miftahussalam Medan. The implementation of the research begins with a review of the research location to find out about the state of the class number and class VIII (eight) students. Learning is carried out in the second semester, from May to June of the 2021/2022 Academic Year. Conducted according to the English lesson schedule in class VIII is the target of research as many as 8 (eight) meetings with each meeting 2 x 45 minutes. The population of this study was 8 (eight) class VIII (eight) students at MTs Miftahussalam Medan. The research used is quantitative research and quasi-experimental type with a factorial design of 2x2.

The data analysis technique in this study was carried out using the 2 x 2 factorial ANOVA technique with the F test. Previously, the requirement test was carried out on the collected data, namely using the normality test, the Liliefors test and the homogeneity test using the F test and the Bartlett test. According to the third hypothesis when it is significant, so that there is interaction, then the research test is continued with the Scheffe test for multiple comparison, because the sample size of each in the research design is not the same.

3 Results and Discussion

Learning outcomes from variations in learning models in experimental groups (taught using CTL were higher than expository learning strategies. The description of the result data is based on variations in verbal ability. English learning outcomes have high verbal ability compared to those with low verbal ability.
Based on the normality test, it showed that subjects were normally distributed, so it was concluded that the study sample came from a normally distributed population and a group of subjects when given CTL with expository learning strategies based on homogeneous high and low verbal abilities. After that, it is necessary that the results for all the data of the subject group are distributed normally and have a homogeneous variance, so that the requirements related to the analysis of two-way variance have been met.

**Table 2. Two-way ANOVA Calculation Results**

<table>
<thead>
<tr>
<th>Source Variances</th>
<th>DK</th>
<th>Number of Squares (JK)</th>
<th>Average Sum of Squares (RJK)</th>
<th>Fcount</th>
<th>F table α = 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Strategy (A)</td>
<td>1</td>
<td>5478</td>
<td>5478</td>
<td>413</td>
<td>4.07</td>
</tr>
<tr>
<td>Verbal Ability (B)</td>
<td>1</td>
<td>14705</td>
<td>14705</td>
<td>34</td>
<td>4.07</td>
</tr>
<tr>
<td>Interaction (A x B)</td>
<td>1</td>
<td>509</td>
<td>509</td>
<td>14</td>
<td>4.07</td>
</tr>
<tr>
<td>Between groups</td>
<td>3</td>
<td>16433</td>
<td>5478</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>In Group</td>
<td>61</td>
<td>2173</td>
<td>36</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>39298</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
From the data, using the CTL were 68.71 and have standard deviation 14.67, while the Expository was 60.04 and the standard deviation was 14.13.

Based on the results of the analysis of variance in Table 2, the results of the calculation of learning strategy data are obtained, where the value of $F_c = 413$, while the value of $F_t$ with $DK = (1.61)$ and $= 0.05$ is 4.00. These results indicate that $F_c = 413 > F_t = 4.00$ so the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted, thus the research hypothesis states that students' learning outcomes of English taught with CTL Learning Strategies are higher than those of students taught with the Expository Learning Strategy is proven true.

From the data obtained, learning outcomes with high verbal learning ability were 74.81 and had a standard deviation of 7.83 compared to students with low verbal ability was 57.9 and with a standard deviation was 9.01.

Based on the results of hypothesis testing, the results of the calculation of verbal ability data are obtained, where $F_h = 34$, while the value of $F_t$ with $DK = (1.61)$ and $= 0.05$ is 4.00. These results indicate that $F_c = 34 > F_t = 4.00$, so Ho is rejected and Ha is accepted, thus the research hypothesis states that the English learning outcomes of students who have high verbal learning abilities are higher than students who have low learning verbal abilities.

From the results of the calculation of the data, it is obtained that the average learning outcomes of students taught English with CTL Learning Strategies and high verbal abilities are 79.41 and standard deviations are 7.75, while the average learning outcomes of students taught using CTL Learning Strategies and Skills low verbal ability of 55.71 and standard deviation of 9.53 while the average student learning outcomes of English taught by Expository Learning Strategies and high verbal ability of 70.21 and standard deviation of 7.91 while the average student learning outcomes of English taught with Expository Learning Strategy and low verbal ability of 60.23 and standard deviation of 8.48.

The interaction of learning strategies and verbal abilities, where $F_h = 14$ and the value of $F_t$ with $DK = (1.61)$ and $= 0.05$ is 4.00. These results indicate that $F_c > F_t (14 > 4.00)$, so Ha is accepted and Ho is rejected, meaning that there is an interaction between learning strategies and verbal ability in influencing English learning outcomes. Thus the hypothesis that there is an interaction between learning strategies and verbal abilities in influencing the results of learning English is proven true.

The interaction in this study was tinged by conducting further tests using the Scheffe test.

Summary of Scheffé test calculation results

| Table 3. Summary of Scheffé's Test Calculation Results |
The results of the study, \( F_c > F_t \), the learning outcomes of students using high CTL learning strategies compared to those using expository learning strategies. Because in the students of the CTL Learning Strategy group, they are more accepting of the potential possessed by students. On CTL strategies, students engage in many classroom activities, such as training the brain, creating cards for objectives, designing mind maps, role-playing, simulations, activation tasks, and demonstrations. They will have high verbal ability to be more excited and motivated, so they don't feel bored.

On the other hand, this type will get bored quickly through expository learning strategies dominated by teachers. Students listen a lot and there are not many class activities so it encourages students. Students are easily curious and try something expository learning strategy. So that students become bored and not enthusiastic. So it can be concluded, high verbal ability gets high English learning outcomes if given a CTL learning strategy compared to expository learning strategies.

Regarding the results of the research conducted, the same thing Haerazi, Prayati, and Vikasari [10] in their research on the Effectiveness of Contextual Methods (CTL) on Motivation to Learn English in Junior High School Students proved that contextual methods in the process of learning English greatly affect motivation to learn English. student. The process of learning English, which is taught using this contextual method, can increase students' motivation to learn English [11]. In general, the results of this study illustrate that students are highly motivated in English.

The results of Alfiah's research [12] discuss the Process of Improving Learning in This Is My Word Material Using a Contextual Approach in learning English in Junior High Schools show that classical learning outcomes from 83% with good predicates to 88% with good predicates, and a quantitative increase of 3%. This means that there is a good increase after being given a contextual approach.

CTL learning applies with results that are expected to help students in understanding the strengths and advantages of their potential to be developed. In addition, according to Rahmayanti [13] mentioned, our expectations for students to have good grades are in accordance with the achievement of learning outcomes, if students' expectations are high for the lesson it

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject Group</th>
<th>Statistical Hypothesis</th>
<th>( F_{count} )</th>
<th>( F_{table} )</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A&lt;sub&gt;1&lt;/sub&gt;B&lt;sub&gt;1&lt;/sub&gt; - A&lt;sub&gt;2&lt;/sub&gt;B&lt;sub&gt;1&lt;/sub&gt;</td>
<td>( H_0: \mu_{A1B1} = \mu_{A2B1} )</td>
<td>11.00</td>
<td>2.76</td>
<td>Significantly different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( H_1: \mu_{A1B1} &gt; \mu_{A2B1} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A&lt;sub&gt;1&lt;/sub&gt;B&lt;sub&gt;1&lt;/sub&gt; - A&lt;sub&gt;1&lt;/sub&gt;B&lt;sub&gt;2&lt;/sub&gt;</td>
<td>( H_0: \mu_{A1B1} = \mu_{A1B2} )</td>
<td>4.62</td>
<td>2.76</td>
<td>Significantly different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( H_1: \mu_{A1B1} &gt; \mu_{A1B2} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A&lt;sub&gt;1&lt;/sub&gt;B&lt;sub&gt;1&lt;/sub&gt; - A&lt;sub&gt;2&lt;/sub&gt;B&lt;sub&gt;2&lt;/sub&gt;</td>
<td>( H_0: \mu_{A1B1} = \mu_{A2B2} )</td>
<td>9.07</td>
<td>2.76</td>
<td>Significantly different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( H_1: \mu_{A1B1} &gt; \mu_{A2B2} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>A&lt;sub&gt;2&lt;/sub&gt;B&lt;sub&gt;1&lt;/sub&gt; - A&lt;sub&gt;1&lt;/sub&gt;B&lt;sub&gt;2&lt;/sub&gt;</td>
<td>( H_0: \mu_{A2B1} = \mu_{A1B2} )</td>
<td>4.84</td>
<td>2.76</td>
<td>Significantly different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( H_1: \mu_{A2B1} &gt; \mu_{A1B2} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>A&lt;sub&gt;2&lt;/sub&gt;B&lt;sub&gt;1&lt;/sub&gt; - A&lt;sub&gt;2&lt;/sub&gt;B&lt;sub&gt;2&lt;/sub&gt;</td>
<td>( H_0: \mu_{A2B1} = \mu_{A2B2} )</td>
<td>2.04</td>
<td>2.76</td>
<td>Not Significantly Different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( H_1: \mu_{A2B1} &gt; \mu_{A2B2} )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>A&lt;sub&gt;2&lt;/sub&gt;B&lt;sub&gt;2&lt;/sub&gt; - A&lt;sub&gt;1&lt;/sub&gt;B&lt;sub&gt;2&lt;/sub&gt;</td>
<td>( H_0: \mu_{A2B2} = \mu_{A1B2} )</td>
<td>6.90</td>
<td>2.76</td>
<td>Not Significantly Different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( H_1: \mu_{A2B2} &gt; \mu_{A1B2} )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
will be in line with achievement and vice versa. Thus, a learning strategy is needed with a series of practical approaches to learning with the CTL strategy.

Research conducted by Mursid [14], shows the same thing: student learning achievement that learns to draw techniques using Contextual Innovative Models is higher than students who learn drawing techniques using Direct Instructional Models, students’ achievement in technical drawings Higher Creative Thinking Ability is the achievement results of students who have Low Creative Thinking Ability to draw technical and there is an interaction between learning creative thinking skills in influencing students’ technical drawing achievement.

Simbolon [15] mentions that to teach learning about speaking English, it is better to use a contextual learning approach instead of conventional learning. From the sentence above, it can be seen that the result used with the CTL learning strategy is that the learning process becomes effective, efficient, and fun. Thus, the use of CTL learning strategies has an influence on English learning outcomes when compared to using expository learning strategies [16].

The results of the data resulted in a higher average score of learning English using verbal ability than students with low verbal ability. This kind of mentions that high verbal ability is more able to understand the lesson than students with low verbal ability [15].

Verbal is like a message or symbol that can have an influence on the feedback process because it proves that there is a guarantee that it has reached the listener. Verbal ability is very important because as a result of learning expressed on cross-curriculum competencies that are part of the competency-based curriculum [17], such as students applying language to understand, develop, and communicate and inform interpersonally, as well as interact with others. Supported by research by Utomo and Harmiyanto [18], it is stated that there is a positive relationship between bilingual ability and verbal ability in class X students of SMAN 4 Malang.

The use of CTL learning that has verbal ability can explore the potential in it [19]. The existence of high verb ability, makes it easier for students to understand and solve problems. In this case, describing students as having verbal abilities is more suitable to be taught using CTL. The interaction between learning strategies and verbal abilities makes it an important point that in addition to CTL, student characteristics, in this case verbal ability, are factors that can influence English learning outcomes.

4 Conclusion

In this study, conclusions were given such as: (1) the results of learning English taught with CTL were higher than using expositories; (2) English learning outcomes have higher high verbal ability than low verbal ability; and (3) the interaction between CTL and verbal ability towards English learning outcomes. Students have verbal skills with high learning outcomes in English if taught CTL rather than expositiori, while students who have low verbal skills will have higher ones if taught using expository than CTL.
References


The Effect of Learning Strategies and Confidence on the Creativity of Children aged 4 - 6 Years at PAUD

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Abstract. This study aims to: (1) whether there is a difference in the creativity of children given the Inquiry learning strategy than that given with the Expository learning strategy, (2) is there a difference in the creativity of children who have high self confidence compared to the creativity of children who have low self confidence, and (3) Is there an interaction between learning strategies and self confidence on the creativity of Children.

The research quasi experiment. The instruments used in this study were a figural creativity test and childrens self confidence scale. Analysis of the data used is 2 x 2. The data analysis technique used two-way ANOVA at a significance level of $\alpha=0.05$. The results showed: (1) the creativity of early childrens provided with an inquiry learning strategy was higher than the creativity of children given an expository learning strategy, (2) the creativity of children who have high self confidence is higher than the creativity of children who have low self confidence, and (3) there is an interaction between learning strategies and confidence in the creativity of children. The research results obtained are expected to provide information for PAUD Institution managers and PAUD educators to use inquiry learning strategies in increasing the creativity of childrens in PAUD institutions.

Keywords: learning strategies- confidence- creativity of children

1 Introduction

The development of creativity through play activities must be directed at stimulating children's ability to make new combinations, foster fluency, flexibility, and originality as the ability to produce unusual responses, as well as stimulate thinking, taste, intuition, in children. Developing children's creativity, such as role playing, telling stories through picture story books, drawing, listening to music, and others.

Role playing is a form of expression activity that is quite popular for kindergarten age children. Role playing is expression and communication that can create an active, fun, and enjoyable atmosphere. In accordance with the purpose of role playing, which is to train to express opinions smoothly, the media that will be used by children should be chosen objects that are easy to use to express their ideas and ideas.

However, based on interviews that have been conducted by researchers with several educators at PAUD IT Mufidatul Hilmi, Playgroups or Kindergartens, it shows that in general creativity is no longer considered important. This is due to the demands of parents as well as the
requirements to enter elementary education which requires children to be good at reading and arithmetic regardless of the child's ability. This is in line with what was conveyed by some parents of students in PAUD who wanted their children to be able to read, write and count after finishing learning from PAUD. Researchers also made initial observations on children at PAUD IT Mufidatul Hilmi, where children's creativity was still low. This Word document can be used as a template for papers to be published in EAI Core Proceedings. Follow the text for further instructions on text formatting, tables, figures, citations and references.

This is thought to be due to a lack of early childhood understanding of learning creativity. Another problem found in the field is the lack of attention from teachers and parents, in this case the teacher does not activate early childhood children who have good creativity so that they can develop their potential in helping their friends. who lack confidence to share knowledge with each other. In other words, cooperation in groups is less noticed. If group cooperation is carried out, generally what happens is that higher creativity is dominant to master what is given, while students with low achievement are less active and seem only as spectators or listeners.

Responding to the problems mentioned above, efforts need to be made by teachers to use teaching strategies that make the learning atmosphere more enjoyable so as to motivate children's confidence to learn, Suparno as quoted by Atmadi (2000: 186) said that, "Teachers, in the teaching and learning process, should pay more attention to what students like, what students don't like, what helps students learn and what hinders students from learning. In addition, the strategy used must also maximize the potential of children by paying attention to the uniqueness of each child, both his learning style, dominant intelligence, and taking into account other factors that can support the teaching and learning process in the classroom.

Using inappropriate learning strategies will result in children being bored and lazy to study. Teaching and learning activities that are less interactive and less varied, lead to boredom in children and reduce children's confidence. This will have an impact on the creativity obtained by the child.

1.1 The Nature of Creativity

AUD's creativity is also characterized by the ability to form mental images, concepts of things that are not present in front of him. AUD also has fantasy, imagination to form concepts that are similar to the real world (Isenberg & Jalongo, 1993). Children's creativity is driven by their nature as thinking humans. Children become creative too because they need the satisfaction of emotional impulses.

But most importantly, the creativity of early childhood 4-6 years appears because children need strategies to build concepts and solve problems according to their intellectual level. Creativity arises from the ability to think divergently, laterally, and multi-directionally. In the brain hemisphere, creativity originates in the activity of the right hemisphere. Divergent thinking activities have generative, exploratory, unpredictable, and multi-responsible characteristics. However, the process of creativity also involves the ability to think convergently. Because in children the process of lateralization is taking place, stimulation of the right hemisphere of the brain becomes very essential and fundamental.
1.2 Inquiry Learning Strategy

The Inquiry Learning Strategy (SPI) emphasizes the process of seeking and finding. Materials are not given directly. The role of children in this strategy is to find and find the subject matter for themselves. Meanwhile, the teacher acts as a facilitator and guide for children to learn. SPI is heavily influenced by the flow of cognitive learning.

According to this flow, learning is essentially a mental process and a thought process by optimally utilizing all the potential of each individual. Learning is more than just memorizing and accumulating knowledge, but how the knowledge gained is meaningful for children through thinking skills. Still according to this theory, learning is not essentially an observable behavioral event, but a person's process of interpreting his own environment. This mental process is actually a very important aspect of learning behavior itself.

SPI is a series of learning activities that emphasize critical and analytical thinking processes to seek and find answers to a problem in question. The thinking process itself is usually carried out through questions and answers between the teacher and the child. This learning strategy is often also called a heuristic strategy, which comes from the Greek, namely heuriskein, meaning I find.

1.3 Expository Learning Strategy

Expository learning strategy the teacher is the main source of information, but other sources of data and information are also used. The main sources that are often used are textbooks. Other sources such as pictures, film strips, encyclopedias, libraries are also often used in expository learning strategies.

The expository learning strategy assumes that there is an important part of the content of the skills and values being taught. Teachers are prepared to teach this important lesson to students. Teachers and learning resources have a major role in transferring information. Skills and value from learning resources to students. However, teaching is not monotonous, learning is information that has been processed according to skills and needs. Information and skills to obtain information are considered important. Consequently, student creativity is measured by the amount of information that can be memorized or how effectively a skill can be used.

Expository learning strategy is a learning strategy that emphasizes the process of delivering material verbally from a teacher to a group of students with the intention that students can master the subject matter optimally.

1.4 Self Confidence

The Nature of Children's Confidence

The development of self-confidence has been stated by many experts. This is evidenced by the many opinions of experts regarding the notion of self-confidence. According to Miskell in Butolo (2013: 6) self-confidence is "belief in one's own abilities that are adequate and aware of their abilities, and can use them appropriately".

Meanwhile, according to Hakim in Ningsih (2014: 18) self-confidence is "a person's belief in all aspects of his strengths and that belief makes him feel capable of achieving various goals in his life". Aunillah (2011: 60) says that self-confidence is "an extraordinary strength. Confidence is like a reactor that generates all the energy that is in a person to achieve success. Regarding children's self-confidence, Woolfson in Ningsih (2014: 19) reveals that a confident child is a
child who always smiles and enjoys his life to the fullest. As quoted by Suyanto (2003:77), Erikson said that "children must be able to carry out developmental tasks to prepare themselves to enter adulthood. Need to have a certain skill. If the child is able to master a certain skill, it can lead to a sense of success, on the other hand, if he does not master it, it can cause a sense of inferiority.

Table 1. Differences in Early Childhood Creativity given educational stimulus with Inquiry Learning Strategies and Expository Learning Strategies.

<table>
<thead>
<tr>
<th>Inquiry</th>
<th>Expository</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fun learning atmosphere</td>
<td>Material delivery process</td>
</tr>
<tr>
<td>Learning strategy contains planning</td>
<td>Strategy is more generally called the scientific approach.</td>
</tr>
<tr>
<td>Trying to do something so that he gains clarity or finds the answer to what he wants to know</td>
<td>Still conceptual</td>
</tr>
<tr>
<td>Curiosity about the natural state around him is human nature since he was born into the world.</td>
<td>Identify it with lecture</td>
</tr>
</tbody>
</table>

Source: Quantum Teaching

The research problem are: (1). Is the creativity of 4-6 year olds taught with inquiry learning strategies higher than children taught with expository learning strategies; (2) Do children aged 4-6 years who have high self-confidence have higher creativity than children who have low self-confidence; (3). Is there an interaction between learning strategies and confidence in creativity?

2 Method

This research will be carried out at PAUD IT Mufidatul Hilmi, District, Batu Bara Regency. The research was conducted in the odd semester of 2022/2023. This research was carried out for 6 meetings which took place in July-September 2022. The research time was determined in class and adjusted to 30 minutes for one meeting.

The method applied in this learning strategy is a Quasi Experiment 2 x 2 factorial design. This method is used because the class used for treatment is a class that has been formed previously or without changing the situation and conditions of the class that has been formed. Through this design, we compare the influence of the Inquiry learning strategy and the Expository learning strategy on role playing creativity in terms of Confidence.

3 Result and Discussion

3.1 Data Normality Test

The normality test was conducted to determine whether the research data were normally distributed or not. The normality test of the data was carried out with SPSS 26 for windows with the Liliefors test approach. The hypotheses that underlie normality testing are:

H0 : Data is normally distributed
H1 : Data is not normally distributed

The results of the model residual normality test.
Table 2. Results of Variety Analysis

<table>
<thead>
<tr>
<th>Source of Diversity</th>
<th>F count</th>
<th>F table</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning strategies</td>
<td>6.092</td>
<td>F_{0.05(1,116)}=3.92</td>
<td>0.015</td>
</tr>
<tr>
<td>Confidence</td>
<td>0.740</td>
<td>F_{0.05(1,116)}=3.92</td>
<td>0.392</td>
</tr>
<tr>
<td>Interaction</td>
<td>0.098</td>
<td>F_{0.05(1,116)}=3.92</td>
<td>0.755</td>
</tr>
</tbody>
</table>

Based on the results of the analysis of variance, that the learning strategy variable has an F count (6.092) > F table (3.92) and p-value (0.015) < 0.05, then reject H0. So it can be interpreted that learning strategies have an effect on role playing creativity. So the inquiry and expository learning strategies can be said to be significantly different.

The self-confidence variable has F count (0.740) < F table (3.92) and p-value (0.392) > 0.05 then accept H0. So it can be interpreted that self-confidence has no significant effect on role playing creativity. In the interaction between learning strategy variables and self-confidence, it has F count (0.098) < F table (3.92) and p-value (0.392) > 0.05 then accept H0. So it can be interpreted that the interaction between learning strategies and self-confidence has no significant effect on role playing creativity.

4 Conclusion

The conclusions of this study are: The creativity of Early Childhood 4-6 years given the Inquiry learning strategy is higher than the creativity of Early Childhood 4-6 years given the Expository learning strategy. Creativity of Early Childhood 4-6 years who have high self-confidence is higher than the creativity of Early Childhood of 4-6 years who have low self-confidence. There is an interaction between learning strategies and confidence in the creativity of early childhood 4-6 years.

Acknowledgments. Through this research, it is shown that on average the creativity of children aged 4-6 years is higher by using inquiry learning strategies than those given by expository learning strategies. This shows that the inquiry learning strategy is more effective in increasing the creativity of 4-6 year olds because in learning that uses the 4-6 year old inquiry learning strategy they tend to be more active.

References

Development of Interactive Media-Based Learning Models for Improving Learning Outcomes English in Class X North Labuhanbatu Man

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Abstract. This study aims to: (1) produce a learning model that is feasible to use, easy to learn and can be used for learning (2) to determine the effectiveness of interactive media-based learning models. This type of research is a development research that uses the Borg and Gall product development model and integrated with the Dick and Carey learning design model. This research was conducted on class X students of MAN Labuhanbatu Utara. The method used in this model is the Quasi Experimental method. The research sample was 72 students consisting of 36 students as an experimental class who were taught using the "AMUSE" learning is based on interactive media and 36 students as a control class are taught using the Inquiry learning model. The results of the hypothesis test research prove that there is a significant difference between students' English learning outcomes who are taught using the learning model. "AMUSE" is based on interactive media with the results of learning English taught using the Inquiry learning model. This is indicated by the acquisition of data that is the significance value obtained is 0.06. Significance value (sig)<0.05 then H₀ is rejected and H₁ is accepted. So it can be concluded that the "AMUSE" learning model based on Interactive Media is better than the Inquiry learning model.

Keywords: interactive media-based “AMUSE” learning model, Inquiry learning model, English learning outcomes

1 Introduction

The world is currently experiencing the fourth industrial revolution, or the 21st century, where science and technology are developing rapidly and becoming a fundamental part of everyday life, thus requiring the development of skills that enable humans to compete on a global scale. To prepare for the 21st century and period 4.0, one of the efforts made is to educate the public to become superior human resources (HR). The field of education must keep up with advances in information and technological resources to provide students with more sophisticated tools for learning. They can support learning so that they can create an efficient learning process by having a thorough understanding of how technology works. (2002) Rose, Meyer, and Strangeman

Based on the results of research conducted at MAN Labuhanbatu Utara class X MIPA, the current method of learning English is not in line with the expectations of the teacher. The researcher identified a number of problems that reduce the effectiveness of the learning process,
including teachers who tend to use traditional teaching methods such as lectures, questions and answers, and homework assignments, and teachers who only focus on books when introducing new concepts to them. When the instructor tried to ask a short question, the students only reacted simply according to the textbook, and most of the students remained silent. Then, the students looked sluggish and only become listeners. Teachers also rarely use interesting teaching tools which demotivate students.

Supporting this statement, Atikah's research (2016: 2) found that many teachers continue to teach only with the aim of providing material to students. Most of teachers use a lecture, practice, and task approach, which makes boring and inhibits the growth of students' potential, reduces children's motivation to extend. These facts enforce them to the unsatisfactory learning outcomes.

In addition, during the interviews conducted outside the classroom, some students stated that the English class was less fun, boring, unattractive, and totally disinterested in learning. The students' activity was also showing lack during the learning process as they responded the teacher's questions. This case affected them to get high learning achievement. Having counted the result of the students' outcomes, it showed that 41.6% was in under Minimum Completeness Criteria (KKM) set by the school, which qualified to be in 75. The learning process needs to be changed considering current conditions. circumstances.

Thus, the learning process needs to be supported by any models in order to develop course curriculum, select resources, and coordinate instructor activities (Joyce & Weil, 1980: 3). Henceforth, Slavin (2010) said that the learning model is a learning method that combines objectives, syntax, environment, and management systems.

In accordance with the learning objectives, teachers must also be able to use interesting media to arouse the students enthusiasm to learn. This is in accordance with the statement of Burden and Byrd (1999: 137) that learning media serves as a tool to teach new information to students. On the other hand, Gagne (2006: 14) argues that various media are environmental elements that can support student learning.

Besides that, Shilpa (2014: 67) claims that students can increase their own knowledge and abilities for professional growth through media.

2. Research Method

According to Borg & Gall, this study uses a research and development (R&D) methodology that combines the manufacture and validation of research products as part of the process (2003).

2.1 Research Results

Learning Model "AMUSE" Class X MAN For English Subjects Based on Interactive Media

The use of North Labuhanbatu is practical.

Validation test is carried out to determine whether a product is feasible or not. Product validation asks for input from content, design, and media experts who evaluate content requirements, learning elements, content accuracy, as well as learning media and design. The “AMUSE” learning model based on Interactive Media aims to explore several general aspects in the process of developing a product through revised and refined aspects based on data analysis, trials, and
input from material experts, learning design experts, as well as media experts, and students as users.

The table below summarizes the average percentage of assessment findings on the interactive media-based "AMUSE" learning model in English topics determined by subject matter experts, graphic designers, media experts, one-on-one trials, small group trials, and testing field.

Table 1. Summary of the Average Percentage of Assessment Results on the "AMUSE" Learning Model Based on Interactive Media in English Subjects.

<table>
<thead>
<tr>
<th>No</th>
<th>Respondent</th>
<th>Average percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material Expert</td>
<td>92%</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>Learner Design Expert</td>
<td>96%</td>
<td>Very good</td>
</tr>
<tr>
<td>3</td>
<td>Media Expert</td>
<td>86%</td>
<td>Very good</td>
</tr>
<tr>
<td>4</td>
<td>Individual trial</td>
<td>90%</td>
<td>Very good</td>
</tr>
<tr>
<td>5</td>
<td>Small Group Test</td>
<td>94%</td>
<td>Very good</td>
</tr>
<tr>
<td>6</td>
<td>Field Test</td>
<td>91%</td>
<td>Very good</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>92%</td>
<td>Very good</td>
</tr>
</tbody>
</table>

The “AMUSE” Learning Model Based on Interactive Media in English subjects is proven to be applicable based on the table above. This is because it has gone through individual tests, small group tests, field tests, and material experts, design experts, and media experts, with the results of "Very Good".

Student Learning Outcomes using the "AMUSE" learning method based on inquiry-based interactive media

Table 2. T-Test Data Posttest Control Class and Experiment Class

<table>
<thead>
<tr>
<th>T-Test Results</th>
<th>T-test for Posttest</th>
<th>Sig (2-way)</th>
<th>Difference h</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumption of Same Variant</td>
<td>0.006</td>
<td>2,114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assumption of Unequal Variants</td>
<td>0.006</td>
<td>2,114</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With one-sided t-test, the significant result according to the table is 0.03. Ha is accepted if the significance value (sig) is less than 0.05 which rejects Ho. The "AMUSE" learning paradigm based on interactive media can be said to be superior to the inquiry learning model.

3 Result and Discussion

Based on evaluations, recommendations, and comments from material, design, and learning media experts, several aspects were changed and improved. The continuity of the material, presentation, language, and visuals are among the characteristics of the learning media evaluated.

According to Aunnurrahman (2009:119), student participation in the learning process is a crucial and essential problem that must be understood and nurtured by all teachers. This is in accordance with the assertion of Triandita (2008) that student participation is the most basic
requirement in the learning process. Concepts are given more simply, clearly, and methodically when the interactive media-based "AMUSE" learning paradigm is used in English classes. Students are given activeness and independence as well as the opportunity to interact with other students, lecturers, and the media through interactive media based on the "AMUSE" learning paradigm in English classes.

Hanum (2013) claims that e-learning can be used as a tool for classroom learning and can be used to improve students' understanding of subject matter, diversify sources of teaching materials, add learning activities, and help teachers organize the learning process in the classroom. Based on the processing and results of the research, what is done is that there are differences between students who use the interactive media-based "AMUSE" learning model in English subjects and students who use the Inquiry learning model in terms of the learning outcomes they achieve. Specifically, the average score of English taught using the interactive media-based "AMUSE" learning model in English subjects is higher than that using the Inquiry learning model.

4 Conclusion

According to the review, it can be said that the AMUSE learning paradigm based on interactive media is an excellent way to be applied by teachers of North Labuhanbatu MAN in teaching students. Thus, this AMUSE model can be helpful to anyone interested to develop the students’ competencies in learning English.

References

The Effectiveness of Digital Book Learning Media Through the Kvisoft Flipbook Application Based on Problem Solving in Elementary Science Subjects

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Abstract. This research is based on the problem of students’ mastery of elementary science subjects in grade 4 with energy materials. The purpose of this study was to measure the effectiveness of the Digital Book Learning media through the Kvisoft Flipbook Application Based on Problem Solving (PBL) in Elementary Science Learning. The method used is quantitative analysis of 4th grade elementary school students. The results showed that the results of the HOTS posttest were in the high category. minimum mastery achievement can be achieved by a minimum of 65% of students. The time used in learning is efficiently used and when teaching takes place there is interaction between students and teachers or between students. Students respond positively and are interested in digital book learning media using kvisoft flipbook using a problem solving approach so that it can be said to be effective.

Keywords: Digital book, Kvisoft Flipbook, PBL

1 Introduction

The direction of science learning is to find out about nature systematically, so that science is not only a mastery of a collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery and the formation of scientific attitudes. Science learning also includes two important things, namely terminology and concepts that are expected to help students understand natural phenomena. Although it is realized that the weakness of science learning is caused by the technique or learning model used by the teacher which emphasizes the memory factor. This weakness is also found in grade 4 of the School MIN 3 Medan which has used smartphone technology in learning science subjects but still gets unsatisfactory grades.

This is because learning media through smartphones used by teachers seem less attractive to students. There needs to be another approach in delivering the message of science subjects. Through the use of digital books or e-books can be used by reading on a desktop or laptop screen, PDA or other portable devices, or on e-book reader hardware. It can also be used through various file formats and can incorporate other features, such as annotations, audio and video, and hyperlinks.

Based on initial observations made to grade 4 MIN 3 Medan, it was shown by the homeroom teacher for class IV which explained that some of the students still got scores below the minimum passing criteria (KKM) in science subjects with energy materials. Only 6 of the 28 students completed. If it is calculated in percentage form, only 21.42% of students who complete, while those who do not complete it, reach 78.58%. The minimum completeness criteria (KKM) that has been determined by MIN 3 Medan is 6.5. It is relevant if one of the software that can be used to produce digital books is through kvisoft flipbook. The kvisoft flipbook application is an application that supports learning media that will help in the learning process because this application is not only focused on writing but can include motion animations, videos, and audio that can make interactive learning media interesting so that learning be not monotonous. To note that the purpose of using media in general is to facilitate communication. In simple terms, the consideration of media selection has a basis, namely meeting learning needs and helping to achieve the desired goals. As for the things that need to be considered in the selection of media, namely: instructional objectives, student characteristics and targets, the type of learning stimulation desired, namely through audio, visual, motion, and so on), environmental conditions, local conditions, and the breadth of the range to be served.

So digital books using the kvisoft flipbook application can be accessed offline and do not have to spend a lot of money because they are in the form of soft files. In this way, the effectiveness of science lessons can be implemented and can be measured.

2 Research methods

Data from the test results of students' higher order thinking skills using a digital book through kvisoft flipbook will be analyzed quantitatively to determine the improvement of students' higher order thinking skills after the learning is carried out. Indicators of students' higher order thinking skills which will be developed into thinking ability tests.

2.1. Indicator Table

Table 1. Indicators of Students' Higher Order Thinking Ability

---


Aspects of Students' Higher Order Thinking Ability

Measured indicators

1. Analysis (C4)
   At the level of analyzing, students will be more emphasized on how to think critically operationally. Analyzing consists of the ability or skill to distinguish (differentiating), organize (organizing), and connect (attributing). The operational verbs that are commonly used are compare, critique, sort, differentiate, and determine.

2. Evaluation (C5)
   Evaluating means making decisions based on standard criteria, such as checking and criticizing. The Operational Verbs used are evaluating, selecting / selecting, assessing, refuting, and giving opinions.

3. Creation (C6)
   The ability of students to design, build, plan, produce, discover, update, perfect, strengthen, beautify, compose. Operational Verbs used are clarify, interpret, predict.

Based on these aspects and indicators, a test grid will be compiled which will then be developed into a test of students' higher-order thinking skills and appropriate scoring guidelines. Before being tested, the questions are validated by experts and then the validity and reliability are determined. After being valid and reliable, the questions were tested on students who were the research subjects.

Analysis of students' classical mastery is done by calculating: (1) the results of the posttest of students' higher order thinking; (2) the achievement of complete learning objectives (at least 75% of the formulated learning objectives can be achieved by a minimum of 65% of students); (3) the time used in learning is efficient or does not exceed ordinary learning; and (4) students responded positively to the components of the digital book learning media using the kvisoft flipbook using the problem solving approach that was developed.

2.1.1 Test Validity Test of Students' Higher Order Thinking Ability

Validity relates to the accuracy of the measuring instrument against the mastery of the concept being measured so that it actually measures what it is supposed to measure. The formula used to calculate validity is the product moment correlation formula, namely:

\[
 r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{N(\sum X^2) - (\sum X)^2}\sqrt{N(\sum Y^2) - (\sum Y)^2}}
\]  

(1)

Information:

- \( r_{xy} \) = correlation coefficient between variables X and Y
- \( X \) = each student's i-item score
- \( Y \) = total score of each student
- \( N \) = many samples

To determine whether a test item is valid or not, the correlation coefficient value is compared with the critical value of the Product Moment r table, with a significant level of 5%. Arikunto

---

(2006) suggests "if rcount > rtable then the question is said to be valid, but if rcount < rtable then the question is said to be invalid". Determination of the validity of the test items can also be done using SPSS 22. Interpretation based on the correlation coefficient value of the validity of the items is presented in Table 2 below:

<table>
<thead>
<tr>
<th>Kofisien Korelasi</th>
<th>Interpasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.80 &lt; rxy ≤ 1.00</td>
<td>Very strong</td>
</tr>
<tr>
<td>0.60 &lt; rxy ≤ 0.80</td>
<td>Strong</td>
</tr>
<tr>
<td>0.40 &lt; rxy ≤ 0.60</td>
<td>Enough</td>
</tr>
<tr>
<td>0.20 &lt; rxy ≤ 0.40</td>
<td>Low</td>
</tr>
<tr>
<td>rxy ≤ 0.20</td>
<td>Very low</td>
</tr>
</tbody>
</table>

2.1.2. Reliability Test of Students' Higher Order Thinking Ability Test

Reliability shows the consistency and stability of a score or measurement scale. Reliability differs from validity because the former focuses on the issue of consistency, while the latter focuses more on the issue of accuracy. An instrument is said to be reliable if a person's answer to a question is consistent or stable over time. In the reliability test, the Cronbach alpha formula (Arikunto, 2012) is used, namely:

\[ r_{11} = \left( \frac{k}{k-1} \right) \left( 1 - \frac{\sum \sigma_b^2}{\sigma^2_t} \right) \]  

Information:  
- \( r_{11} \) = instrument reliability  
- \( k \) = the number of questions  
- \( \sum \sigma_b^2 \) = number of item variances  
- \( \sigma^2_t \) = total variance

The level of reliability of the spatial ability test questions using interpretations is as follows:

<table>
<thead>
<tr>
<th>Reliability Coefficient</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 ≤ r_{11} ≤ 0.20</td>
<td>Small</td>
</tr>
<tr>
<td>0.20 &lt; r_{11} ≤ 0.40</td>
<td>Low</td>
</tr>
<tr>
<td>0.40 &lt; r_{11} ≤ 0.70</td>
<td>Currently</td>
</tr>
<tr>
<td>0.70 &lt; r_{11} ≤ 0.90</td>
<td>Tall</td>
</tr>
<tr>
<td>0.90 &lt; r_{11} ≤ 1.00</td>
<td>Very high</td>
</tr>
</tbody>
</table>

If the alpha value is 0.70 or more, it is said that the item provides a sufficient level of reliability, on the contrary, if the value is taken to 0.70, it is said that the item is less reliable.

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3 Results and discussion

3.1 The Effectiveness of Digital Book Learning Media using Flipbook Based on Problem Solving in Science Learning Material Energy for Grade IV Students of MIN 3 Medan

3.1.1 Student Mastery Level

From the post-test score data on student learning outcomes, each student is determined by the Percentage of Student Mastery (PPS) of learning outcomes, which can be seen in Table 4.21 below:

<table>
<thead>
<tr>
<th>Mastery Level of Students</th>
<th>Mastery Level</th>
<th>number of students</th>
<th>Percentage Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% ≤ K ≤ 100%</td>
<td>Very high</td>
<td>1</td>
<td>3.33%</td>
</tr>
<tr>
<td>80% ≤ K ≤ 89%</td>
<td>Tall</td>
<td>14</td>
<td>46.67%</td>
</tr>
<tr>
<td>65% ≤ K ≤ 79%</td>
<td>Currently</td>
<td>14</td>
<td>46.67%</td>
</tr>
<tr>
<td>55% ≤ K ≤ 64%</td>
<td>Low</td>
<td>1</td>
<td>3.33%</td>
</tr>
<tr>
<td>0% ≤ K ≤ 54%</td>
<td>Very low</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Based on Table 4. above shows that obtained 1 student with a percentage of 3.33% very high level of mastery, 14 students with a percentage of 46.67% of a high level of mastery, 14 students with a percentage of 46.67% of a moderate level of mastery, 1 students with a percentage of 3.33% low mastery level. It can be interpreted that the criteria for the level of student mastery are classically included in the high category.

3.1.2 Student Learning Mastery

Data on student learning mastery on the subject of energy changes can be seen in Table 5. below:

<table>
<thead>
<tr>
<th>Information</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students who have finished studying</td>
<td>29</td>
<td>96.67%</td>
</tr>
<tr>
<td>Students who do not finish studying</td>
<td>1</td>
<td>3.33%</td>
</tr>
</tbody>
</table>

From the results of Table 5. above, it can be said that classical learning completeness is 96.67% or as many as 29 students from 30 students who score above 65 or obtain a minimum score of 65. Based on the criteria for mastery learning if there are 75% students in the class which achieves absorption of 65%, the classical mastery of learning has been fulfilled.

3.1.3 Time Used in Efficient Learning

During the teaching and learning process, there must be interaction between students and teachers or other students. The better student interaction can accelerate the learning process and improve student learning outcomes, so as to achieve the expected goals. Therefore, the time in
the teaching and learning process should be used as much as possible. This can be seen in Table 6. below:

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Overall Value</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paying Attention and Listening to Master's Explanations</td>
<td>552</td>
<td>23.38%</td>
<td>Effective</td>
</tr>
<tr>
<td>Reading and Understanding problems in Learning Media or LKPD</td>
<td>572</td>
<td>24.23%</td>
<td>Not Effective</td>
</tr>
<tr>
<td>Finding Solutions and Resolving Given Problems</td>
<td>384</td>
<td>16.26%</td>
<td>Not Effective</td>
</tr>
<tr>
<td>Discuss and Ask Teachers or Friends</td>
<td>302</td>
<td>12.79%</td>
<td>Effective</td>
</tr>
<tr>
<td>Drawing conclusions from the material studied</td>
<td>318</td>
<td>13.47%</td>
<td>Effective</td>
</tr>
<tr>
<td>Doing Activities Not Relevant to Learning</td>
<td>233</td>
<td>9.87%</td>
<td>Effective</td>
</tr>
</tbody>
</table>

Based on Table 6, above shows that the acquisition of time used in learning, aspects of paying attention and listening to teacher explanations with an average percentage of 23.38% with effective categories, on aspects of reading and understanding problems in learning media or LKPD obtained a percentage of 24.23% in the ineffective category, the aspect of finding solutions and solving the given problem obtained a percentage of 16.26% with the ineffective category, the aspect of discussing and asking the teacher or friends obtained a percentage of 12.79% with the effective category, the aspect of drawing conclusions from the material studied, a percentage of 13.47% was obtained in the effective category, and aspects of carrying out activities that were not relevant to learning obtained a percentage of 13.47% in the effective category. This means that the time used in developing digital book learning media using problem solving-based flipbooks for class IV students of MIN 3 Medan is effectively used for class IV students of MIN 3 Medan.

3.1.1. Student Response to Digital Book Learning Media using Flipbook Based on Problem Solving

Seeing student responses to digital book learning media using kvisoft flipbook using a problem solving approach can be shown in Table 7 below.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Criteria</th>
<th>Total Score</th>
<th>Rs</th>
<th>Average score per aspect</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Quality</td>
<td>1</td>
<td>108</td>
<td>4.00</td>
<td>3.98</td>
<td>Interested</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>114</td>
<td>4.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspect</td>
<td>Criteria</td>
<td>Total Score</td>
<td>Rs</td>
<td>Average score per aspect</td>
<td>Category</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------</td>
<td>-------------</td>
<td>----</td>
<td>----------------------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>114</td>
<td>4.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>96</td>
<td>3.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td>3.85</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td>Interested</td>
</tr>
<tr>
<td>Media Display</td>
<td>13</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligibility</td>
<td>14</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>114</td>
<td>4.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td>3.91</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td>Interested</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>96</td>
<td>3.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of Use</td>
<td>23</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td>3.96</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>102</td>
<td>3.78</td>
<td></td>
<td>Interested</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>108</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Average</td>
<td></td>
<td></td>
<td></td>
<td>15.69</td>
<td></td>
</tr>
<tr>
<td>Average overall score</td>
<td></td>
<td></td>
<td>3.92</td>
<td></td>
<td>Interested</td>
</tr>
</tbody>
</table>

Based on Table 7. above, it shows that the average acquisition of student responses is 3.92 in the interested category. The quality aspect of the content with an average percentage of 3.98 with interest, in the linguistic aspect a percentage of 3.85 was obtained with interest, the media display feasibility aspect obtained a percentage of 3.91 with the interested category, and the ease
of use aspect obtained a percentage of 3.96 with interested category. This means that students' responses in developing digital book learning media using problem solving-based flipbooks for grade IV students of MIN 3 Medan have almost all activities carried out and get positive responses and are interested in using them.

4 Conclusion

So it can be concluded that the digital book learning media using problem solving-based flipbooks in science learning material energy for grade IV students at MIN 3 Medan is effective with: the results of the posttest of students' higher order thinking obtained the criteria for classical student mastery levels included in the high category; the achievement of complete learning objectives (at least 75% of the formulated learning objectives can be achieved by a minimum of 65% of students) have been met; the time used in learning is efficiently used and when teaching takes place there is interaction between students and teachers or other students; and students responded positively and were interested in the components of the digital book learning media using flipbooks using a problem solving approach.

4.1 Suggestion

As the current digital era develops, it is hoped that educators must continue to innovate to find better learning methods to facilitate student learning. The feasibility of Digital books will trigger student activity, and the application of Digital book materials through Kvisoft Flipbook in learning is very effective in developing students' critical thinking skills. For teachers to use Digital books through Kvisoft Flipbook as learning materials for science students. Because the Digital book through Kvisoft Flipbook is only equipped with critical thinking exercises, teachers need to develop evaluation tools to measure students' understanding. Digital books through Kvisoft Flipbook can be used not only as independent learning media, but also as group learning media.

References

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