Proceedings of the 4th Progressive and Fun Education International Conference
6-8 August 2019, Makassar, Indonesia

Profunedu 2019

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Preface

Assalamualaikum warahmatullahi wabarokatuh

Education is an effort to educate people, through education the quality of human life becomes better, and it is captured and realized by all Muhammadiyah universities in Indonesia, especially from the Faculty of Teacher Training and Education Science. The problem that occurs is the need for a lot of innovation related to the implementation of learning in the classroom so that the learning process becomes more enjoyable. Thus, students will be more eager to learn and their academic achievement will be better, which of course has implications for the quality of education which is also better. Therefore, the Association of Muhammadiyah Higher Education Teaching Institutions (ALPTK-PTM) in collaboration with Makassar Muhammadiyah University as a local committee, Muhammadiyah Surakarta University, Muhammadiyah Research and Development Center, Ministry of Research, Technology and Research, and Fatoni University (Thailand), The Education University Hong Kong, and Universiti Utara Malaysia initiated the holding of The 4th Progressive and Fun Education International Conference (The 4th Profunedu) which was held on 6 - 8 August 2019 at the Aryaduta hotel, Makassar, Indonesia.

The conference invited two speakers namely Prof. Dr. Jasruddin, M.Sc. (Head of LLDIKTI Region IX, Sulawesi, Indonesia) and Prof. Mohd. Hairy Ibrahim (Universiti Pendidikan Sultan Idris, Malaysia). In addition, the conference was also attended by 89 participants and speakers with 70 papers listed. The 4th Profunedu this time collaborated with the European Alliance for Innovation (EAI) in the paper publication process. From 70 papers listed, 32 papers were selected to be published by EAI as publishing partners in this conference.

We strongly believe that The 4th Profunedu International Conference has become a forum to disseminate the latest research results related to progressive and enjoyable education. Thus, the quality of education becomes better and improved.

Prof. Dr. Harun Joko Prayitno
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The Students' Probabilistic Thinking Profile Based Cooperative Learning Numbered Heads Together (NHT) Type

Abdul Taram¹, Fitri Ana Sari², YL Sukestiyarno³, Rochmad⁴, Iwan Junaedi⁵

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Abstract. This study aims to determine the students' probabilistic thinking profile level of grade IX-A SMP Muhammadiyah 3 Mlati in the learning process of Numbered Heads Together (NHT). This type of research was descriptive qualitative research with subjects in this study were drawn from grade IX-A SMP Muhammadiyah 3 Mlati which amounted to 22 students and elected 8 of the research subject. The technique of data collection in this study consisted of probabilistic problem-solving questions test and interview guidelines. The results showed that after being held of Numbered Heads Together (NHT) cooperative learning, it was obtained the conclusion (1) students' probabilistic thinking level 1 (Subjective) in solving the problem of probability were less likely to understand the questions, the strategy used tended to be out of the concept, the subject in the register space of the sample answered was less complete and had difficulty in predicting an event, (2) students' probabilistic thinking level 2 (Transitional) in solving problems of probability tended to be a little added information, the subject was able to register complete of a set of one level experimental results, and in predicting and recording an event based on the opinions in quantitative terms but returned at subjective opinion, (3) students' probabilistic thinking level 3 (Informal Quantitative) in solving the problem of probability were able to provide information when retold the matter and tended to understand the subject, the used concepts tended to be correct, however there were strategies which were less precise, (4) students' probabilistic thinking level 4 (Numeric) in solving the problem of probability of being able to explain questions and answers, as well as performed calculations using the formula and the right steps, the subject was able to register complete of a set experimental results of two or three levels, and to mention the probability definitely.

Keywords: Thinking Profile, Probabilistic Thinking, and NHT

1 Introduction

Every mathematics learning activity of students will be treated to several mathematical problems. There are fundamental differences between students working on practice questions by solving problems in learning mathematics. In working on practice questions, students are only required to immediately get the answer. Pratiwi (2016: 15) states that a problem is a
situation where an individual wants to do something but doesn’t know the way of the action needed to get what he wants. Each student will respond to the problems they experience to produce the ability to connect something else to solve a problem and get new ideas. In this case, a thought process arises to be able to understand something that is being experienced (Mahyudi, 2017: 55).

Problem-solving in mathematics involves methods and methods of non-standard solutions that are not known in advance. Yuwono (2010: 35) states that solving problems in mathematics requires methods and methods of resolution that are not standardized and the truth is unknown in advance. According to Suherman, et al. (2003: 91) the solution to problem-solving contains four steps in the completion phase, namely: (1) Understanding the problem, (2) Planning a settlement, (3) Resolving the issue according to plan, and (4) Checking again. According to Sujadi (2008: 187) the mathematical problems are probabilistic because in reasoning, predicting and predicting students don’t yet know the certainty. A probability situation is a problem that contains an element of uncertainty (a case involving change). The question that includes a part of change is a problem that refers to an activity or random experiment that can get different possible results, but the exact effects are not predetermined correctly. The term probabilistic thinking will be used to describe students’ thinking in responding to various probabilistic problems.

It is challenging to find out about probabilistic students' thinking. Suppose students are given a problem related to the chance of an event, perhaps from the problem will get some answers to the same students. Sujadi (2008: 188) states that students' thinking in answering a probabilistic question has different levels of thinking. Students' knowledge of these opportunities is informal, namely knowledge that is built in non-academic settings, so it is possible to be different from the concept of opportunity formally, namely the concept of opportunities built in academic settings.

Taram (2016: 2) states that probabilistic thinking skills are one of the many variants of thought processes, and are classified in the high-level thinking process. The level or level of probabilistic thinking expressed by Jones et al (in Sujadi, 2008: 188) that there are four levels or levels of probabilistic thinking. Level 1 (Subjective): Thought students are constantly tied to subjective reasons. Level 2 (Transitional): is a period of transition between thinking subjective and thinking quantitatively, which is characterized by the thinking of students who often change (naive quantitative). Level 3 (Informal Quantitative): thinking at this level is shown through the use of generative strategies in registering the results of the 2-stage experiment and can harmonize and quantify their thoughts about the sample space and opportunities. Level 4 (numerical): students can make the right relationship about the sample space and its opportunities, and are able to use numerical measures correctly to describe the chance of an event.

Sugihartono, et al (2013: 74) states that learning is a process of changing behavior as a result of the interaction of individuals with their environment in meeting their needs. Regarding critical and creative thinking, students must continue to learn and learn, so a teacher must be clever to use what methods can be applied to students, especially in mathematics. Given that many mathematics lessons are not liked by students, the teacher must create active learning principles.

Based on observations on September 25, 2018, at SMP Muhammadiyah 3 Mlati the students tend to be passive in class, and lack interaction with teachers, activeness and independence of students in learning in most classes is still lacking. Some students even feel mathematics is a painful lesson. Teachers need to have the skills to interact with students and
can choose the right learning model to deliver material so that students can be active in learning activities in school. According to Majid (2016: 176) learning by using cooperative methods allows students to work together to maximize their learning and learn other members in the group.

Cooperative learning refers to learning methods, where students work together in small groups to help each other in education. Group members are responsible for completing group tasks and for learning the material itself. Each group formed has different abilities. The principle of the cooperative learning model doesn’t change, but there are several variations of the model (Suprihatiningrum, 2013: 191). Numbered Heads Together (NHT) is one of the cooperative learning models. Numbered Heads Together (NHT) is an approach developed by Spencer Kagen (1993) to involve more students in reviewing the material covered in a lesson and checking their understanding of the content of the experience (Suprihatiningrum, 2013: 209). The selection of the Numbered Heads Together (NHT) type of cooperative learning method is expected that learning can be more meaningful and give a strong impression on students so that students can increase the activity of learning in mathematics. Also, Numbered Heads Together (NHT) is expected to be able to help and encourage students who think that their probabilistic level is still low increases to a higher level.

This study aims to determine the students’ probabilistic thinking profile level of grade IX-A SMP Muhammadiyah 3 Mlati in the learning process of Numbered Heads Together (NHT).

2 Research Method

The method used in this research was descriptive qualitative research. The subjects in this study were drawn from grade IX-A SMP Muhammadiyah 3 Mlati which amounted to 22 students and elected 8 of the research subject. Items have never obtained opportunity material, and the researcher chooses each of the two things representing each level of probabilistic thinking. Data collection techniques used written tests and documentation. The instrument of data collection uses probabilistic thinking questions and interview guidelines. The results of probabilistic problem-solving tests and interviews were then presented and analyzed based on indicators of probabilistic thinking.

3 Discussion

Discussion of the results of research on the ability of students to solve probability problems in terms of probabilistic thinking indicators. Before the researcher took the data, the researcher conducted Numbered Heads Together (NHT) type cooperative learning on opportunity material. To facilitate understanding and discussion, the results of the study are presented by beginning with the data collection process, namely probabilistic thinking tests and interviews. Retrieving data from probabilistic thinking test results were obtained through problem-solving tests with 1 item description and given to 22 students grade IX-A SMP Muhammadiyah 3 Mlati. The probabilistic problem-solving analysis is used to classify/categorize the level of probabilistic thinking of each learner based on the probabilistic thinking indicators expressed by Jones (in Imam Sujadi, 2008). After the data is processed, it is obtained information that the highest level of probabilistic thinking in grade IX-A SMP Muhammadiyah 3 Mlati is at level 1 (subjective), while the level of probabilistic thinking is at least level 3 (Informal Quantitative).
After analyzing the test results of probabilistic thinking of students, the researchers then conducted interviews to find out more information about the profile of probabilistic thinking on the material opportunities. The interview data presented was obtained from research conducted on eight selected subjects with different levels, namely level 1 (subjective) selected by two subjects, level 2 (transitional) selected two subjects, level 3 (informal quantitative) selected two subjects, and level 4 (numeric) selected two subjects. The subject is based on consideration of the mathematics teacher SMP Muhammadiyah 3 Mlati who has the ability to convey ideas both verbally and in writing. The following eight subjects were selected for the researchers to conduct interviews:

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<td>BP1</td>
</tr>
<tr>
<td>RJN</td>
<td>Level 1</td>
<td>BP2</td>
</tr>
<tr>
<td>GES</td>
<td>Level 2</td>
<td>BP3</td>
</tr>
<tr>
<td>AG</td>
<td>Level 2</td>
<td>BP4</td>
</tr>
<tr>
<td>TWS</td>
<td>Level 3</td>
<td>BP5</td>
</tr>
<tr>
<td>DR</td>
<td>Level 3</td>
<td>BP6</td>
</tr>
<tr>
<td>AIA</td>
<td>Level 4</td>
<td>BP7</td>
</tr>
<tr>
<td>AL</td>
<td>Level 4</td>
<td>BP8</td>
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After the subject was chosen according to the level of probabilistic thinking raised by Jones (in Imam Sujadi, 2008), then the subject was given a problem-solving test based on probabilistic thinking indicators which amounted to 1 problem description. Questions were worked out within 20 minutes after conducting Numbered Heads Together (NHT) type learning. Then the subjects were interviewed one by one to get a more in-depth picture of the profile of probabilistic thinking of students in solving probability problems. To get the maximum interview results, all activities of the research subjects during the interview were recorded using cellphone recorders and cameras. The results of the interviews are then transcribed and encoded with capital letters and numbers that state the initials of the research subject.

From the results of interviews with the eight research subjects representing each level the following information was obtained:

Level 1 subject (Subjective).

Based on the results of the research on probabilistic thinking questions and the results of interviews on level 1 subjects in solving probability problems showed that the subject registered an incomplete set of one-level experimental results. It is evident that the subject is still confused and has difficulty registering a set. Subjects have not been able to analyze the problem and are still based on subjective opinions in predicting and recognizing an event. In answering questions, the subject doesn’t use certain steps and only comes from answering. Evidently when interviewed, the subject is confusion when answering the issue. Subjects are only able to meet indicators of probabilistic subjective (level 1) level probabilistic thinking. Subjects in solving probability problems do calculations, but not based on mathematical models. It was proven that in the answer sheet the subject did not write down the completion steps or the formula used. During NHT cooperative learning level 1 subjects tend to be indifferent, less active in groups, and not paying attention during learning. So that it affects the results of probabilistic thinking tests that have been given. The following is an example of the answer sheet for probabilistic thinking level 1:
Based on the results of the research on probabilistic thinking questions and the results of interviews on level 2 subjects in solving probability problems showed that the subject listed a complete set of results from a one-level experiment, sometimes registering the results of a two-level experiment using a limited strategy. It is evident that the subject is still confused and has difficulty registering a complete and valid set. Subjects in predicting and recognizing an event based on opinions quantitatively but return to subjective opinions. In answering questions, the subject tries to use certain steps but is still based on subjective opinions. Evidently when interviewed the subject definitely answered the question, but sometimes in certain parts of the subject felt a sense of confusion to answer.

Subjects are able to fulfill indicators of probabilistic transitional level (level 2) probabilistic thinking. Subjects in solving probability problems do calculations, trying to use formulas and steps based on mathematical models. It was proven that in the answer sheet the subject wrote down the completion steps or the formula used. During NHT cooperative learning level 2 subjects tend to be indifferent, a little active in groups, and pay attention to learning. The following is an example of the answer sheet about probabilistic thinking level 2:

Based on the results of the research on probabilistic thinking questions and the results of interviews on level 3 subjects in solving probability problems showed that the subjects registered consistently the results of a two-level experiment. Subjects in predicting and recognizing an event based on opinions quantitatively. In answering questions, the subject tries to use generative steps and strategies, and has the ability to harmonize the sample space and
opportunities. When interviewed the subject definitely answers the question and gives reasons with quantitative but valid reasoning.

Subjects are able to meet the probabilistic indicator of the level of informal quantitative (level 3) thinking probabilistic. Subjects in solving probability problems do calculations, and use formulas and steps based on mathematical models. It’s evident that in the answer sheet the subject wrote a few steps for completing and using the formula. During NHT cooperative learning level 3 subjects are active in groups, often asking the teacher if they feel they don't understand and always pay attention when learning. The following is an example of the answer sheet for probabilistic thinking level 3:

![Example of level 3 answer sheet](image)

**Fig.3. Example of level 3 answer sheet**

Level 4 subject (Numeric).

Based on the results of a probabilistic thinking test and the results of interviews on level 4 subjects in solving probability problems showed that the subject applied and used generative strategies that made it possible to register in a complete and consistent two or three level experimental results. It is evident that on the answer sheet the subject adds certain information before registering all possible events. The subject in predicting and recognizing an event mentions with certainty and is able to use numerical measurements correctly. In answering questions, the subject uses the right steps and formulas. When conducting an interview the subject definitely answers the question and is able to describe the opportunity of an event precisely.

Subjects are able to meet probabilistic thinking indicators of numerical (level 4) probabilistic thinking. Subjects in solving probability problems do calculations, and use formulas and steps based on mathematical models. It is evident that in the answer sheet the subject writes the completion steps and uses the right formula. During NHT cooperative learning level 4 subjects are very active in groups, often asking the teacher if they feel they don't understand and always pay attention when learning. The following is an example of the answer sheet for probabilistic thinking level 4:
4 Conclusion

Based on the results of research and discussion in chapter IV regarding the profile of probabilistic thinking of students based on cooperative learning of Numbered Heads Together (NHT) type, it can be conclude that:

Profile of probabilistic thinking of level 1 (subjective) students in solving probability problems after NHT learning tends to lack understanding of questions. The strategies used tend to be out of concept. The subject in registering the sample room answers incomplete and still has difficulty predicting an event.

Profile of probabilistic thinking level 2 (transitional) students in solving probability problems after NHT learning tends to add a little information. Subjects are able to register a complete set of results at a one-level experiment, but sometimes register with a complete two-level experiment using a limited strategy. In predicting and registering an event based on opinion quantitatively but returning to subjective opinions.

Profile of probabilistic thinking level 3 students (informal quantitative) in solving probability problems after NHT learning is able to provide information when retelling the problem and tend to understand the problem. The concepts used tend to be right, but there are strategies that are not right. Subjects were able to register consistently the results of two-level experiments and in predicting events based on opinions quantitatively.

Profile of probabilistic thinking on level 4 (numeric) students in solving probability problems after NHT learning is able to explain these questions and answers, and do calculations using appropriate formulas and steps. The subject is able to register a complete set of experimental results of two or three levels, and states with certainty the chance of an event.
References

Analysis of Students’ Difficulties in Solving Trigonometry Problems

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Abstract. This study aimed to describe the difficulties of students in solving math problems, especially in solving trigonometry questions. The subjects of this study were freshmen majoring math program who had already taken trigonometry courses. The research type was qualitative descriptive research. Data collection tools were essay trigonometry tests, deep interviews and documentation. Data analysis techniques were carried out using document analysis techniques. The results show that the students have difficulty in understanding the information given to solve the problems. They do many errors in applying trigonometric concepts to answer the questions, because they do not calculate correctly the results of angle comparison. Besides, they incorrectly determine the angle of comparison between the angles obtained. Furthermore, the students were not familiar with the trigonometry questions because they were confused. This problem has hindered them from accomplishing the task in a given time.

Keywords: Difficulty Analysis, Trigonometry, Mathematics Education Students, Problem Solving.

1 Introduction

Problem solving ability is one of the soft skills that students should have in learning mathematics. It is an essential part of the learning process [1]. Therefore, students need to be able to formulate and solve complex problems [2], so they can acquire ways of thinking, habits of persistence and curiosity, also self confidence to solve other problems in the real life. A question will be a problem for someone only if the question remains unsolved even though he or she knows the way to solve it.

The problem solving process requires systematic, logically planned activities, including appropriate strategies and selection of appropriate implementation methods. There are two types of problems in math. First is that routine problems, refers to simple problems related to solving mathematical problems. Technically, arithmetic abilities that involves four basic operations in mathematics (addition, subtraction, multiplication and division), direct applications using
formulas, laws, theorems and mathematical equations, are generally common mathematical problems. The second is non-routine problems or unique problems, that require applications and skills, concepts or principles in solving them. Solving non-routine mathematical problems does not require a text book based answer and the answers could be relatively varied [3].

When it comes to several difficulties in problem solving that the students faced, namely: 1) They could not understand the mathematical sentences; 2) They couldn’t figure out the necessary information to solve the problem; 3) They tend to guess the answers without any thinking process; 4) They tend to be impatient reading mathematical problems; and 5) They do not like to read long problems [4]. Those kinds of problems usually happen to new students in math majors. Some of them try to seek help to overcome those problems, but some are just happy with the situations.

There are difficulties in resolving mathematical problems, as follows: 1) the students cannot understand the language of mathematics; 2) the students cannot understand mathematical concepts; 3) the student cannot make plan to solve the problem; 4) the students do not have enough experience and skills in solving mathematical problems; 5) the students hesitate to understand the purpose of the question; 6) the answers are less accurate due to error in writing or counting; and 7) the students have less motivation to solve the problems [3].

Based on the explanation above, it can be concluded that the types of difficulties in solving mathematical problems are difficulties in understanding mathematical questions or understanding the information provided to solve problems, difficulties in using concepts (conceptual errors), difficulty in counting, inaccuracy, lack of experience and skills in completion problems and lack of motivation in solving mathematical problems.

Trigonometry is a very important subject in mathematics. It is a subject that is taught in schools and a basic concept that are also used in other subjects such as geometric, algebraic and graphical ways of thinking [5]. It helps students develop cognitive strategies, such as problem solving through reasoning and proofing capabilities of the students [4]. It makes the students follow up with complex numbers, limits, derivatives, and integrals. Therefore, problem solving in trigonometry may be considered very difficult for high school students, also for teacher candidate to master [6] and [7].

There are several research related to analyzing problem solving in trigonometry problems. One of which is that a study of 80 senior secondary students in Nigeria. The researchers used the Mathematics Achievement Test (MAT) and the Trigonometry Diagnostic Test (TDT) to investigate the type of errors that were done by the students. The results indicated that students still struggled to solve trigonometry problems. Also, the teacher should give more opportunities for students to do regular problems, and concentrate to solve problems one step at the time. The researchers suggest that this study has to be expanded in different level of education [8].

Solving math problems including trigonometry needs IDEAL problem solver, such as identifying problems, defining the problem, exploring solution, acting on strategies, and looking back & evaluate [9]. The students must follow those steps so they can handle the math problems. It is very important to understand, how the students solve their math problems, so the teacher can give some suggestions. Hopefully, in the future they can solve more math problems or even in their daily problems using logic.
Therefore, this study is to find out about the difficulties of students in solving trigonometry problem solving questions. This is important for the lecturers, so they can pay more attention to overcome the problems and emphasize the steps that are usually carried out in a situation and look for ways to sharpen student skills in solving problems. In addition, so that the students can find out what difficulties and mistakes are often found and they do not repeat the same mistakes in the future.

2 Method

This study used descriptive qualitative research to describe how students answer the trigonometry problems. This method gets information about the “human” side of an issue [10], so we can gain many factors that affect students’ abilities to solve the problems. The data of this study were the answers of trigonometry submitted by seven students majoring in math study program and had already took their trigonometry class. The procedure of data collection were through: 1. The students answered four trigonometry essay problems, 2. Deep interview about the students’ difficulties in answering the problems given, and 3. Documentation of all data. Document analysis was used as a systematic procedure for reviewing or evaluating documents [11]. The interview will enrich the data collection and the analysis of the documents to know more about how the students solve the problems [12].

3 Results

Based on Table 1, it is found that 25% of errors are due to mathematical statements, 32% due to concept errors and 7% due to calculate errors.

<table>
<thead>
<tr>
<th>Kind of students’ mistakes</th>
<th>Questions</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mathematical statement</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Concept</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Error calculation</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
3.1 First Question

- In the ABC triangle, the length of side A is 8 cm longer than that of \( \frac{1}{2} \) of side B and the length of side C is 2 cm shorter than that of \( \frac{3}{4} \) of side A. If the circumference of the ABC triangle is 42 cm. Please count:
  1) The length of side A, side B, and side C
  2) The area of the ABC triangle.

- The students’ answers analysis:
  1) Based on the analysis that has been carried out on the answers to the student's description tests, it was found that four students had difficulties in understanding mathematical statements (Fig. 1).

Fig. 1. First student’s answer for first question

2) Two students had difficulties understanding the concept or the intent of mathematical statements, but were wrong in using the concepts used to complete the description (Fig. 2).

Fig. 2. Second student’s answer for first question
3) One student can understand the mathematical statement and the answer is correct, but he used the method of trying out the length of the side that matches the circumference and the provisions of the question statement (Fig. 3).

![Third student's answer for first question](image1)

**Fig. 3. Third student’s answer for first question**

### 3.2 Second Question

- Rina, Rani, and Rika play on a soccer field. The position of the three people forms a triangle. The distance between Rina and Rani is 8 meters. The distance between Rani and Rika is 6 meters, and the distance between Rika and Rina is 3 meters. Determine one of the angles formed by the three children.

- The students’ answers analysis:

  1) Four people answered correctly the math problems. One person had difficulties in understanding the concept (Fig. 4).

![First student's answer for second question](image2)

**Fig. 4. First student’s answer for second question**
2) One person understood the problem and the concept, but it was wrong to conclude the angle (Fig. 5).

![Fig. 5. Second student’s answer for second question](image)

3) One person understood the problem and concept, but was not careful in calculating (Fig. 6).

![Fig. 6. Third student’s answer for second question](image)

### 3.3 Third Question

- Adi with a height of 1.5 m will measure the height of the tree. From Ali’s spot, the treetop was seen with an angle elevation of 45° from the point of view of Adi. The horizontal distance from Adi to the tree is 18 m.
  1) Make the illustration of the story
  2) How long is the height of the tree?

- The students’ answers analysis:
  1) Three students have difficulty understanding mathematical statements, this can be seen from the illustration that is still wrong (Fig. 7).

![Fig. 7. First student’s answer for third question](image)
2) Four students can understand mathematical statements well shown by being able to draw illustrations correctly, but students are still having difficulty in determining the concept of trigonometric formulas used in solving this question (Fig. 8).

![Fig. 8. Second student’s answer for third question](image)

3.4 Fourth Question

- A ladder laid on a vertical wall. The cusp of the stairs attached to the adobe wall at an altitude of 8 meters of the ground. If the length of the stairs is 10 m, determine the size of the angle formed by:
  1) The illustration image
  2) Stairs and ground level
  3) Stairs and wall

- The students’ answers analysis:
  1) Four people can solve trigonometric problems correctly. Two people can understand mathematical statements, but still have difficulty understanding mathematical concepts (Fig. 9).

![Fig. 9. First student’s answer for fourth question](image)
2) One person can understand mathematical concepts and trigonometric concepts that are used well, but are wrong in the final calculation process (Fig. 10).

![Second student’s answer for fourth question](image)

Fig. 10. Second student’s answer for fourth question

Based on the results of the interview, it was also known that students still experienced difficulty/ies in understanding the sentences of mathematical statements. They were confused in choosing the right concepts of trigonometry to solve the problems, so they ran out of time.

The students have not been familiar to solve real life problems. In the classroom, the lecturer focuses more on teaching the discovery of formulas and how the students can use the formula. They should obtain and understand the concept well, not just memorize it. Therefore, problem solving were not trained specifically.

In the trigonometry textbook, there are already problem solving, but the lecturer does not discuss specifically and asked the students to study on their own, discuss it with classmates and ask the teacher for any queries. However, students had low motivation to do it. They gave up before they tried to answer. They prefer working on routine questions to implementing the concepts.

4 Discussion

The finding from this study were leading to most of the theoretical concept in the beginning of this paper. From the students’ answers and the interview, we can gain many understanding about what was happening in the class when the lecturer explained trigonometry concept. We can find the answer also, about what the lecturer should do in the future classes.

The questions were answered by seven students. The first question was quite difficult for them that only had one right answer, but that answer involved guessing by the students. This is in line with [4] in their research that students tend to guess if they do not know how to solve the math problem. The second and fourth questions were so somehow familiar to the students, so each questions got four right answers. The third one was the most difficult one for the students that no one can answer it.
The students’ difficulty to understand math statements or to apply math concepts appeared in all numbers. Especially, in question number three. The students could not understand math concept and choose the correct trigonometry concept. Followed by other numbers, this situation was also experienced by [4] and [3]. The other problem is that when the students understand the concept but could not apply it, or calculating it wrongly.

The interview showed that, the students had lack of motivation to solve those problems. They just learnt what the lecturer gave them. They also did not practice, even though the lecturer asked them to practice a lot. The common problems of Trigonometry seemed difficult to students [7], because they said that the lecturer never gave them those kinds of questions in the class. The students tend to give up and wait until their lecturer give the explanation.

From that evaluation, we can conclude that the lecturer must bring new perspective to the class that math problems are applicable with logic IDEAL strategies [9]. Therefore, the students can set the way of thinking, so they solve the problems. Later on, if the students have any problems related to math in general or trigonometry in particular they can solve it with confidence.

5 Conclusion

The results showed that students had difficulties in understanding the information given to solve the problems. (difficulties in understanding the intent of mathematical statements). That situation has led to errors in applying trigonometry concepts to get the solution of the problem. The students were not careful in calculating the result. The students were not familiar with real life math problems. The results of this study can be used as a basis for conducting further research on solving mathematical problems in trigonometry. Lecturers can also use the results of this study to evaluate learning method and how to motivate students to practice mathematical questions, especially trigonometry materials.

Acknowledgments. We thank the students of Mathematics Education, University of Muhammadiyah Banjarmasin who voluntarily become our respondents. Also for the Dean of Teacher Training and Education, University of Muhammadiyah Banjarmasin, who gave us the full support to finish this paper.

References


Abstract. Higher order thinking skills is one of the most popular issue in Indonesia’s education as at this recent time the government made new regulation that learning process should include HOTS concept especially on problem-solving questions. Thus, there are many innovation, implementation, and research related to HOTS problems solving. It is, however, still lack both of implementation and research related to how teacher or pre-service teacher could arrange HOTS problems. In this paper, we present new perspective of HOTS problem based on pre-service teacher’s ability to design it. The novelty of this perspective is that teacher and pre-service teacher should have ability to pose HOTS problems, while most of research discuss the implementation of HOTS in learning as well its problem solving. This descriptive qualitative research conducted at mathematics pre-service teacher joining Assessment and Evaluation of Students Achievement class. Besides, the data was collected by test given for students and validated by researcher triangulation. Then, the data was analyzed by reduction, presentation, and conclusion. The result showed that most of pre-service teacher could not arrange HOTS problems. In fact, their perspective of HOTS problems was wrong. Moreover, 10 pre-service teachers could design HOTS problems with various characteristics

Keywords: HOTS, pre-service teacher, problem posing.

1 Introduction

Mathematics is one of essential subjects which is taught since elementary school until university. In particular, mathematics in university is unalike mathematics in school as well it is more challenging and abstract. It consists of arithmetic, algebra, geometry, and analysis. In addition, students of faculty teaching and education learn not only pure mathematics but also school mathematics as they are pre-service teachers. Besides, they also study how to teach mathematics for school as well create evaluation instrument for mathematics learning. It is important for pre-service teachers to design a test and non-test assessment as they will use it to evaluate their student’s achievement in the future.

In Mathematics Education Department of Universitas Muhammadiyah Surakarta, there is Assessment and Evaluation of Students Achievement subject which aims to introduce students related to learning assessment. In that subject, students were required to arrange a set of instruments that tested in senior high school or vocational school students. Based on that tasks, there were some findings related to how students design a good mathematics question. In particular, there were 16 groups that could arrange a valid mathematics questions, while 4 other groups showed that they were lack of knowledge and understanding related to design good
mathematics questions. The majority of 16 groups, however, designed questions at the conceptual understanding level which that questions tend to apply a certain formula directly without contextual situation. It means, most of students focused arranging lower order thinking questions. Furthermore, even some students design a contextual mathematics questions, most of them did some mistakes on irrational real situation.

For instance, there is a question related to concept of finding surface area of cube. The question is “There is a beam-shaped hall with a size of 8 meters, 6 meters, and 4 meters. A worker would paint the wall inside of the hall with a cost of Rp 80,000 per square meters. How much the total costs that he needs to paint the wall inside of the hall?”. This question was made by determined the surface area of beam without lid, then the painting costs would be calculated by the result of the surface are multiplication by the costs each square meter. This question is not wrong by the concept. Is that question a contextual problem? however. How could be the hall has the real beam-shaped like a certain beam? At least, it has a door. Therefore, the calculation is not equal to the surface of the beam. Arranging the contextual problems like this need special attention how could students design mathematics contextual problems from the conceptual understanding level to the higher order thinking skills problems. This concept is known as problem posing skill.

Problem posing means asking students to arrange problems or questions based on the certain information provided. Problem posing is an essential aspect especially in learning and teaching mathematics [1]. There are, however, some difficulties on arranging or posing the certain problems for teachers. Based on [2], teachers had some difficulties on posing relevant problems related to real situation that could be understood by students, designing problems that suitable with the applicable curriculum in certain level of education, and also modifying problems that could be understood by their own self. Recently, one of demand both on applicable curriculum and the global issue is how the 21st century skills could be developed for students both in learning and assessment. Consider to Ravitch, learning by using higher order thinking skills, also known as HOTS, was a complicated and challenging aspect for teacher, especially how could teachers assess students ability with HOTS problems [3].

Based on the previous explanation, problem posing in mathematics learning is one of important aspect both for teachers as well students. Besides, there is a demand for teachers to apply HOTS concept not only for teaching, but also for assessing student’s ability included arrange problems with HOTS characteristic. This research aims to identify how pre-service teachers could design HOTS mathematics problems for senior high school students

2 Related Works

2.1 Mathematics Problem Posing

Mathematics problem posing is student’s task that require them to design mathematics problems or questions based on provided information, and also solving the problems that they made directly [4]. Besides, problem posing have relation and benefit for other mathematics skills. Based on [5], learning with problem posing related to indicators of students critical thinking abilities and this abilities could be improved by implementing problem posing concept on learning. Furthermore, problem posing could be enhanced three aspects of creative thinking ability, namely understanding of information, novelty, and fluency, even flexibility aspect did not increase yet [4]. There was a significant relation between problem posing skills and problem
solving skills [6]. Thus, by giving chance for students for designing their own problems, it would be enhanced their reasoning and reflection skills [1].

There are three ways to find idea on problem posing, namely trial-error, semi-intentional, and intentional [7]. In particular, students ability on problem posing could be analyzed based on five criteria, namely (1) the problems can be solved by students or not; (2) the problems related to the material or provided information or not; (3) solution of the problems are given or not; (4) the problems use correct and good language or not; and (5) level of difficulty [8]. Besides, there is classification of problem solving developing by Afifah [9] based on Siswono and Muiz’s criteria. The following Table 1 shows that classification of problem posing.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety of material</td>
<td>1. Varies: the posing problems consist of more than four different concepts</td>
</tr>
<tr>
<td></td>
<td>2. Less varied: the posing problems consist of three or four different concepts</td>
</tr>
<tr>
<td></td>
<td>3. Does not vary: the posing problems only consist of one or two different concepts</td>
</tr>
<tr>
<td>Trend of information</td>
<td>The given information could be grouped as verbal and visual.</td>
</tr>
<tr>
<td>Problem solving</td>
<td>1. The question is clear</td>
</tr>
<tr>
<td></td>
<td>2. The data are enough to answer the questions</td>
</tr>
<tr>
<td></td>
<td>3. The question could be solved based on information of the problems</td>
</tr>
<tr>
<td>Level of difficulty</td>
<td>1. Easy: answer of the problems could be solved by one concept or formula directly without analyze data to get new information.</td>
</tr>
<tr>
<td></td>
<td>2. Moderate: answer of the problems could be solved by analyze the data once from the provided information.</td>
</tr>
<tr>
<td></td>
<td>3. c. Hard: answer of the problems could not be solved directly from the given information and analyze the data more than one step to solve the problems.</td>
</tr>
</tbody>
</table>

2.2 Higher Order Thinking Skills (HOTS)

Thinking is a cognitive proses which explained by various ways. Higher order thinking skills (HOTS) is a concept that use on education reformation based on learning taxonomy such as Bloom’s taxonomy. Consider to Crawford & Smith, the basic idea of HOTS is part of learning which require cognitive knowledge is higher than other knowledge [10]. Moreover, skill of analyzing, evaluating, and creating is needed higher order knowledge compared to remembering facts and concepts, and implementing the concepts. Therefore, HOTS need special strategy on learning problem solving, and also problem posing by higher level questions.

HOTS is one of essential aspect in learning. Based on the research related to pre-service teacher perception about HOTS concluding that students had awareness to the importance of HOTS and learning that focusing on HOTS should be faced as challenge for learning in 21st century [11]. In addition, HOTS have positive correlation with students achievement in mathematics learning [12]. Besides, HOTS level of students in collage have positive correlation toward their quality of life [13].
At least, there are two aspects of HOTS, namely critical thinking ability and creative thinking ability [14]. Moreover, there are three components of HOTS, namely critical thinking ability, creative thinking ability, and also systematic thinking ability [12]. Meanwhile, Consider to Marzano, there are 13 aspect of HOTS, namely comparing, classifying, inductive reasoning, deductive reasoning, analyzing errors, constructing support, analyzing perspectives, abstracting, decision making, investigation, problem solving, experimental inquiry, and invention [15].

2.3 Related Works

There was a research conducted by Agustina & Amin purposing to analyze student’s profile of mathematics problem posing in junior high school grade VII [16]. In this research, characteristics of problem posing was analyzed by some criteria, namely students could pose the problems or not; the problems related to the require material or not; students could solve the problems or not; and difficulty level of problems. In particular, the result of that research showed that the boys that have higher ability could design their own mathematics problems; then 92,86% of students could arrange problems related to the required material; 92,86% of students could solve their problems correctly; and they arrange easy problems.

From research [9] related to profile of mathematics problem posing on Junior High School students based on cognitive style, showed that student’s characteristics with field independent (FI) and field dependent (FD) cognitive style had different type on mathematics problem posing. Students with FI cognitive style had characteristics on problem posing such as the information on problems was verbal; the problem was solvable; there was difficult question, but mostly difficulty level of the questions was moderate; various questions; included new data or information. Meanwhile, students with FD cognitive style had characteristics on problem posing such as there was non-mathematics problems; mathematics problem consist of verbal information; there were some problems that could not be solved; there was difficult problems; the question tended to similar; the problems did not includ new data, in general.

Another research [17] related to students’ profile on problem posing based on cognitive style and information categories showed that students with field dependent style could do mathematics problem posing that solvable and includes new data and information; and the problems have high-level quality. Meanwhile students with field dependent style could make problems that solvable, but the problems do not include new data; and the problems have moderate-level quality.

3 Research Methods

This research was qualitative description which describe student’s problem posing in mathematics for school using HOTS concept. The subject was students of Mathematics Education Department of Universitas Muhammadiyah Surakarta year academic 2017/2018 which had Assessment and Evaluation of Students Achievement class. The data was collected by task that ask students to design mathematics problems with HOTS content. Then, the task was used to identify how students could pose the HOTS problems in mathematics. Besides, the data was analyzed by data reduction, presentation, and conclusion. Moreover, the data was validated by using two researcher which analyze it, namely investigator triangulation.
4 Results and Discussion

Based on the task given for 79 pre-service teachers in mathematics education, all of students could arranging mathematics school problems. However, most of them could not design problems that consist of HOTS content. In particular, less than 20% of 79 pre-service teachers could arranging mathematics problems with HOTS criteria.

Even only 8 pre-service teachers, they could arrange well mathematics problem posing with HOTS content. At this research, researchers found 2 pre-service teachers design high level of problem posing. Moreover, 3 pre-service teachers made moderate level of HOTS. Meanwhile, only 2 pre-service teachers.

Pak Muslim membeli sekeping tripleks seharga Rp 125,000. Karena dia minta tripleks tersebut dipotong menjadi 3 bagian yang sama, dia dikenakan biaya Rp 3500 sekali potong. Selanjutnya Pak Muslim harus membayar biaya pengecatan sebesar 30% dari seluruh biaya setelah pemotongan. Toko memberikan tanda pembayaran sebagai berikut:

<table>
<thead>
<tr>
<th>1 lembar tripleks @ Rp 125,000</th>
<th>Rp 125,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>3xpemotongan @ Rp 10,500</td>
<td>Rp 31,500</td>
</tr>
<tr>
<td>Subtotal</td>
<td>Rp 156,500</td>
</tr>
<tr>
<td>Pengecatan</td>
<td>Rp 40,650</td>
</tr>
<tr>
<td>Total</td>
<td>Rp 176,150</td>
</tr>
</tbody>
</table>

Pak Muslim mengetahui biaya tersebut salah. Manakah yang salah?

The first analysis related to characteristic of student’s problem posing. Based on Figure 1, it is noticeable that the problem related to given information; it is number material for Junior High School (JHS) grade 7. In particular, the material consists of addition, subtraction, multiplication, division, and percentage in simple calculation. Besides, the problem consists of 3 data analysis to get new information before solving the main problem, namely calculating cost of cutting plywood, calculating cost of painting plywood, and adding up total cost. The main question aims to evaluate the given solution. In addition, given information is interdependent and the problem is solvable. It means that the question-maker had considered whether the problem could be solved or not and the information is enough to solve the problem. Furthermore, the language she used is structured, understandable, and not ambiguous. It shows that the question-maker could use appropriate language based on student level. Additionally, the question tends to use verbal information in short-story form. The question-maker could use real condition or daily activity purposing to make the problem closer to students. This problem has easy level of difficulty since the questions are in basic material. Thus, this problem included on high level of problem posing.

The second analysis related to HOTS characteristics on mathematics problems, consists of Bloom’s taxonomy, critical thinking, and creative thinking. Based on Bloom’s taxonomy, this
problem has level C5, evaluation, as the main question of this problem is focusing on how students identify the given solution, find the errors, and do solve the problem correctly. Besides, the problem fulfills enough on categories of critical-thinking problems. The statement on the problem is clear enough as the reader could directly understand the aims of problems and there is no double meaning of problem. The data are accurate such as the cost of plywood, the cost of cutting and painting also. It shows that the question-maker had done observation related to the real condition. Moreover, the information, data, storyline, and the question are relevance, especially it uses contextual situation and reasonable. Additionally, this problem uses good logical algorithm since the question-maker had presented the solution, and it looks like true, thus the reader should resolve problem by their self. However, this problem has some drawbacks such as the use of unappropriated unit, the deepness and the width of problem.

Furthermore, for creative thinking analysis, this problem fulfills fluency and novelty aspect. As the problem was arranged more than one concept even it was very simple, so this problem has fluency. Besides, this problem quite different with others as the question ask student to evaluate given solution. Thus, students are required to use their critical ability to analyse solution of the problem. Based on the analysis, the problem includes HOTS problem for Junior High School student grade VII.

Based on Figure 2, it is noticeable that the problem related to given information; it is linear equation material for Junior High School (JHS) grade 7. The problem related to given information; it is linear equation systems material for JHS grade 7. The problem contains 2 data analysis to get new information. Additionally, the main question aims to compare 2 conditions and identify which is the best transportation that will student choose. The information is interdependent and the problem is solvable. The language is structured. It tends to use verbal information. The data are enough to solve the problem. The difficulty level is easy.

Based on Bloom’s taxonomy, this problem has level C4, analysis, as the main question of this problem is focusing on how students comparing two conditions and choosing what is the best answer. Besides, the problem fulfills enough on categories of critical-thinking problems. The statement on the problem is clear enough as the reader could directly understand the aims of problems and there is no double meaning of problem. The data are quite accurate related to cost of taxi. It shows that the question-maker had done observation related to the real condition. Moreover, the information, data, storyline, and the question are relevance, especially it uses contextual situation and reasonable. Additionally, this problem uses good logical algorithm
because students should solve two conditions and compare them to get solution. This problem, however, less depth and width as the question is very simple.

For creative thinking analysis, this problem fulfills fluency and novelty aspect. As the problem was arranged more than one concept even it was very simple, so this problem has fluency. Besides, this problem quite different with others as the question ask student to compare two types answer to get best solution. Thus, students are required to use their critical ability to analyze solution of the problem. Based on the analysis, the problem includes HOTS problem for Junior High School student grade VII.

In addition to analysis, this research finds some findings related to how pre-service teachers could make mathematics problems in HOTS level. There are three main findings, namely the problems using real-world situation, the problems related to culture and environment, and the problem using diagram or table or graph to present introductory information.

First findings are related to real-world situation that used by students when creating the problems. Figure 3 is one example showing the problems that use real-world situation, its content is Krakatau mountain. It can be seen that question-maker use real information, real data, and real story about Krakatau mountain. Besides, she also uses both verbal and visual introduction to construct students’ knowledge before facing the main question. Based on character of problem posing, it can be analysed that the problem is good enough. The problem suitable with the material of sequences and series for Junior High School grade 8. Besides, the problem is solvable; uses appropriate data to solve it; as well the language is structured. The positive side of this problem is using real-world situation, informative stimulus, and verbal as well visual introduction. However, this problem contains only one way of data analysis to solved it.

On the other hand, based on character of critical thinking and creative thinking problem, this problem does not fulfill it as to solve problem it just needs one formula that is very common for students. Moreover, for solving it, students do not need to analyze first. Additionally, even the introduction is very interest and new compared to other problems, but the main question includes routine problem. It also noticeable that the Blooms’ taxonomy of this problem has C2 level, it is explanation.
Thus, based on the data analysis, this problem is very interested and related to the real-world situation, informative stimulus, also verbal and visual information. This problem, however, does not categorised as HOTS problem as the Blooms’ taxonomy in level C2, and does not fulfil critical and creative thinking problems.

Second findings are related to culture and environment, means that question-maker use their own culture both local or national, as well as their environment to create or stimulus on mathematics HOTS problem. Figure 4 is an example showing problem using question-makers’ environment. It can be seen that question-maker use Surakarta and Sragen city to illustrate the problem. Figure 3 also shows problem that use question-makers’ culture as she uses Krakatau mountain which is one of popular mountain in Indonesia. By using culture and environment, student would feel closer with problems and the problem becomes common for students. It would be very different if question-makers use other country culture, students would feel uncommon with problem as the culture are different. Besides, students might not understand with the culture, and it is possible if the culture is contrary to Indonesian culture.

Based on character of problem posing, it can be analysed that the problem is quite good. The problem suitable with the material of linier equation for Junior High School grade 7. Besides, the problem is solvable; uses appropriate data to solve it; as well the language is structured. The positive side of this problem uses contextual problem, and related to question-maker environment. Meanwhile, the problem includes as routine problem, the stimulus only part of main question, and the problem could be solved without finding new data and only use common formula.

On the other hand, based on character of critical thinking and creative thinking problem, this problem does not fulfil it as to solve problem it just needs one formula that is very common for students. Moreover, for solving it, students do not need to analyse first. Additionally, the problem is arranged by one main concept, one way to solved it, and there is no novelty of the problem. It also noticeable that the Blooms’ taxonomy of this problem has C3 level, it is applying.

Thus, based on the data analysis, this problem is quite interested as it related to the question-makers’ environment. This problem, however, does not categorised as HOTS problem as this problem is routine question, the Blooms’ taxonomy in level C3, and does not fulfil critical and creative thinking problems.
Third findings are related to stimulus that used by question-maker when creating problems. Most of problem use verbal stimulus such as short stories or real-world information. However, another finding is that many pre-service students use diagram, picture, table, and chart to present the information. This is quite unique as they need many appropriate data, then present them to the diagram or table or chart. This activity needs critical and creativity thinking because they have to present in proportional items. Figure 5 is one of the examples that the problem uses both picture and table.

Based on character of problem posing, it can be analysed that the problem is quite good as the question more than one item. The problem suitable with the material of comparison for Junior High School grade 7. Besides, the problem is solvable; uses appropriate data to solve it; as well the language is structured. The positive side of this problem uses data on table to present the information and the problems consist of three questions. Meanwhile, the problem includes as routine problem, each question could be solved by one step, and one question to others are not related each other. So, this problem does not enough to analyse students' ability on higher order thinking.

On the other hand, based on character of critical thinking and creative thinking problem, this problem does not fulfil it as to solve each problem it just needs one step without finding new data. Moreover, for solving it, students do not need to analyse first. Additionally, the problem is arranged by one main concept even it consists of three questions; it is needed only one step to solve it; and there is no novelty of the problem. It also noticeable that the Blooms’ taxonomy of this problem has C3 level, it is applying.

Thus, based on the data analysis, this problem is quite interested as it has been used table to present the data. This problem, however, does not categorised as HOTS problem as this
problem is routine question, the Blooms’ taxonomy in level C3, and does not fulfill critical and creative thinking problems.

The participants have a high perception in implementing HOTs in the classroom. However, the participants face some difficulties in its implementation, such as time management and students’ ability [18]. discovered that preservice teachers would not change their unstated perceptions or beliefs until they saw the difference in teaching and students for themselves [19]. According Hasim, Abdullah, Arifin, & Noh (2015), the teachers or preservice teacher see that teaching HOTs has future value and this will logically increase their level of commitment and skills that their need in implementing HOTs [20]. we need cultivating a positive awareness of the importance of HOTs in order to fostering the need for teaching that emphasizes the aspects of HOTs during pre-service education [11].

4 Conclusion

Pre-service teachers could make mathematics problems for students in elementary, Junior High School, and Senior High School. Most of pre-service teacher, however, still could not design HOTs problems in mathematics. Additionally, pre-service teachers that could design HOTs problems have various characteristics. Some pre-service teachers could design HOTs problems by evaluation the given solution, while others designed HOTs problems by comparing two condition to get the best solution of the problems. Besides, this research also finds three kinds of findings related to the problems that pre-service teachers make. There are three main findings, namely the problems using real-world situation, the problems related to culture and environment, and the problem using diagram or table or graph to present introductory information. For the next research, it is highly recommended to identify how pre-service teachers understand related to HOTs problems as at this research, only some of pre-service teachers that could design HOTs problems in mathematics. Besides, the research could identify pre-service teachers’ perspective toward HOTs problems.

References


The Development Of Mathematics Learning Based On Double-Loop Learning: Preparing Independent And Dignified Learners

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Abstract. In general, this study aims to develop a model of mathematics learning management based on double-loop learning that effectively increases learning output. The specific objectives of this study are to describe (1) the conditions of mathematics learning at the research site, (2) mathematics learning based on double-loop learning, and (3) preparation of independent and dignified learners. This study is a research and development with ethnographic qualitative design. The research subjects included mathematics teachers, school principals, and students of SMP (Junior High School) in Sukoharjo district. This study employed observation, interview, and documentation as the data collection method. Flow model qualitative analysis was then used as the data analysis technique. The results of the study: (1) Mathematics learning at the research site tends to be directed to make students think simple. Mathematics learning conditions at the research site occurred in the paradigm of “the teacher explains—the students listen.” (2) Mathematics learning based on double-loop learning in the paradigm of “active learners construct meaning—the teacher as a facilitator.” The mindset is a change in reflection and action. The management model went through three stages with five conditions. (3) Preparing independent and dignified learners based on strong religious value, core character, lifestyle character, character to respect others, and have intelligent, creative, and entrepreneurial potential.

Keywords: dignified, double loop learning, independent, mathematics learning

1 Introduction

The development of culture towards cyber-based life aroused the attention of teachers to the problem of character and independence. Education can be seen as one of the social forces that contributes to shape, style, and direction in the life of an intelligent, creative, and innovative future society. The work culture of the teacher both in his thought and action that is smart, creative, and innovative is expected to prepare tough and dignified students.

“What is wrong with the learning management that has been done by teachers?” Some did not feel the progress in the learning management, some even said that the learning management had a setback in independence. The statement of independence is a cultural statement [1]. The learning management without reflection and action will only lead to activism and verbalism. Only through praxis, which is a combination of action and reflection, management of mathematics learning becomes quality learning. To realize the quality mathematics learning
management, alternative solutions can be offered, namely “mathematics learning innovation based on double-loop learning.”

Double-loop learning is learning that encourages changes in values such as assumptions and strategies. Double-loop learning has a destructive aspect that always questions the norms, values, and assumptions that apply. Norms, strategies, and learning objectives are always explored deeper and reflected, questioned again, and corrected to encourage optimal learning outcomes [2]. According to Cartwright [3] double-loop learning is a transformation from a perspective that is highly held in the habit of working and acting, through communication, dialogue that involves a lot of interaction between students. Broadly speaking the objectives of double-loop learning are to 1) create a harmonious working relationship between the teacher and students; 2) develop the ability to solve mathematical learning problems more openly; 3) create openness in communication; and 4) develop the morale of the students and the ability to control themselves.

Building values in mathematics learning based on double-loop learning is in accordance with the learning characteristics of the 2013 curriculum which includes directing students to understand their potential, interests, and talents. For this reason, through mathematics learning based on double-loop learning, students are prepared to have the quality character and competence in accordance with the demands of 21st century skills. Competencies that are appropriate for 21st century skills, namely a) critical thinking and problem solving skills, b) communication skills, c) creativity and innovation, d) collaboration [4].

According to Paul and Elder [5], critical thinking is the process of analyzing and evaluating thinking with a view to improving it. Critical thinking skills that can be developed, namely a) reasoning; b) understanding interconnection between concepts; c) determining decisions effectively; d) testing the results and establishing connection between information and argument; e) processing, interpreting and testing information; f) solving non-routine problems; g) using the ability to solve problems; h) arranging and revealing, analyzing and solving problems.

Communication is the process of transmitting information, ideas, emotions, and skills using symbols, words, pictures, graphics, and numbers. Communication skills that can be developed, namely a) understand, manage, and create effective oral, written, and multimedia communication (ICT Literacy); b) use the ability to express his ideas; c) use attitude to listen and respect the opinions of others; e) use a logical, structured mindset in accordance with the rules; and f) the possibility of multi-language communication.

Creativity is a divergent way of thinking, productive thinking, creative, heuristic thinking, and lateral thinking. Creativity skills that can be developed: a) have the ability to develop, implement, and convey new ideas; b) be open and responsive; c) able to express creative ideas d) use their knowledge in new and different situations; e) use failure as a vehicle for learning; f) have the ability to create; and g) able to adapt to new situations and make a positive contribution to the environment.

Collaboration in the learning process is a form of cooperation with each other, helping each other and completing so that the specified goals are achieved optimally. Collaborative skills that can be developed, namely a) ability to work in groups; b) adapt in various roles and responsibilities, work productively with others; c) have empathy and respect for different perspectives; d) be able to compromise with others.

Associated with quality learning and provide opportunities to express themselves. Sutama, Narimo, and Haryoto [6] stated that in learning mathematics begins with questions related to the lives of students to challenging questions. Questions related to the lives of students can be
used as an effective way to begin a development of teaching materials. Challenging questions (important, difficult, and useful in the future) provide opportunities for students to guess, discuss, and debate to get the answers.

On another occasion, Sutama, Narimo, and Haryoto [7] stated that in learning mathematics, there are practical principles, namely 1) starting from what is mastered by students not from what the teacher knows; 2) delivering mathematics in a pleasant atmosphere; 3) giving opportunity for students to speak, work, write; 4) using familiar language to students; 5) associating mathematical concepts with other concepts; 6) utilizing the results of technology; 7) using media that are easy to process and interesting; 8) familiarizing students to be active in groups.

In general, this research is aimed at developing a model of mathematics learning management based on double-loop learning that is effective in increasing the learning output of SMP Sukoharjo, Central Java. The specific objectives of this study are to describe (1) the conditions of mathematics learning at the research site, (2) mathematics learning based on double-loop learning, and (3) preparation of independent and dignified learners.

2 Method

This study is a research and development with ethnographic qualitative design [8]. This study employed a qualitative research approach with ethnographic design. The research subjects included mathematics teachers, school principals, and students of 65 SMP (Junior High Schools) in Sukoharjo district, Central Java. The sixty five (65) SMP in Sukoharjo district, Central Java were for exploration and analysis of research data needs. Exploration and analysis of research data needs were obtained using observation, interview, and documentation [9]. Data collection methods in the development were complemented with focus group discussion (FGD). Flow model qualitative analysis was then used in this study as the data analysis technique [10]. Research activities in the data collection to data analysis process are illustrated in Figure 1.
3 Result and Discussion

A. Mathematics Learning Condition

Learning is basically a communication process to deliver educational messages in the form of teaching materials from learning resources to learners aiming to change the behavior [11]. The quality of learning is largely determined by the effectiveness of the communication that occurs in it, namely there is a two-way flow of information that is both responded to in accordance with the expectations of the two actors of communication. What is the trend of communication that occurs in mathematics learning at the research site?

The new education paradigm emphasizes learners as humans with the potential to learn and develop. However, the communication tendencies that occur in mathematics learning where monotune research is one-way. This is indicated by the learning of mathematics where research is influenced by the view that mathematics tools are ready to use. This view encourages teachers to be inclined to tell concepts/theorems and how to use them. This situation occurs because in the process of learning mathematics at the research site, students were less given the opportunity to express their ideas and the reasons for their answers.

The condition of mathematics learning at the research site tended to occur in the first paradigm of “the teacher explains - students listen,” not the second paradigm of “students actively construct the meaning - teacher helps.” Changing the paradigm adopted by the teacher from the first paradigm to the second paradigm is not easy. Why? Most mathematics teachers at the research site are familiar with the first paradigm.

The creativity of learning mathematics at the research site is needed to be continuously developed. The learning strategies applied in schools are too many, but not yet optimal in their implementation. Mathematics learning that is applied tends to be textbook oriented and less related to the students’ daily lives. This is getting worse because the mathematics teachers tend to derive the test items and assignments from the books they owned. Considering mathematics is a symbol language [12], the learning needs to start from what the students experienced.

Rediscovery, which is an informal way of solving in learning. The learning process with the invention is described by Purwaningsih, Sutama, and Narimo [13], where the students in group construct the formula discovery of the trapezoidal area with different pieces, the results of the trapezoidal group work are cut into: 1) two triangles, 2) two triangles and squares, then between groups discuss the discovery of the trapezoid formula and the teacher plays a role as a facilitator. In order to strengthen students’ understanding, the activity is continued by applying formulas in controlled and independent exercise.

B. Mathematics Learning based on Double-loop Learning

Mathematics learning management model based on double-loop learning offered is student-centered through three preliminary stages (conditioning, perception, motivation, and delivery of learning objective and learning process), core activities (integrating scientific approaches, strategies, methods, and learning media), and closing (reflection, conclusion, post-test, and follow-up), and with five additional provisions as follows.
1. To strengthen the scientific approach, mathematics teachers apply Problem-Based Learning (PBL), Discovery Learning (DL), and Project-Based Learning (PjBL) in accordance with the characteristics of the teaching material;

2. Space management changes every certain time period, to realize effective and productive mathematics learning in junior high school level. Media management varies, namely visual media and still and motion projections foster motivation and understanding of concepts in learning mathematics;

3. Management of teaching materials pay attention to the urgency, complexity, and depth of the material, to realize optimal learning outcomes; teaching material management varies which will create the development of students’ reflective thinking;

4. Managing multi-directional interactions, making the learning process of mathematics conducive and enjoyable, and learning objectives are achieved; and

5. Managing the authentic assessment of learning processes and outcomes based on cognitive, affective, and psychomotor aspects.

If it is agreed upon the mathematics learning task based on double-loop learning fostering character and building the character of the children, then the management of learning seeks to (1) develop all talents and abilities towards the traits of smart and skilled, honest, disciplined, know the abilities and limits of personal abilities and have a sense of self-respect and (2) place the Indonesian nation in a place of honor in the association between nations of the world. The characteristics of the character must be carried out with courage without inferiority that is not free of values, which is inseparable from the limits of the moral values of Pancasila ethics.

The implication of that description is that mathematics learning based on double-loop learning must be able to create intelligent life in politics, economics, social, and culture. Changes in reflection and action in the mathematics learning management based on double-loop learning is a driving force that brings every child to political, economic, social, and cultural life.

The mindset of the mathematics learning management based on double-loop learning with changes in reflection and action, that is the personal development of the students to be human beings. Through reflection, students are expected to be confident (not because they are obedient to tradition or regulations). Through action, students do it of their own volition (not because they are part of it or are afraid of sanctions).

Reflection is one of the keys in the learning process. Freire [14] considers that there are three types of reflection, namely 1) reflection on content; 2) reflection on the problem, and; 3) reflection on premise. The activities of teachers and students in the form of “action and reflection” are praxis that enable students to find themselves. Learning management with reflection and continued with dialogue will open opportunities for the change of one’s mindset (perspective). As a praxis effort, reflection must be done by action (deciding to behave, intend, and act concretely), so that it becomes a new experience for students which then is reflected as an effort to improve future actions.

Stimulating students from passive to active communication is not a simple matter. Fullan [15] suggested that there are four phases in the process of change, namely 1) initiation, 2) implementation, 3) sustainability, and 4) results. According to Fullan’s view, in developing students’ potential through changes in reflection and action in the mathematics learning management based on double-loop learning involving five elements, namely context, experience, reflection, action, and evaluation.
Mathematics learning based on double-loop learning, also recommends that student learning is a shared responsibility of teachers and parents. Pestalozzi [16] provided several points about the role of teachers and parents in developing the students’ potential. A teacher provides new knowledge, learning tasks in limited and directed scope, develops reasoning, places physical and intellect in a moral and spiritual experience. Parents as the first educators play a role in instilling faith through the affection given and providing concrete examples so that students can bring their faith experience into the classroom.

Teachers in double-loop learning organize students’ learning experiences so that they significantly change their appearance, and the way mathematics teachers teach students will determine the success of their students. As stated by Even and Ball: “... teachers are key to students’ opportunities to learn mathematics.” Example of a mathematics teacher facilitating students learn the power of 0 of a number other than 0.

The steps of the learning process are as follows.

T = Teacher and S = Student

T: What happens if a non-zero number is divided by itself? ... Mimin, please?
S: The result must be 1.
T: Right. What if a^m divided by a^m?
S: The result must be 1 as well.
T: A few days ago, the formula of a^m : a^n has been discussed, hasn’t it? Then, what will happen with a^m : a^n?
S: Will a^m : a^n be equal to a^{m-n} = a^0?
T: If so, how about a^0?
S: a^0 will be equal to 1.
T: Yes. In general, it can be concluded that a^0 = 1 for a ≠ 0. Try to investigate why a ≠ 0?

Examples of such learning are humanists, which emphasize the importance of preserving human existence, in the sense of helping humanity to be more humane, more cultured, as a fully developed human being. Mathematics learning should also be returned to the humanity aspects that need to be developed in students themselves [17].

The development of all power in a balanced manner can be realized if quality learning is applied. According to Sutama [18] the quality of mathematics learning can be observed and measured from three aspects, namely planning, process, and learning assessment. The planning of mathematics learning is said to be of high quality, if students are involved in planning the learning media and teaching materials. The process of learning mathematics is said to be of quality, if students are actively involved in a pleasant and highly motivated atmosphere. Assessment of mathematics learning is said to be of quality, if assessment process is done authentically both in the process and the results as well as achieving completeness of more than or equal to 85%.

To achieve the quality that has been designed, mathematics learning activities based on double-loop learning use principles, 1) students are facilitated to find out, 2) students learn from various learning sources, 3) use scientific approaches, 4) competency-based learning, 5) emphasize divergent answers that have multi-dimensional truth, 6) applicative skill-based learning, 7) improve balance, continuity, and the relationship between hard skills and soft skills,
8) prioritize the culture and empowerment of students as lifelong learners, 9) apply values by setting an example, developing students’ will and creativity, 10) learning that takes place at home, school, and in the community, 11) utilization of Information and Communication Technology (ICT) to improve efficiency and effectiveness as in the Flipped Classroom [19], 12) recognition of students’ individual differences and cultural background, 13) a pleasant and challenging learning environment, and 14) authentic assessment.

C. Preparing Independent and Dignified Students

The image of mathematics teachers in double-loop learning is expected to be able to bring changes to this country. The teacher is no longer a source of knowledge, but rather a student partner in learning. Therefore, mathematics teachers must take part in preparing the golden generation by requiring mathematics teachers to be wise and tough in double-loop learning.

It is time that globalization era is interpreted in a positive sense and faced with professional teachers who prioritized the dignity and independence of the nation. Dignity [20] [21], explains that self-esteem as a respectable nation, born from a process of blood, tears, and bones of the nation’s hero which should not be mortgaged for the sake of food. Independence [22], emphasized that Indonesia’s economic direction must be sovereign, it must become a master in its own country. Preparing students to become fully independent and dignified requires a balanced development of all forces (affective, positive, psychomotor). Independent and dignified students are the results of mathematics learning based on double-loop learning based on strong religious, honest personality, responsibility, discipline, hard work, humble, and respect for others, and have entrepreneur soul.

4 Conclusion

Mathematics learning based on double-loop learning, in the paradigm of “active learners construct - teacher as a facilitator.” The mindset is a change in reflection and action which is to develop learners’ personalities into humanities. The management model through three preliminary stages (conditioning, perception, motivation, and delivery of learning objectives and processes), core activities (integrating scientific approach, strategies, methods, and learning media according to teaching material), and closing (reflection, conclusion, post-test, and follow-up), with five conditions: (1) to strengthen the scientific approach, mathematics teachers apply Problem-Based Learning (PBL), Discovery Learning (DL), or Project-Based Learning (PjBL); (2) space management changes every certain time period, media management varies, (3) teaching material management pays attention to urgency, complexity, and depth of material, management of teaching materials varies; (4) management of multi-directional interaction; and (5) management of authentic assessment process and learning outcomes according to cognitive, affective, and psychomotor aspects.

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References


A PISA-based Student Worksheet for Better Understanding of Mathematical Concept

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Abstract. A student worksheet is one of the teaching materials to improve student understanding in the classroom. However, many teachers could not effectively arrange and utilize it so that the learning objectives stated might not be reached. This study aims to generate a PISA-based student worksheet on valid and practical content and expose the effect on the ability to understand students' mathematical concepts. Using development research of a preliminary research, development phase, and assessment, the worksheet is composed. Besides, a test is used to determine the effectiveness of worksheets and another test is also to find out the effect of worksheets that have been made on the ability to understand mathematical concepts. As a result, this study has produced a valid and practical PISA-based student worksheet. The thing that is distinctive of this worksheet is that the question contains Sharing Task and Jumping Task. The result also shows that the worksheet could improve student understanding of a mathematical concept.

Keywords: mathematical concept, PISA, student worksheet, sharing task, jumping task.

1 Introduction

Understanding concepts is one of the mathematical skills or skills that is expected to be achieved in learning mathematics that is by showing understanding mathematical concepts learned, explaining the interrelationships between concepts and apply concepts or algorithms in a flexible, accurate, efficient and precise manner solution to a problem. Mathematical understanding will be meaningful if learning mathematics is directed at developing the ability of inter mathematical connections ideas, understanding how mathematical ideas are related to one another so that a comprehensive understanding is built up, and deep mathematics is used context outside of mathematics.

The use of student worksheets is expected to be able to change the conditions of learning from what the teacher usually has to determine "what is learned" to "how to provide and enrich student learning experiences". Student learning experiences can be obtained through a series of activities to explore the environment through active interaction with friends, the environment, and other resource persons. Presentation of mathematics learning by using worksheet demands active participation from students because student worksheets is a form of teacher's effort to guide students in a structured manner, through activities that can provide an attraction to students to study mathematics. Through learning with the worksheet, the effectiveness of the
teaching and learning process can be improved. Although many forms of worksheets are found in the field, teachers do not know how good student worksheets criteria can be used to help achieve learning objectives.

2 Literature Review

In the process of learning mathematics, understanding concepts is a very important part. Understanding mathematical concepts is an important foundation for thinking in solving mathematical problems and everyday problems.

Mathematical thinking means (1) developing a mathematical view, assessing the process of mathematical and abstraction, and have the pleasure to apply it, (2) develop competence, and use it in mathematical understanding. The implication is how the teacher should design learning well, learning with characteristics that how to be able to help students build meaningful understanding [1].

Understanding of mathematical concept is a student competence to [2]:

- Explaining a concept could also be interpreted as an ability of a student to restate what they had already received to other people, for instance when they study about a circle, the definition, and the elements, they could restate them. Answering questions such as "what is a circle?" and "how a plan figure is can be considered as a circle" is tranquil.
- Applying a concept in various situations. for example, in daily life, if a student intends to give his friend a birthday gift in the form of a tin piggy bank that has been coated with a cloth, the can is available at home but the fabric must be purchased. The student must think about how many meters of fabric he should buy? How much money do you have to have to buy fabric? To think about how much fabric to buy means that the student already knows the concept of the surface area of the can to be covered and the concept of social arithmetic.
- Developing some consequences of a concept, it can be interpreted that students understand a concept as a result student can solve every problem correctly.

A student worksheet is one of the teaching materials to enhance student understanding of a certain concept. The student worksheet consists of tasks to be done by the student and usually in the form of instructions, steps to complete the task. The task is proposed in the activity sheets should represent the competencies to be achieved[3]. A student worksheet is a teaching material that students could learn independently. It should at least contain the title, basic competencies, time allocation, task requirements, sufficient information, working stapes, and expected report[4]. The essential issue is that worksheet contains stages should be accomplished by the student to obtain a concept [5].

Advantages of utilizing student worksheet in learning are 1) enhancing student activity, 2) facilitating student to develop certain concept, 3) leading student to discover and develop process skill, 4) as a guide for teacher and student in learning, 5) helping student acquire annotation and further information about the topic studied[6]. Steps to arrange student worksheets are 1) curriculum analyzing 2) stating the title, 3) composing the worksheet[7].

The development of comparative assessments on an international scale such as PISA which aims to ensure the capacity of individuals to apply mathematics to life-like problems is a reflection of the government's attention to the mathematical abilities of their citizens[8]. Program for International Student Assessment or PISA committed by OECD (Organization for Economic Cooperation and Development), is an international program to monitor the outcomes of the
education system, in terms of student achievement[9]. The main concept of PISA is literacy includes reading literacy, mathematics literacy, and science literacy. The principal objective of the PISA surveys is to notify the decision making of educational researchers and policymakers such that their decisions have a larger impact at the real classroom level[10]. PISA has been influential in creating a sense of worldwide educational accountability, leading to improved internal attention upon national accountability mechanisms[11].

![Diagram](image)

Fig. 1. Research and Development Procedure

Understanding of mathematics is essential to a young individual’s prepares for life in current society. A growing percentage of problems as well as situations encountered in daily activities, involving professional contexts, need certain level of mathematics understanding, mathematical
reasoning, and mathematical tools, before they could completely understood and addressed. Thus, mathematical literacy is critical for young people to confront issues and challenges in the personal, occupational, societal, and scientific aspects of their lives.

Mathematical PISA question has several components. Those are [12]:
1. Mathematical content that is directed for assessment items that are quantity; change and relationships; space and shape; uncertainty and data.
2. The context in which the assessment items are set, namely personal, occupational, societal, and scientific.
3. The mathematical process describing what individuals do to connect problems to certain mathematics concepts and to solve the problem as well as depicting the capabilities that underlie those processes, that is a reproduction, connection, reflection.

3 Research Method

This is design research with the type of research development or development studies. Research and development mean a process to develop a product that has already be existent [13]. This kind of research in education aims to design or develop an intervention such as program, learning resources, learning strategies, product, and also system as a solution for problems in education and to increase knowledge or develop the character of intervention in education. The model of this research consists of a preliminary research phase, development or prototyping phase, and assessment phase[14]. The model then decomposes into several steps as shown in the Fig. 1 Research and Development Procedure.

4. Result and Discussion

A preliminary study performed by interviewing students and teachers could be noticed that student worksheet used in the classroom was taken from some publishers whereas the content as well the body content arrangement might not suitable for students with their particular character of learning. Likewise, teaching material should display a complete figure of competencies that students will master in learning activities[4]. Moreover, the worksheet should contain stages should be accomplished by the student to obtain a concept[5]
The field survey also expresses the worksheet was not satisfying characteristic of a good student worksheet as stated in the literature review. Generally, it does not inform steps to accomplish tasks assigned. Question stimulation does not reflect the daily problem or situation so it might not improve mathematical thinking. Furthermore, students' understanding of the mathematical concept would not be enhanced.

4.1 PISA-based Student Worksheet Design

Literature review and curriculum analysis being held afterward to obtain the concept of the student worksheet. Concept designing is Selecting a topic, as curriculum analysis result, “bangun ruang sisi lengkung” or space geometry was being selected to develop the worksheet. It is a part of mathematical topics in junior high school grade IX.

Afterward, arranging the material, the material presented and an example of the problem of the material based on situations encountered daily. The most important part of a worksheet that is how the questions are presented starting from the exercise to the measurement. The thing that is distinctive of this worksheet is that the question contains Sharing Task and Jumping Task as described below.

1) Sharing Task

Sharing tasks contain problems that have the same difficulty level as the questions in the textbook. This task is intended to provide a foundation for students to be ready to meet more challenging tasks. Sharing tasks is more often done individually, but the broad learning space of each other lies.

Sharing Task is given a few moments after a teacher doing a review or brainstorming at the beginning of the learning process. Every student has a certain time that has been set by the teacher to collaborate with the other within their groups discussing the contents of the task. In this case, students have the opportunity to interact. Students who have below-average comprehension skills and who feel they have not understood the material will have difficulty in understanding and completing the given assignment. Meanwhile, students who have above average abilities or those intelligent students will easily complete the given task. This is where the learning process creates a state of mutual benefit for both types of students.

The advantage of such a task is that smart students will help students who have not been able to complete the task. Sometimes students will understand more easily when explained by their peers. Students whom help and students assisted, both benefits. Students who help get roles like a teacher. This will strengthen their understanding of the particular topic they discussed in the discussion. They can also recall basic materials when working on assignments to help their friends understand the assignments.

2) Jumping Task

Knowledge is spread among people and the environment, which includes objects, tools, artifacts, books, and communities where people are located. This shows that acquiring knowledge can be achieved well through interaction with others in joint activities. Knowledge is also constructed collaboratively between individuals and the situation can be adjusted by each individual. One that can be used is a collaborative learning model[15].
Jumping tasks are tasks that must be completed collaboratively (not cooperatively) with group settings. Jumping tasks contain questions or problems that force students to think more. This type of task is given with an intention that students can think more critically and challenged so that students will experience ‘leap’ of learning to drive them to think harder and to obtain something out of what is learned and usually cannot by themselves, need discussion partners. However, the questions in this assignment are still in the zone of proximal development (ZPD) students.

The zone of proximal development is the zone between the actual and potential development level. The actual development level is seen from the ability of children in completing tasks independently. Whereas, the level of potential for development is seen from the students’ ability to accomplish the task or solve problems with the help of adults. The discussion of sharing tasks at the beginning of learning becomes a strong asset for students to complete their jumping tasks independently.

4.2 Assessment of the design

The PISA-oriented worksheet development was validated by 2 material experts from lecturers and teachers and 1 media expert from instructional media lecturers. Based on the results of three validators, an average percentage of 83.7% was found to be valid which can be seen in Table 1 below.

<table>
<thead>
<tr>
<th>Examined Aspects</th>
<th>Percentage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Material Expert</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>79.8</td>
<td>valid</td>
</tr>
<tr>
<td>Construct</td>
<td>85</td>
<td>strongly valid</td>
</tr>
<tr>
<td>Language</td>
<td>82.3</td>
<td>valid</td>
</tr>
<tr>
<td><strong>Learning Media Expert</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphic Design</td>
<td>87.6</td>
<td>strongly valid</td>
</tr>
<tr>
<td>Language</td>
<td>84.5</td>
<td>strongly valid</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>83.7</td>
<td>Valid</td>
</tr>
</tbody>
</table>

The content aspect in the PISA-oriented worksheet consists of nine indicators that are categorized as valid. This is because the concept of the material in the worksheet is following the 2013 curriculum, which activates students in learning because PISA-generated questions use context in daily life so that students feel close to the problem. Furthermore, it will make you more motivated to learn. Along with increasing student motivation is expected to improve learning outcomes. This is consistent with Widjaja's research (2013) that the habit of using the PISA model questions in learning, the use of context is also considered very important. This is done so that in learning students can be motivated in learning mathematics[16].

In addition, The Cornerstone of Tech Prep (1999) states learning to use context makes students find meaningful relationships between abstract ideas and practical applications in real-world contexts[17]. UNESCO (2008) also state that the use of local contexts can help students understand mathematical phenomena from the perspective of their own life experiences. This makes mathematics much more interesting and useful for all students[18]. A research conducted by Kadir, K., & Masi, L. (2013) claims contextual questions that are more related to the daily
lives of students in their homes are very interesting to enable students in learning. Those kinds of questions will also challenge students' mathematical thinking processes[19].

The validation of media experts consisted of 2 aspects of evaluation, namely graphic design aspects and worksheet layout. In the graphic design aspect, which consists of seven statements namely regarding the appropriateness of the use of letters, the attractiveness of colors, and the accuracy of the location of the images contained in the worksheet is considered to be very valid. This is because the use of letters used in worksheets is clear and easy to read. And the use of color and color selection in student worksheets has the attraction of students' interest by having different colors on each title of the activity. With a different color in each activity can direct the focus and attention of students in every 8 learning activities so that PISA-oriented worksheet is feasible to use. As expressed by Sadiman (2012) that with the use of interesting learning media in the learning process can arouse interest in learning so that learning goals are achieved[20].

Furthermore, the innovative aspect of presenting material or layout consisting of five statements about the presentation of images, and the design of the worksheet has been considered to be very valid. This is because the appearance of the worksheet has a strong and resistant printing. At the presentation of the image has a clear image display and has a regular worksheet page design. So that it can make it easier for students to see each page of the worksheet. With the ease of use of the worksheet can also make it easier for students to understand every step of the activities contained in the worksheet. As said by Prastowo (2015) that the simplicity of the design and the attractiveness of the layout of the images on teaching materials can attract the attention of students[7].

The effectiveness analysis was carried out using a mathematical concept understanding test. Student test results are assessed according to the scoring guidelines. The maximum score for this test is 100. The learning device developed is said to be effective if more than 70% of students have a minimum understanding of concepts in the high category based on test results. Guidelines in determining the category of students' concept understanding abilities can be seen in the following Table 2 below.

The test results show that out of 34 students, only 6 have medium and low scores, as well as no student, has a poor understanding of mathematical concepts. As a result, as many as 82.3% have a high category and very high. That is, students' worksheet was arranged could be categorized as effective teaching materials.

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 &lt; N ≤ 100</td>
<td>very good</td>
</tr>
<tr>
<td>75 &lt; N ≤ 84</td>
<td>good</td>
</tr>
<tr>
<td>56 &lt; N ≤ 84</td>
<td>medium</td>
</tr>
<tr>
<td>41 &lt; N ≤ 55</td>
<td>low</td>
</tr>
<tr>
<td>0 &lt; N ≤ 40</td>
<td>poor</td>
</tr>
<tr>
<td>85 &lt; N ≤ 100</td>
<td>very good</td>
</tr>
</tbody>
</table>

4.3 Measuring Mathematical Concept Understanding

An experimental study was carried out as a measure of the ability to understand mathematical concepts using PISA-based worksheets. Two classes were taken from a junior high school in Karanganyar Regency, one as an experimental class where learning using a PISA-based
worksheet was used, while the other class was used as a control class. Before being treated, a balance test is first performed to ensure the two classes are balanced. The balance test is carried out using the Z-test which is preceded by a normality test with the Kolmogorov-Smirnov Test.

The normality test is carried out by the Kolmogorov-Smirnov test for each experimental class and the control class. The results of the normality test can be seen in the following Table 3. It noticed that all calculations were performed with the IBM SPSS Statistics 21 assistance program.

Table 3. Normality Test

<table>
<thead>
<tr>
<th>Class</th>
<th>Kolmogorov-Smirnov*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic df Sig.</td>
</tr>
<tr>
<td>Experiment</td>
<td>.145 35 .061</td>
</tr>
<tr>
<td>Control</td>
<td>.120 34 0.200*</td>
</tr>
</tbody>
</table>

It is an Obtained sig. for the experimental class and the control class respectively 0.061 and 0.200, using a significance level of 5% it can be concluded that the two data are normally distributed. In other words, the data from each class is normally distributed.

The instrument used to measure students' understanding of mathematical concepts is a test instrument. The instrument consists of 5 questions that meet the indicators of understanding mathematical concepts. The validity of the instrument was carried out to 2 experts to see the suitability of the questions with the indicators, problem construction, and language used. Both validators stated that the test instrument was valid with minor revision.

Table 4. Data Description of Students' Mathematical Concept Understanding Ability

<table>
<thead>
<tr>
<th>Class</th>
<th>Central Tendency Measure</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of student (N)</td>
<td>Mean standard deviation</td>
<td>t Sig. df Sig.(2-tailed)</td>
</tr>
<tr>
<td>Experiment</td>
<td>35</td>
<td>82.71 8.86</td>
<td>4.136 .046 4.437 68 .000</td>
</tr>
<tr>
<td>Control</td>
<td>34</td>
<td>71.47 11.78</td>
<td>4.437 63.357 .000</td>
</tr>
</tbody>
</table>

The average difference test is done by the independent t-test. The results are presented in the following Table 5.

Table 5. Independent Test

<table>
<thead>
<tr>
<th>Class</th>
<th>Central Tendency Measure</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F Sig. t df Sig.(2-tailed)</td>
<td></td>
</tr>
<tr>
<td>Experiment</td>
<td>4.136 .046 4.437 68 .000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4.437 63.357 .000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table above is the main table of the independent sample t-test analysis. It is recognized that 2-way significance value (t-tailed) are 0.000 <0.05. Thus, there is a significant difference in score points between the control and treatment groups.

The results of the study are in line with research conducted by Park et.al (2016) which states that the way students express their understanding of volume is correlated to how they are
structuring it[21]. J. C. Andamon and D. A. Tan (2018) also researched understanding mathematical concepts in secondary school, it stated that conceptual mathematics understanding is a knowledge that involves a thorough understanding of underlying and foundation concepts behind the algorithms performed in mathematics [22].

5. Conclusion

This research has produced a valid and effective PISA-based worksheet. The teaching material has been validated by 3 experts’ validator and has been tried out in one of the classes to see its effectiveness. On the results of experimental studies using the PISA-based worksheet, it can be concluded that the PISA worksheet can improve students’ understanding of mathematical concepts.

This research focuses on the development of a PISA-based student worksheet to improve students’ understanding of mathematical concepts. Therefore, the suggestion for further research is another PISA-based teaching material that can improve other mathematical skills.

Acknowledgement. Thank you to Direktorat Riset dan Pengabdian Masyarakat Direktorat Jenderal Riset dan Pengembangan Kementerian Riset, Teknologi, dan Pendidikan Tinggi and Universitas Muhammadiyah Surakarta.

References


A Review of Assessing Mathematical Proving Ability

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Abstract. Mathematical proof is a deductive argument logically composed to show the truth of a statement. The study of mathematical proofs is separated between construct a mathematical proof and comprehending a given proof. This article is aimed to discuss the notion of mathematical proving ability which is combined from two ability: construction and comprehension of proofs. The assessment of this ability is derived from assessing both construction and comprehension.

Keywords: Assessment, proofs, proving ability, mathematics, proof construction, proof comprehension

1 Introduction

There are many different ideas and suggestions provided by the literature on what a mathematical proof is. Proof itself is a common notion which people used to convince others that the statement they have made is true. At the court for instance, the attorney gives the proofs to the judge for proving that the suspect is a guilty person and deserved to be punished or contrary that the person is innocent and must be released. The proofs used can be anything including witnesses speech or documents such as photos, voice record or a videotape. Those proofs then are arranged as logic as much in order to prove and convince the judge what attorney have said is logically true. That analogy is working on mathematical proofs. Proofs in mathematics is used to investigate and show the truth of a mathematical conjecture or theorem by utilizing mathematical statements which logically and properly composed.

Even though proofs can be used in mathematics or other applications such as law or science, yet it is still have a minor difference between them in term of the truth. Katz & Starbird [1] claim that the truth outside mathematics was an evidence or a data for supporting a statement. For example in natural science, the truth of a claim is determined by empirical mean involving observation, measurement, and experiment. Meanwhile truth in mathematics is establish by proof that is an logically sound argument where each statement used must be logic unless the argument was denied [2]. Hence the truth outside mathematics discourse is determined by showing the existence of empirical evidence whereas the truth in mathematics is a logical value comprised in a mathematical argument. The differences on the truth decision distinguish mathematics and other empirical sciences as Healey and Hoyles said “Proof is the heart of mathematical thinking, and deductive reasoning, which ... exemplifies the distinction between mathematics and the empirical sciences” [3].
1.1 Defining Mathematical Proofs

Aforementioned explanation provides a description about proof in general but what is proof and mathematical proving itself? The scholars give several views on it. Stylianides [4] describes that mathematical proof is fundamental for knowing and doing mathematics because mathematical proof is important for understanding, communicating, and developing mathematics knowledge. Meanwhile Harel and Showder [5] said that proof in mathematics is “...the relatively precise argumentation given by mathematicians...” which is supporting what Selden and Selden [6] said “...proofs are... convincing, deductive arguments...” Moreover, Devlin [2] also exposed that “...proof in mathematics is a logically sound argument that establishes the truth of the statement...”. Combining the ideas of mathematical proof mentioned can be stated that proof in mathematics is an deductive argument logically composed to show the truth of a statement.

However, every argument that has been made is not necessarily said to be a proof because the argument must be validated and accepted by others. Devlin [7] stated that the argument has been made must (i) has been accepted by a number of mathematical whom the community at large feels it can trust on such matters, and (ii) has not yet been shown to be false. This implies that aspects of recognition from others are very important to ensure that the argument is logically correct. Scholars called it as social aspect of proof. For instance, Heinze [8] said that “there is a consensus that social processes particularly play an important role in the acceptance of new scientific results, theorems, and proofs”. Heinze also indicate that a tendency for mathematicians to accept a proof mainly because it was checked by themselves, produced by colleagues with high standards or published a long time ago and had not since been contradicted. Hence a proof is accepted by the mathematical community as a proof once there is social agreement that it is indeed a proof.

Other considerable aspect in an exploration of proof notion is the nature of proof. A statement or theorem is possible to be proven with a formal or informal proof. Formal proof has a formal syntax, a clear logical sequences, formulas or terms and arguments logical syntactically arranged [9]. Conversely, informal proof does not utilize certain rules such as logical sequences, logical axioms and formulas. Some mathematicians and experts argue that a textbook proof is actually formal [10] as it provides all of the information that students need to obtain a basic understanding of the proof, even though some of the logical links may not be explicitly written in the text. While informal proof is likely experienced by secondary students as using example to prove odd and even number problem [11] eventhough some undergraduate student student still using it for generalisation [12], [13]. Some philosophers even suggest this informal proof is a “real (mathematical) proof” where students produce argument by themselves [14].

Regarding the definition of mathematical proof, the researcher wants to discuss the ability of students concerned to mathematical proof and whether the ability related to proof can be assessed and how to measure it. Specifically the research questions from this literature review-based study are:

**Research Question 1:** What abilities are associated with mathematical proof?

**Research Question 2:** What aspects are covered in the mathematical proof ability?

**Research Question 3:** How do you assess this ability?
2 Method

This study uses a literature review approach with a multistep process. First, researchers conducted an online searching of peer-reviewed articles in journals or conference proceedings mainly using the google scholar search engine, ERIC and journals subscribed by the University of Szeged library. While searching, the researchers used the keywords *mathematical proof, mathematical constructing arguments, assessment of mathematical proving abilities*. In the searching process, the term "Mathematical Proving Ability" was not found explicitly, but several terms obtained from the literature were "proof comprehension" and "proof construction".

The second step is to combine the *proof comprehension* and *proof construction* terms into a single term to "mathematical proving abilities" and identify any evaluation tools that have been used to measure sub-components of "mathematical proving abilities". In the selection of academic literature, the researcher did not make a limitation for the year of publication so that any research relevant to the search was included in this study.

3 Proving Ability

Students’ ability of mathematical proof involved two aspects: ability to comprehend proof and construct proof. Those aspects altogether constitute mathematical proving ability. It is generally understood that proof construction tasks simply relate to the creation of an argument that attempts to prove a given theorem. In contrast, it is generally understood that proof comprehension relates to understanding a proof which has already been constructed.

A number of studies had been done by researchers both proof comprehension [15]–[17] and proof construction. The studies indicates that generally students experienced difficulties or made errors on both aspects. Even though most of students’ difficulties found was about proof construction [18]–[20], some researchers argued that students’ difficulties when facing proof comprehension or proof construction was quite similar [21]. To make it clear the differences between those aspects, this section therefore briefly confirms what is meant by proof comprehension and proof construction and the differences between the two.

A. Proof comprehension

Understanding proof is a basic element in proof ability. Understanding mathematical proof requires mathematical reasoning to determine the relationship between premises in an argument. Lin & Yang, [15] revealed in their research about reading comprehension in geometry that the main factors influencing a person in understanding proof are logical reasoning and relevant knowledge. In general relevant knowledge helps in digesting and understanding the statements written by the author. Relevant knowledge is very helpful in understanding the evidence as in the textbook which has eliminated several steps in order to save more space. Whereas logical reasoning here plays a role in inference, namely conclusions to whether the proof is logical or not.

Furthermore, Lin & Yang [15] and Mejia-Ramos [17] suggested four levels of proof comprehension. At the first level, termed surface, students acquire basic knowledge regarding the meaning of statements and symbols in the proof. At the second level, which Yang & Lin [16] called recognizing the elements, students identify the logical status of the statements that are used either explicitly or implicitly in the proof. At the third level, termed chaining the elements, students comprehend the way in which these different statements are connected in the
proof by identifying the logical relations between them. Finally, at the fourth level, referred to as encapsulation, students interiorize the proof as a whole by reflecting on how one may apply the proof to other contexts. These aspects then used to compose instrument to measure proof comprehension in their studies.

Having established the methods for measuring students' understanding of proofs, the researcher's focus is now turn on how to improve proof comprehension. This was reviewed by several researchers, including Hodd et al. [22] and Alcock et al. [23]. They conducted experiments to enhance proof comprehension using self-explanation training. They suggested that using self-explanation training increases students’ cognitive engagement and the frequency with which students move their attention around a proof hence improves students’ proof comprehension.

B. Proof Construction

Lee [24] define proof construction as the process of constructing mathematical assertions to determine the largest of mathematical objects for which the mathematical proposition is true or false through the search for possible examples and counterexamples. Proof construction problems are often faced by undergraduate students in subjects that are dominant in abstraction such as real analysis [25], abstract algebra [18], [26], and number theory [27], [28]. The number of difficulties were found by several researcher regarding proof construction [13], [18], [19], [29]. These difficulties are inseparable from the nature of proof constructing ability which is a very compound ability. In order to fulfill the tasks, students must have relevant knowledge, know how to generate the arguments and validate that the arguments made are logically correct to be accepted. This is supported by Boero [30], that construct a proof involves: production a conjecture includes the examination of the problem, identification the arguments which supporting the evidence and formulation of conjecture, exploration of the content of the conjecture, and identification of appropriate arguments for validation.

One important aspect in proof construction is the method of constructing the arguments. The application of appropriate method can help students in constructing a proof otherwise improper using method will instead increase the level of difficulty even causing logical errors. Some construction methods proposed by Gould & Hurst [31] and widely utilized and studied by researchers are direct proof [32], mathematical induction [33], proof by cases [12], [34], contradiction [20] and contrapositive. In addition to these construction methods, there is also a notion of proof construction strategy. Zazkis et al. [25] proposed 2 types of strategies that is believed to have a higher success rate, called the targeted strategy and the shotgun strategy. When using a targeted strategy students would develop a strong understanding of the statement they were proving, choose a plan based on this understanding, develop a graphical argument for why the statement is true, and formalize this graphical argument into a proof. When using a shotgun strategy, students would begin trying different proof plans immediately after reading the statement and would abandon a plan at the first sign of difficulty.

Students’ strategy utilization or methods selection in proof construction is influenced by students’ proof scheme. Lee [35] define a student’s proof construction scheme as a cognitive scheme underlying one’s proof construction [36], [37] and organization or interpretation of information concerning proof construction. According to Harel and Sowder [5], there are three types of proof scheme.

a. External conviction

The conviction is coming from external to students where students rely on authority, the ritual, or on symbol. Authoritarian proof scheme is approved by an establish authority like
teachers or books. While the conviction of the ritual proof scheme comes from the form of the proof such as pre-service teacher belief on two column format of geometry argument.

b. Empirical proof scheme.

Those with this proof scheme rely on evidence from examples or internal perceptions to believe a proof proves a claim. Using one or more examples to imply general truth is known as inductive proof scheme whereas perceptual proof scheme use rudimentary mental images.

c. Deductive proof scheme

With this proof scheme, a person or community believes a proof proves a claim based on logical inferences and accepted principles (axioms).

Harel and Sowder suggested that the deductive proof scheme is the ideal scheme for students to have, since it is in line with the proof scheme of mathematicians. They also suggested that students’ proof schemes can be changed and refined over time.

C. Assessment Of Mathematical Proving

The previous discussion has discussed two types of abilities relating to proof and proving. Research conducted by researchers mainly only supports one aspect of proof whether proof comprehension or proof construction. In this section we will try to explore the assessment method in both aspects of proving ability.

D. Assessment Of Proof Comprehension

Several studies have been carried out in measuring proof comprehension abilities. In the Yang & Lin [16] study they call it reading proof comprehension because understanding proof is more dominant in the reading aspect. In their research Yang & Lin [16] tried to compile instruments that could be used to measure the ability of reading proof comprehension for secondary school level students. They conceptualized the notion of proof comprehension from several previous studies including Duval [38], [39], Healy and Hoyles [40], Lakatos [41] and Selden & Selden [42], [43]. Yang & Lin [16] formulate five facets in reading proof comprehension. Those are of basic knowledge, logical status, integration or summation, generality and application or extension.

Basic knowledge status measures students’ understanding of mathematical terms, images and symbols. The facet of logical status is to measure the recognition of the status of an argument, which may be premises, conclusions or applied properties of proof. Summarisation measured understanding of the given, the claims or the critical idea in a proof. The facet of generality measures the recognition of accuracy of proposition or proof and what a proof tries to prove. The facet of application is measuring the ability of knowing how to apply a proposition in the other situation. They then described the facets into 16 item numbers in the form of open question. In more detail, the Yang & Ling [16] model is depicted in the Table 1.

Table 1. Facet of reading comprehension by Yang & Ling [16]

<table>
<thead>
<tr>
<th>Facet</th>
<th>Object of comprehension</th>
<th>Operational definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>Content of premise or conclusion</td>
<td>Recognizing the meaning of a symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recognizing and explaining the meaning of a property</td>
</tr>
<tr>
<td>Logical status</td>
<td>Status of premise</td>
<td>Recognizing a condition applied directly</td>
</tr>
<tr>
<td></td>
<td>Logical relation between premise and conclusion</td>
<td>Judging the logical order of statements</td>
</tr>
</tbody>
</table>
Nevertheless, the results of the analysis, according to Yang and Lin, suggested the five facets could be split into three different groups. Group one was basic knowledge, group two was logical status and summarisation and group three was generality and application. Yang and Lin conjectured that as a student acquires the skills in each group, they develop their reading comprehension of geometry proof and move through four hypothetical levels of comprehension: surface level, recognising elements, chaining elements and encapsulation. They stated that student who understand most of the terms and sentences (basic knowledge) under the context of reading a proposition and its proof is beyond the surface level and toward the second level; another who identifies most statements as premises, conclusions or applied properties (logical status) and catching the hardcore of this proof or the critical proof idea (summarization) is beyond the recognizing elements level and toward the third level; and one who identifies what is validated by the proof (generality) and knows how to apply the proposition or proof (application) is beyond the chaining elements level and toward the encapsulation level. The Figure 1 shows clearly model constructed by Yang & Lin [16].

This model then replicated and modified by Mejia-Ramos et al. [17] for undergraduate proof comprehension because they argued that Yang & Lin’s model was too simplistic for modelling undergraduate proof. Furthermore, according to Mejia-Ramos et al., Yang and Lin’s model did not include whether a student understands a proof in terms of higher-level ideas which mean the methods involved in the proof or how the proof relates to specific examples.

Mejia-Ramos et al developed multiple choice questions of seven different aspects of proof. The first three types of assessment address students’ comprehension of only one, or a small number, of statements within the proof. They consist of the meaning of term and statement, logical status of statement and proof framework, justification and claims. The remaining four types which is called holistic address student’s understanding as a whole. They are summarizing via high-level ideas, Identifying the modular structure, Transferring the general ideas or methods to another context and Illustrating with examples. The Table 2 resume the aspect of proof comprehension from Mejia-Ramos et al. [17].

Table 2. Facet of proof comprehension by Mejia-Ramos et al. [17]

<table>
<thead>
<tr>
<th>Facet</th>
<th>Measure Student’s understanding of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean of terms</td>
<td>key terms and statements in the proof</td>
</tr>
<tr>
<td>Logical Status and Proof</td>
<td>-logical status of statements</td>
</tr>
<tr>
<td>framework</td>
<td>-logical relationship between statements and</td>
</tr>
<tr>
<td>Justification and claims</td>
<td>-statement being proven</td>
</tr>
<tr>
<td></td>
<td>how each assertion in the proof follows from</td>
</tr>
<tr>
<td></td>
<td>previous statements in the proof and other proven</td>
</tr>
</tbody>
</table>
Summarizing high-level ideas: students’ grasp of the main idea of the proof and its overarching approach.

Identify the modular structure: the proof in terms of its main components/modules and the logical relationship between them.

Transferring to another context: adapt the ideas and procedures of the proof to solve other proving tasks.

Illustrating example: The proof in terms of its relationship to specific examples.

E. Assessment Of Proof Construction

Assessing the results of proof construction is a rather complicated thing. As well as assessing someone’s essay results in the IELTS writing exam, the assessment criteria very much involve whether the writing answers the question or not, cohesion and coherence in the writing. An assessment on proof construction can be analogous to that case. The most important thing is whether the argument students composed is answering the question and whether the statement is correctly used.

Research on proof writing has been carried out by many mathematical researchers and mathematics educators. The results found are also diverse as the fact that there are still many mistakes made by students when writing a proof. These errors are various, one of them is the result of the Stavrou [19] study which makes classification of errors that are most likely done by students, namely: assuming the conclusion in order to prove the conclusion, proving general statements using specific examples, not proving both conditions in a biconditional statement and misusing definitions. Here Stavrou gets data from students’ homework which he graded then he analyzes every error that occurs and categorizes it. What is not mentioned here is how he assesses the homework of the student.

Besides Stavrou, many other researchers such as Antonini and Mariotti [44], Moore [45], Selden & Selden [42], and Weber [18] which also examined student difficulties and errors at proof construction. They pay little attention to how the proof is assessed and only respond to errors that occur. It is Moore [46] who tries to adduce the idea of the assessment of the written proof. He asked for help from 4 professors to discuss on how a good proof should be written. In general, a good proof criteria according to the professors in Moore's research are logic and clarity. Logic according to him is the most important aspect of proof because it relates to the validity of proof. Logic is referred to as the overall logical structure, or proof framework [42], the line-by-line reasoning, and the correctness of algebraic manipulations and calculations. Here proof must begin and end correctly, where the steps used are correct and logically flow from beginning to end.

The second important part of written proof assessment is clarity. Here clarity can be interpreted in various ways, namely first by mentioning explicitly the reasoning and justification of each step used, the second is proof organization so that readers can read and follow, and thirdly use language and mathematical notation correctly. Another important aspect is the issue of fluency. The purpose of fluency here is the use of language and correct mathematical notation such as grammar and punctuation. However, errors in this section are not significantly considered in proof because they have a little weight in the assessment. The last aspect is the understanding which means that students should understand what they write and a good proof shows that they understand the proof.
F. Proof Validation

One of the most important criteria in assessing a mathematical proof is the truth of the argument used so that the purported proof can be said to be valid. This evaluation of validity can differ between assessors from one another so that the evaluator's subjectivity cannot be avoided. Even so, Inglis et al. [47] stated in his article that most researchers from the mathematical community consider that the validity of proof is not a subjective matter. They mention "many in the mathematical community believe that the validity of a proof is not an issue of subjective but an objective fact ..." (p. 271). So that researchers with this kind of understanding of course must be able to show the consistency of their assessment of a proof.

Contrary to this assumption, Auslander [48] states that in evaluating the validity of proof it is subjective. He stated, "standards of proof vary over time and even among mathematicians at a given time" (p. 62). This can be seen from the assessment of several professors in Moore's (2016) study who gave different values for a particular argument. These two things make differences of view between mathematical scientists addressing the validity of proof.

Against this mathematician's view of proof, Weber [49] conducted an investigation and here he found that mathematicians disagreed about the validity of purported proofs. The same thing was also investigated by Inglis and Alcock [50] who concluded that disagreements among mathematicians were solely mathematical issue rather than problems of writing or presentation styles. Related to this, Inglis et al.[47] found other evidence that there was no agreement between the researchers about what was meant by valid proof in his study involving 109 participants. He added that many mathematicians who considered a proof were valid but some other mathematicians considered as invalid. Finally, it can be concluded that the standard in determining whether a proof is valid among mathematicians is different and it is possible for students to get an inconsistent understanding of a valid proof.

Beyond the differences of view on the conclusion of a proof validity, Weber [49] tried to explain how mathematician determines whether or not a proof is valid. Seven of the eight participants involved in the study made the proof validation in two phases. Weber explained that participants would first determine the structure of the argument, the proof technique being employed, that is primarily by being used in the argument. If the participants found the structure of the proof to be acceptable, he or she would then check argument each line.
4 Conclusion

Study of mathematical proving ability is indirectly separated into two domains: proof construction and proof comprehension. The study of mathematical proof is dominated by study of proof construction. Later research about proof construction shows that students’ performance to construct the proof still under expectation. Many of studies implies that students often make errors or misconception in making arguments on their proof. This skill is inseparable with their ability to comprehend the proof where student ability to construct is influenced by the proof they have read from textbook or teacher explanation. However, the study of comprehending the proof is always separated with proof construction. That is why the authors want to investigate the ability of proving by combining the ability of comprehending and constructing the proof. The assessment of proving ability is adapted from the criteria of proof comprehension [72] and [50]. While assessing proof construction the rubric will be developed as the inexistence of aspects of proof construction.

5 Acknowledgment

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The Existence of The Definite Integral: Students’ Understanding

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Abstract. The definite integral is a part of a compulsory subject, Integral Calculus, for mathematics education students. As pre-service mathematics teachers, students’ understanding of the definite integral concepts is crucial to note. This article presents the result of the investigation students’ understanding of the definition of the definite integral and its existence. The study reported in this paper was done through qualitative research. A questionnaire about the definition of the definite integral and the existence of the definite integral of a defined function on a closed interval was given to 163 students who took Integral Calculus course. Then, 4 of them were selected to interview in depth. The students’ responses indicated the diversity of the conceptual understanding of the existence of the definite integral. Various students’ understanding of the definition of the definite integral that leads to students’ understanding of the existence of the definite integral is presented as well.

Keywords: calculus, conceptual understanding, the definite integral, students’ understanding

1 Introduction

When students meet calculus, students learn some basics of mathematics, such as function, limit, and integral [1]. This is a mandatory course to study in Science, Technology, Engineering, or Mathematics (STEM) [1][2][3]. Therefore, calculus is considered as a crucial course to master [2][4]. In fact, calculus is one of a difficult part in mathematics, no exception to the integral. The conceptual understanding of integral is considered as one of the causes why students have to struggle to pass this course [4].

Calculus is not a completely new course for undergraduate students, because they dealt with it in their secondary school [5][6][7]. This is still the compulsory subject for students who study in the mathematics education department. After students face with limits of function and derivative, students learn integral calculus. Students presume that calculating integral is the greatest goal in learning integral [2] so that they neglect the formal definition. They focus on how to calculate like the teacher’s examples, do their task, and miss the meaning of the problems that they solved [8]. Whereas the definite integral is considered as an essential concept to solve the problem in Calculus [9].

In secondary school, curricula focus on evaluating the definite and indefinite integral, and using integral in some applications, such as in finding area. Teachers in secondary schools do not stress the definition of integral. Students neglect the conceptual understanding and focus on the
procedural concept [10]. Like in limits and continuity which students have their concept image [11], students also have some concepts on integral that differ from the formal definition. It is hard for students to learn the abstract concept when they face it in the first undergraduate year [12]. The formal definition of the definite integral is systematically learnt in this undergraduate year [13].

At the beginning of the definite integral course, the class was started by watching a video about Riemann Sum and how to lead it to the definition of the definite integral. In their book, Varberg, Purcell, and Rigdon [14] state if \( f \) be a function that is defined on closed interval \([a, b]\) then the definite integral of \( f \) from \( a \) to \( b \), is given by:

\[
\int_a^b f(x) \, dx = \lim_{|P| \to 0} \sum_{i=1}^{n} f(\bar{x}_i) \Delta x_i
\]

where \( P \) is a partition of the interval \([a, b]\) into \( n \) subintervals and \( \bar{x}_i \) is an arbitrary point in each subinterval \([x_{i-1}, x_i]\).

Though there are some point of view to define the definite integral, such as: a computation, an area, a summation, a total change from \( x = a \) to \( x = b \), a function, or an abstract object, the central point is the limit of summing process [15]. Range [16] state that integral is the limit of approximating sum. The problem related to finding area leads to the concept of the definite integral [14][16]. Before students learn the definite integral, students have studied about the indefinite integral. In Calculus, Fundamental Calculus Theorem becomes the bridge of the indefinite integral and definite integral. Based on Varberg, Purcell, and Rigdon [14], the theorem says that if \( f \) be a continuous function on \([a, b]\) and \( F \) be an antiderivative of \( f \) on \([a, b]\), then

\[
\int_a^b f(x) \, dx = F(b) - F(a)
\]

This theorem usually used to solve problems related to the definite integral. Not surprising that students consider that The Fundamental Theorem of Calculus as a definition of the definite integral. In the first meeting on the definite integral class, this understanding arisen on students’ understanding of the definition of integral.

The latter theorem is what students’ usually answer when they face with a question about the definite integral. On the first meeting in studying the definite integral, though the concept of limit of approximating sum is essential for the definite integral [16], there were no students who mentioned the concept of limit. Based on the questions that usually given to provoke students’ understanding, students’ answer indicated the lack of students’ understanding of the definition of the definite integral. Besides, students seemed to neglect the guarantee of the existence of the definite integral before they calculate it. However many papers propose students’ understanding of the definition of definite integral or the difficulties, fewer papers explain students’ understanding of the existence of the definite integral. This paper presents students’ understanding of the definite of integral and its existence.
2 Methods

2.1 Participants

The presented paper is based on the results of 163 students’ work in answering a questionnaire of the definite integral. They were pre-service mathematics students who took Integral Calculus course. The questionnaire was given at the end of the semester so that students have learnt the definite integral and its characteristics. Based on the results of questionnaire, purposive sampling approach was done to choose subjects of this research.

2.2 Questionnaire

The questionnaire was designed to gain students’ perception of the definition of definite integral and its existence. The questionnaire consists of three questions. The first is about the definition of \( \int_{a}^{b} f(x) \, dx \), the second asks students to explain about the existence of the definite integral function \( f \) from \( a \) to \( b \). The last is a question about the existence of \( \int_{a}^{b} f(x) \, dx \), where \( f \) is a discontinuous function in a point of \((a, b)\). The questionnaire is presented in Fig. 1.

1. Jelaskan definisi dari \( \int_{a}^{b} f(x) \, dx \) ?
2. Misalkan \( f \) fungsi yang terdefinisi pada \([a, b]\). Apakah kita selalu dapat menemukan nilai dari \( \int_{a}^{b} f(x) \, dx \) ? Jelaskan.
3. Perhatikan gambar berikut ini.

\[
\begin{align*}
\int_{a}^{b} f(x) \, dx & \quad \text{dan} \\
\int_{a}^{b} f(x) \, dx & \quad \text{Jelaskan.}
\end{align*}
\]

Fig. 1. The questionnaire

The first question was proposed to capture students’ understanding of the definition of the definite integral. This question also used by [5]. Question 2 was designed to find out students’ perception of the existence of the definite integral \( f: [a, b] \rightarrow \mathbb{R} \), where \( \mathbb{R} \) is a real number system. This question also enriches data about students’ understanding of the definite integral. The last question was proposed to check students’ understanding on the existence of definite integral function \( f \) from \( a \) to \( b \). Question 3 was considered to confirm students’ perception about the definition of definite integral for a discontinuous function on a point in \([a, b]\) and its characteristics. Before this questionnaire was used to gain data, this was validated by two mathematics education lecturers who have a background in lecturing Calculus.

2.3 Triangulation

The method triangulation was done to gain valid data. Based on these results of the questionnaire, four students were selected to get more rich data about students’ understanding on definition of definite integral and the existence of definite integral. These four students have
different type in response to the questionnaire. For instance, these four students are called Alpha, Beta, Gamma, and Delta, then the symbol of I means the interviewer. They were interviewed in depth to confirm their answers and to delve further information.

3 Findings and Discussion

First, this paper proposes the brief students’ understanding on the definition of \( \int_a^b f(x) \, dx \) and the existence of definite integral based on 163 student’s responses. Further, some analysis were done to capture students’ understanding in detail and to find out some facts or misconceptions.

3.1 The definition of \( \int_a^b f(x) \, dx \)

As many as 163 students’ answers were analyzed to capture students’ understanding of the definition of \( \int_a^b f(x) \, dx \). The result are summarized in Table 1 as follows.

<table>
<thead>
<tr>
<th>Students’ responses about the definition of the definite integral</th>
<th>The number of students’ responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit of Riemann sum</td>
<td>2</td>
</tr>
<tr>
<td>Tried to state limit of Riemann sum but failed</td>
<td>3</td>
</tr>
<tr>
<td>The Fundamental Theorem of Calculus</td>
<td>39</td>
</tr>
<tr>
<td>Incorrect The Fundamental Theorem of Calculus</td>
<td>14</td>
</tr>
<tr>
<td>Only read the symbol of ( \int_a^b f(x) , dx )</td>
<td>58</td>
</tr>
<tr>
<td>The sum of polygons bounded by ( f, x = a ) and ( x = b )</td>
<td>14</td>
</tr>
<tr>
<td>The sum of the area under the function</td>
<td>7</td>
</tr>
<tr>
<td>Wrote response with keyword “increase function”</td>
<td>2</td>
</tr>
<tr>
<td>Anti-derivative of ( f )</td>
<td>4</td>
</tr>
<tr>
<td>The deviant responses</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
</tr>
</tbody>
</table>

According to Table 1, many students have conceptual understanding that deviates with the formal definition. Only 9.82% students answered correct way by stated about the limit of Riemann sum and the sum of polygons bounded by \( f, x = a \) and \( x = b \). As stated by Range [16], the limit is essential to the definition of definite integral. The lack of this limit concept leads to students’ misconception on the definite of integral [10].

There are 53 students who have concept image the definite integral is associated with The Fundamental Theorem of Calculus. According to Radmehr and Drake [17], most of thr students considered that \( \int_a^b f \, dx = F(b) - F(a) \) used to calculate the area under the function of \( f \) from
α to β. In this study, 14 of 163 students stated that the theorem incorrect, for example, Alpha. Alpha wrote the definition of \( \int_{a}^{b} f(x) \, dx \) as follows.

![Fig. 2. Alpha’s answer in defined the definite integral](image)

Part 1 on the Fig. 2. is what Alpha wrote on his questionnaire. Alpha’s first opinion about \( \int_{a}^{b} f(x) \, dx \) is \( f(B) - f(a) \). This form is nearly close to Fundamental Theorem of Calculus. However, it has to underline that Alpha wrote function \( f \), not the antiderivative of \( f \). An interview was done to confirm Alpha’s answer. An excerpt of it is stated as follows.

I: We agree that this (showed \( \int_{a}^{b} f(x) \, dx \)) is the symbol of the definite integral of \( f \) from \( a \) to \( b \). Then, what is the definition of the definite integral of \( f \) from \( a \) to \( b \) or we symbolized as \( \int_{a}^{b} f(x) \, dx \)

Alpha: At first, I remembered this was \( f(b) - f(a) \) but I read again, we had to do integration at first. So this is not what I mean.

I: So what is the definition of the definite integral of \( f \) from \( a \) to \( b \)?

Alpha: This (showed \( f(b) - f(a) \)) have not done by integration. First, we have to do integration on \( f \) then we tested the points

I: So what is the definition?

Alpha: (wrote Part 2 on Fig.2)

I: What is \( F \)?

Alpha: \( F \) is the function of \( f(x) \) after we did integration

I: Is it the definition? (showed Part 2 on Fig.2)

Alpha: Yes

Students usually ignore the difference between two distinct objects. For example in writing \( f \) and \( F \), \( x \) and \( X \), \( a \in A \) and \( a \subseteq A \). This seems paltry, but in mathematics, this is fateful because they have a different meaning. However, from the conversation, it is clear that Alpha’s understanding of the definition of \( \int_{a}^{b} f(x) \, dx \) tend to Fundamental Theorem of Calculus. However Alpha never said that \( F \) is an anti-derivative of \( f \), term “the function of \( f(x) \) after we did integration” directs to anti-derivative of \( f \). This is Alpha’s concept image about the definition of the definite integral. This concept appears through students’ experiences [11]. The hypotheses is Alpha’s concept image grew because Alpha usually the problems of definite integration that Alpha faced is calculation, such as evaluating the value of definite integral or some applications of integral.

The interesting response also appears from Beta’s answer. Beta gave an opinion that the definition of the definite integral is similar to Fundamental Theorem of Calculus. It is clear from the Fig.3. that Beta wrote “function \( F(x) \) increases its degree then substitutes the bound”.

Betha stated the Fundamental Theorem of Calculus well by writing $\int_a^b f(x) \, dx = F(b) - F(a)$, but Betha did not mention any hypotheses of the theorem. This theorem works on continuous function [14]. Besides, Betha also wrote the degree of $f$ increase. The piece of the interview about this part can be seen as follows.

$I$ : We agree that this (showed $\int_a^b f(x) \, dx$) is the symbol of the definite integral of $f$ from $a$ to $b$. Then, what is the definition of the definite integral of $f$ from $a$ to $b$ or we symbolized as $\int_a^b f(x) \, dx$

Betha : In my opinion... (silent for a moment) function of $f(x)$ is... Oh, it’s hard to explain. The point is that $f(x)$ is anti-derivative

$I$ : $f$ or $F$

Betha : This (referred to $F$)

$I$ : Okay

Betha : $F$ is anti-derivative, we increased the degree, and then we substituted defined bound as the substitution of variable.

From Betha’s response on the last part, it is obvious that Betha’s understanding about the definite integral is the Fundamental Theorem of Calculus and Beta associated $F$ anti-derivative with the term “increase the degree of function”. Though Beta seemed hard to say in Beta own word, Beta looked to use The Fundamental theorem of Calculus. In line with Denbel, students feel difficult to say their conceptual understanding of their word [18].

The similar response was given by Gamma. From Fig. 4, Gamma declared that the integral of function is “increase the function”.

$I$ : We agree that this (showed $\int_a^b f(x) \, dx$) is the symbol of the definite integral of $f$ from $a$ to $b$. Then, what is the definition of the definite integral of $f$ from $a$ to $b$ or we symbolized as $\int_a^b f(x) \, dx$

Gamma: The definite integral is like the general integral, but it is like space, there is upper bound and lower bound.

$I$ : It is like the general integral. What do you mean by the general integral? 
Gamma: The general integral is like a general function but if it is integral, it is increased.
I: What is increased?

Gamma: Anti-derivative

I: What do you mean by “increase”? The first function and the last form after it is increased.

Gamma: For example, 3x then it became \( \frac{1}{2} \cdot 3x^2 \)

I: What does go up?

Gamma: \( x \) is increased. For example, we have \( \sin x \), how to increase it?

Gamma: The increase of \( \sin x \) and if there is a coefficient of \( x \) then it be one over the coefficient.

I: And then you wrote “substitute the bound of \( x \)”. What do you mean?

Gamma: After it is integrated, then we substitute the upper bound and lower bound to \( x \).

As stated in the excerpt, Gamma gave an example of the increased function by saying \( 3x \) then it became \( \frac{1}{2} \cdot 3x^2 \). Moreover, when Gamma was asked about another case of function, \( \sin x \), Gamma told the increase of \( \sin x \) and said that “if there is a coefficient of \( x \) then it be one over the coefficient”. What Gamma mentioned is like the theorem related integral of algebraic functions, or it is called Theorem of Power Rule [14], that is:

\[
\int ax^n \, dx = \frac{a}{n+1} x^{n+1}
\]

where \( n \) is any rational number and \( n \neq -1 \). Gamma looks difficult to state the concept image in Gamma own words [18]. According to Gamma, the integral of function is the increase of function that related to the Theorem of Power Rule. Gamma’s concept image thought to appear because Theorem of Power Rule is oftentimes used in solving the integral problems. This theorem is a great tool to solve the definite integral [14]. Gamma’s experience leads to this concept image about the definite integral [11].

Other interesting responses also seem written by many students. Even though students were emphasized to write their understanding of the definition of definite integral, the majority of students left their questionnaire by only read the symbol \( \int_a^b f(x) \, dx \) without any explanations. One of them is Delta. Fig. 5. depicts Delta’s response when he was asked about the definition of \( \int_a^b f(x) \, dx \).

An interview was done to verify Delta’s response. The following excerpt is Delta’s confirmation about the definition of the definite integral.

I: We agree that this (showed \( \int_a^b f(x) \, dx \)) is the symbol of the definite integral of \( f \) from \( a \) to \( b \). Then, what is the definition of the definite integral of \( f \) from \( a \) to \( b \) or we symbolized as \( \int_a^b f(x) \, dx \).
Delta: This is integral of $f$ from $a$ to $b$

I: Is that the definition?

Delta: Yes

I: What do you think about integral? Integral of $f$ from $a$ to $b$.

Delta: What is it? It is like the opponent of the derivative.

The first, Delta stated the definition of the definite integral was similar to Delta’s written response by reading the symbol of the definite integral. However, when Delta was asked what is integral, Delta stated that integral is like the opponent of the derivative. Varberg, Purcell, and Rigdon [14] state that indefinite integral is anti-derivative, and the definite integral is the limit of Riemann sum. Though, there is The Fundamental Theorem of Calculus that evaluate the definite integral by using indefinite integral, these two kinds of integrals are a different concept.

### 3.2 The existence of definite integral

Question 2 and Question 3 delved students’ understanding of the existence of the definite integral. Table 2 shows students’ response about the existence of the definite integral of a defined function on $[a, b]$.

**Table 2. Students’ responses about the existence of definite integral of the defined function on $a, b$**

<table>
<thead>
<tr>
<th>Students’ reasons about the existence of the definite integral</th>
<th>The number of students’ responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>The definite integral exists</td>
<td></td>
</tr>
<tr>
<td>The Fundamental Theorem of Calculus</td>
<td>24</td>
</tr>
<tr>
<td>The function has bounds on $[a, b]$</td>
<td>37</td>
</tr>
<tr>
<td>The function is defined on $[a, b]$</td>
<td>26</td>
</tr>
<tr>
<td>Without reason or other deviant reasons</td>
<td>55</td>
</tr>
<tr>
<td>The definite integral does not necessarily exist</td>
<td></td>
</tr>
<tr>
<td>Depending on the function</td>
<td>6</td>
</tr>
<tr>
<td>The sum of polygons can be infinity</td>
<td>1</td>
</tr>
<tr>
<td>The integral concept is “almost close to” so there is no guarantee the existence</td>
<td>1</td>
</tr>
<tr>
<td>It can be a discontinuous function</td>
<td>2</td>
</tr>
<tr>
<td>Without reason or other deviant reasons</td>
<td>5</td>
</tr>
<tr>
<td>Blank</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
</tr>
</tbody>
</table>

At a glance, the majority of students consider that the definite integral of the defined function on $[a, b]$ always exists. The argumentations come from some perspectives. A 33.74% of students argued that the definite integral exists but they left without reason, wrote less logical reasons or even deviant reasons, such as because integral has characteristics or the value of function increases. Further, Beta’s responses can be delved to gain more information about this case.
From Fig. 6, Beta stated that the value could be known by solving the question to the simplest form. This statement is supported by the following excerpt.

I: (Gave an introduction of Question 2) *Then, does this definite integral always exist?*
Beta: Yes
I: *Why?*
Beta: Because…... (took a long time)
I: *In your work, you wrote “finishing until the simplest form”, what does it mean?*
Beta: From the question, function of $f(x)$, then it is solved the its integration until... the degree increased.
I: *Do you mean that integral is the degree increased?*
Beta: Yes, So.... (took a long time to respond)
I: *Do you think that all functions always be found the simple value or be increased their degree?*
Beta: Yes
I: *Is that so?*
Beta: Of course

According to Beta, all function could be integrated by increasing the degree and this value always exists. The same response was given by Gamma.

In the last sentence of the excerpt above, Gamma called integral of function as the increase of function. This Gamma’s conceptual understanding appears because the indefinite integral is considered as derivative (in Bahasa, it is called “turunan”, that means the decrease).
It is interesting to note from Table 2 that 14.72% of students stated that the definite integral of function $f$ on $[a, b]$ exists because of The Fundamental Theorem of Calculus. This theorem offers the connection between the area enclosed by continuous functions and their antiderivatives [19]. Most of the students, in this case, stated the theorem without any argumentation about continuous function.

At a glance, from Fig. 8, it seems interesting why Alpha changed $f(b)$ into $a$ then Alpha wrote " $f(a)$ is not $b$". Based on clarification, Alpha thought that $[a, b]$ means the value of $f$ in $a$ is $b$ or $f(a) = b$. This statement contradicts with what Alpha wrote. It seems that Alpha misunderstood about the symbol of a closed interval $[a, b]$ as a point $(a, b)$, so that Alpha said that $f(a) = b$. After it is clear, Alpha tried to answer the existence of definite integral as follows.

$I$ : It is the defined function on closed interval $[a, b]$. Does the definite integral from $a$ to $b$ always exist?

Alpha : From $a$ to $b$, the value of $f$ always exists. This means if we find the value of integral, it always exists.

$I$ : Does that guarantee the existence?

Alpha : Yes

According to Alpha, $\int_a^b f(x) \, dx$ exists because function $f$ is defined on $[a, b]$. This reason only restated the hypotheses of Question 2. The similar answer was given by Delta as in the following picture.

$I$ : Do you think that the definite integral of $f$ from $a$ to $b$ always exist?

Delta : Yes. When the bounds and the function exist.

$I$ : If the function is defined on $[a, b]$, do the definite integral always exist?

Delta : Of course, when the function is defined.

$I$ : Why?

Delta : When we calculate integral, the bound and function must be exist.

As stated by Delta, the existence of function and bounds (this means the function defined on $[a, b]$) guarantee the existence of its definite integral. According to Varberg, Purcell, and Rigdon [14], not every defined function on $[a, b]$ is integrable on $[a, b]$. For example, the unbounded function $[a, b]$. However, there are 22.70% students wrote about the possibility of the unbounded function, students considered this possibility lead to the absence of the definite integral on $[a, b]$. 
3.3 The existence of the definite integral of a jump discontinuous function on \([a, b]\)

Question 3 was given to delve students’ understanding of the existence of the definite integral of a piecewise function as mentioned in Fig. 1. In response to this question, Beta stated that the definite exists. Beta guaranteed the answer by writing a formula given in Fig. 10 as follows.

At a glance, what Beta wrote is like Interval Additive Property. However, Beta stated a formula about \(\int_{a}^{c} f(x) \, dx\), not \(\int_{a}^{b} f(x) \, dx\).

**Fig. 10.** Beta’s answer in Question 3

I: We have a function with its graph is like this [showed the graph in Question 3]. You wrote that the definite integral exists, why? What formula did you write? (showed Beta’s answer).

Beta: The bounds in this [showed Beta’s answer]. From \(a\) to \(b\), suppose that this point is zero [showed the discontinuous point].

I: Where is zero?

Beta: Eh... (took a long time to respond)

I: In your answer, why did you wrote \(c\)? What is \(c\)?

Beta: Oh, the question is from \(a\) to \(b\). Why did I write \(c\)?

I: Okay. The question is the definite integral from \(a\) to \(b\). What do you think about it?

Beta: This can be divided into \(a\) to “this” and from “this” to \(b\). (Beta referred the term “this” to the discontinuous point). It can be simplified.

I: Do you think that the value always exist?

Beta: Of course, it exists

An excerpt of an in-depth interview shows that Beta tried to divide the closed interval \([a, b]\) into two sub-intervals, namely \([a, c]\) and \([c, b]\), where \(c\) is a discontinuous point. Then Beta calculated the definite integral by “simplifying” the function. Though the conceptual understanding of solving definite integral is incorrect, what Beta want to say is Interval Additive Property.

Meanwhile, in response to Question 3 and in an excerpt of the interview, Alpha mentioned that the definite integral does not exist because of the disconnected graph.

**Fig. 11.** Alpha’s response to Question 3

I: Now, you can see Question 3. Does the definite integral exist?

Alpha: In my opinion, if it is from \(a\) to \(b\), the definite integral does not exists because the graph is disconnected. However, the definite integral exists if it is from \(a\) to the disconnected point, then from \(b\) to the disconnected point.
I: If the question is like this (referred to \( \int_{a}^{b} f(x) \, dx \)), does the definite integral exist?

Alpha: No, it does not.

The same response also given by Delta. Fig. 12 depicts Delta’s answer in Question 3.

Fig. 12. Delta’s answer on Question 3

Delta wrote that the definite integral does not exist because it is a different function. Through an interview, Delta explained that the curve in Question 3 consists of two functions so that the definite integral failed to calculate. The excerpt interview related to this condition is given as follows.

I: If you have function like this (showed graph on Question 3). Does the definite integral exist?

Delta: No, it doesn’t
I: Why?
Delta: Because the function is disconnected. This consists of two functions (showed the graph on Question 3), but the question is only one function (showed Delta’s answer). The curve is disconnected.

I: Does this consist of two functions? (showed the graph on Question 3),
Delta: Yes.
I: Hence, according to you, this is two functions so that the integral does not exist. What if this is one function? For example, I have a graph like this (drew a discontinuous graph without jump discontinuity)

Delta: The definite integral exists. Suppose this is c (showed the discontinuity point).
I: Okay. This is c, this is hollow.
Delta: This is a disconnected graph, isn’t this?
I: Yes. Can we calculate the integral?
Delta: If this is a disconnected graph, we can’t calculate the integral.

Delta could explain that if the curve does not have a jump discontinuity point, then the definite integral exists. However, when Delta faced with a graph with a jump discontinuity point, Delta stated that it is two functions. Hence the definite integral does not exist. Almost the same argumentation was produced by Gamma. However, Gamma concluded that the definite integral of the graph in Question 3 exists.

I: If you have a function like this (showed the graph on Question 3). Does the definite integral exist?

Gamma: Yes.
I: Why?
Gamma: There are two spaces. From this (referred to a) to this (referred to the discontinuous point), and from this (referred to the discontinuous point), until this (referred to b). Then the first space can be summed with the second space.
I: How to find this? Your first space.
Gamma: Find this bound (referred to the discontinuous point)
I: Okay. We can suppose the bound as...
Gamma : 2a
I : Okay, 2a.
Gamma : Then, this integral from a to 2a and...
I : Must it be 2a?
Gamma : No, it depends on the function. After we integrate the function, we substitute the upper bound and lower bound
I : How about our second space?
Gamma : It is same with the first space, from this to b
I : So, can you calculate the integral of f from a to b?
Gamma : Yes.

Though Alpha, Delta, and Gamma have a similar idea to solve the definite integral in Question 3, by dividing into two part in its jump discontinuous point, they have a different conclusion about the existence of the definite integral. In line with Attorps et al [13], students meet difficulties in distinguishing the condition when they should use The Fundamental Theorem of Calculus.

The last, it is worth noting that based on Table 2, though 15 of 163 students argue that the definite integral does not necessarily exist, only 10 students stated the logical reason, such as the existence depends on the function, the sum of polygons can be infinity, the integral concept is “almost close to”, and the possibility of discontinuous function that lead to the absence of the definite integral of its function. This condition reflects students’ understanding of the definite integral has not to meet hope that pre-service mathematics teachers should discern the fundamental notion in definite integral. These errors finding in this study could be the background to support the calculus course instruction [20].

4 Conclusion

Many students who have a deviant understanding of the definition of the definite integral. In case they understand some concepts related to the definite integral, they cannot handle it to define the definite integral. Besides, some students consider the integral of function as the increase of function. There are various students’ conceptual understanding of the existence of the definite integral. Some of them deviate from the formal concept. Most of the students guarantee the existence of the definite integral without a logical reason. Students work on The Fundamental Theorem of Calculus without regard to the hypotheses so that they failed to use it. In case of the definite integral of a piecewise function, though students have a great idea to solve it by using The Additive Rules, they cannot execute well.

Meaningful teaching and learning should be thought to support students’ understanding of the definite integral. A teaching and learning program that emphasizes conceptual understanding, not only procedural understanding in solving integral problems.

References


Engaged Reading Strategy in Literature Appreciation Learning and Its Implications on Character Education

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Abstract. This current study aims at describing (1) engaged-reading strategy in the literature appreciation learning, (2) methods of engaged-reading strategy, and (3) the implementation of engaged-reading strategy to the character education. The employed method is literary review from some relevant references related to the focus of this study. There are some revealed findings listed as below. (1) The engaged-reading strategy in literature appreciation learning is deemed suitable because this strategy elaborates the mind, heart, and flow in the process of reading and thus it trains students to become skilled readers. (2) The implementation of engaged-reading strategy provides cognitive, affective, and psychological skills in the appreciation activities for creative thinking with visualization, prediction, inference, understanding, and challenges in real life. (3) The implications of the engaged-reading strategy to the character education are curiosity, hard work, cooperation, and self-esteem for resolving problems based on the literature appreciation and for adequately developing social competence.

Keywords: engaged reading strategy, literature appreciation, character education

1 Introduction

In essence, the learning of Indonesian literature appreciation is introducing students to the values contained in literary works and inviting students to engage themselves in the presented experiences. Literature appreciation learning aims to develop students' sensitivity to sensory, logic, affective, religious, and social values in an integrated manner, as reflected in literary works. The ultimate goals of literature teaching are enriching the experiences of students and developing them to be more responsive to human events, recognition, and respect to values, in both individual and social contexts. The strategy to reach those goals are reading, listening, speaking, and writing skills. Patience and precision are of urgency to be able to conduct literature teaching properly in addition to the sensitivity and openness of teachers and teaching subjects.

Language and literature activities can be carried out simultaneously by means of the activities of feeling, thinking, imagining, and so on. Language and literature activities occur in a context, in the form of place, time and feel. Through literature, students will gain new and unique experiences that they may not necessarily face in real life. In addition, there will be


intensive communication for accommodating a logical, systematic and aesthetic framework of thinking.

Language is a means of conveying aesthetic messages related to the literature inventions. In addition to showing the recreational nature, literature is also able to stimulate people to look for values that can help them to meet the nature of humanity with personality. Literatures are equipped with spiritual content covered by ethics. Therefore, after someone reads literature, the reader is able to do self-introspection and improvement because it provides benefits to the reader. The existence of literature serves a support for the development of cultural values cumulatively and effectively. This means that literature has a power to present various events related to human life. Therefore, it has a coherent and integrated structure regarding the social environment and the natural environment of its era. argues that the creation of literary works relates to the worldview of the author formed by various experiences of his life. He divides experience into two basic elements, namely individual (internal) world and external world. Individual (internal) world consists of emotions and reasons or commonly called as heart and brain. Emotion is the means for the development of life. External worlds consist of (1) physical phenomena or facts that can be sensed by everybody, and (2) meaning as a form of power and law that is scientific, economic, political, moral, and spiritual. The internal and external worlds are always related to the development of reader’s view that is explored from various cultural environments and events.

Basically, language and literature learning is to be directed, making students have the ability to sharpen their thoughts and feelings effectively. As stated by , the relationship between emotions and cognition is quite strong in learning. In this case, the learning of language and literature must be balanced so that it becomes an important subject, especially in the development of students’ characters, namely ethic, logic, and aesthetic. These are in line with the purpose of education that the formations of character are manifested in the essential unity of the subject with the behavior and attitude of life that they have. A person’s character is something that qualifies personal being. From this sort of character maturity, a person's quality can be measured.

Language and literature learning must lead to increase emotional capacity and increase thinking capacity. Accordingly, language and literature learning will contribute to the character building, including (1) strengthening attitudes and developing sensitive feelings toward values and (2) helping advance complex individual skills such as perseverance, intelligence, imagination, creativity, as well as contribute to the education of students' knowledge.

On the other hand, language and literature learning is able to establish students’ critical thinking and emotional development. This will occur if students are able to reap other values related to the nobility of the human mind when they read literary works, considering that literary

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works have a broad possibility to store human values, namely values which in reality are often distorted and even lost. In good literary works, human values are maintained and disseminated (Sayuti in Sujarwanto, 2001: 514). Through literature, the institutions and traditions of a society are forwarded to the readers during its era, and to the community in the future that are concerning on the way of thinking, religious behavior, customs, history, and other cultural values.

This is in line with text-based language learning which can be presented in both oral and written forms. A text is an expression of a complete human mind that has a situation and context. In other words, Indonesian language learning does not only use Indonesian as a communication tool, but also need to know the meaning or how to choose the right words that fit the cultural order and the user community 7.

Literature learning is desiring the occurrence of literary activities, namely language activities and aesthetic activities (Rusyana in 8. There are various literature elements, such as characters, characterizations, storylines, settings in prose; elements of form and meaning in poetry; as well as dialogues and complementary texts in the drama. They are not taught separately but in a coherent arrangement as a beautiful work of creation in listening, speaking, reading, and writing activities. Listening, speaking, reading, and writing activities are used in the appreciation activities dealing with literatures 9.

In accordance with the nature of literature in the curriculum, literature learning can be raised by several criteria for the selection of literary works that lead to the students’ character development. First, the language is beautiful, rich in authentic expressions, and forming sensitivity and empathy for humanitarian issues of the readers. Second, literature can stimulate readers to reflect on the containing messages, and gain wisdom and enlightenment within national identity, creativity, courage to compete, human solidarity, faith, and devotion. Third, literature is able to bring noble values of humanity, which will develop readers’ empathy towards human problems. These noble values include noble morality, gentleness, forgiveness, antiviolence, self-discipline, work ethic, respect to parents and educators, and listening to the opinions of others. Fourth, literature can encourage readers to be good to human beings in treating others, in a ranging variety of personal and community activities 10.

Literature learning in schools has several objectives; namely (1) students can enjoy and use literary works to broaden their horizons, refine their characters, and improve their knowledge and language skills; (2) students can appreciate Indonesian literature as a treasure of Indonesian human culture and intellectuals, or that students gain knowledge that includes literature seen from various theories, the analysis of literary works, titles, authors, and eras; (3) students can appreciate literature, in receptive, productive, or receptive productive activities; (4) literature teaching can shape the attitude of students who are appreciative and creative towards literary works as well as fostering language in general; and (5) literary works can also develop characters 11. Therefore, literature learning in terms of literature appreciation can raise a sense of readers that is related to character education.

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8 Suryaman, op. cit.
9 Suryaman ibid.
10 Suryaman ibid.
11 Kinayati Djojosuroto, Pendidikan Karakter Melalui Karya Sastra (Fakultas Bahasa dan Seni: Universitas Negeri Jakarta, 2010).
Literature appreciation could implement engaged reading strategy that is held through three stages, namely (a) before reading, (b) during reading, (c) after reading. These three stages are carried out continuously to get comprehensive information that has an impact on student’s character. This is in line with the idea that literature is able to contribute to human intelligence that can be described in three dimensions, namely cognitive, psychomotor, and affective skills. Through cognitive development, human thinking capacity has to develop. Through psychomotor development, human life skills should grow. Through affective development, the capacity of human attitude should be noble. These are in line with the basis of Indonesian education, namely the education of faithful and noble characters.

Engaged reading strategy is used in literature appreciation learning because this strategy is directing students to become skilled readers. Therefore, students understand the foundation, objectives, and aspects that need to be considered while reading literatures explains that reading works of fiction (literature) by means of engaged reading strategy can make readers develop their character values and empathy, predict events chronologically, appreciate textual aesthetics, understand themes and symbols, and renew understanding during the reading process.

Departing from the points above, the role of a teacher is required to create learning that is able to trigger students to create individually or in groups. In addition, students are able to build good communication and show an independent attitude so that the potential of each individual can be explored and fully developed. This can be reached if teachers carry out various strategies and techniques to build appealing and fun learning atmosphere for students.

2 Method

The method used in this current study is a literary review carried out by tracing a number of relevant literatures on engaged reading and methods that can be utilized, as well as their implications for character education. Literary review is explored by utilizing journals, books, and proceedings that contain the results of research and theoretical studies. The process of information is carried out by means of a descriptive qualitative design.

To understand engaged reading strategy comprehensively, this current study elaborates (1) engaged reading strategies in literature appreciation learning, (2) methods that can be used in engaged reading, and (3) the implications of engaged reading on character formation of students.

3 Results and Discussion

3.1 Engaged-Reading Strategy on Literature Appreciation Learning

Engaged reading strategy is an effort to learn reading that integrates various aspects needed by students to become competent readers. Therefore, students are not only required to understand the contents of the reading, but they are also guided to know the direction and purpose of reading so that the reading process can be more effective and efficient argues that

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12 Van de Weghe, op.cit, pp. 92
13 Suryaman, op.cit.
14 E. Keene, To Understand (Portsmouth: Heineman, 2008)
16 Van de Weghe, op.cit. pp. 90
engaged reading is a learning strategy that synergizes between the intellectual and emotional aspects needed by readers to be competent in reading comprehension process.

Competent readers can also be called as skilled readers, namely readers who have the ability to think actively and are able to process reading more comprehensively. In this regard, 17 explains that engaged reading is held in three stages, starting from before, during, and after reading so that the process is called the Trinal Approach to Reading. In this regard, 18 state that skilled readers read more actively than unskilled readers. Before reading, readers need to preview the text and determine which part is most relevant to read. During the reading process, the speed of reading is arranged based on several factors, such as the relevance of the text, density, and level of interest in the text. After reading, skilled readers reflect on the text, determine which parts of the text are important to remember, and think about how to use ideas in the text for the next.

Based on these three stages, in the process before reading, readers need to understand their initial knowledge so that they can determine the purpose of reading clearly, namely what new knowledge they need to obtain through the text. 19 explains that a connection between new knowledge and prior knowledge is needed in readers’ brain so that the core knowledge of the reader needs to be activated first. The more prior knowledge readers have before reading, the easier they understand the text they are going to read. 20 state that connecting lessons with contexts that are familiar to students can strengthen the transfer of information to students. The familiar context to students is the embodiment of prior knowledge so that students are more easily accepting new knowledge if a context has been connected to them.

In the process of reading, readers need to master the information relations that exist in the text 21. Readers also need to control the development of their knowledge during reading so that if there are parts that have not been understood, they can repeat or reduce the speed of reading. It is expected that readers do not miss important information in the construction of their understanding of the text.

In the process of reading, skilled readers need to check their understanding of the text. This can be held by rereading and reflecting on the results of reading 22. The process can be designed by teachers by conducting question and answer session, stimulating problem solving, and other activities that are able to check students’ understanding of information in the text.

In the process of literature appreciation, engaged reading strategy is deemed suitable. This is caused by the involvement of mind, heart, and flow 23. Accordingly, students not only use their intellectual aspects, but also they use their emotional aspects to deepen the meaning in stories that are interwoven in literature, especially prose. This is in accordance with the essence of appreciation of literature, which not only requires thinking, but also requires appreciation so that the emotions that an author wants to convey can reach target readers. In addition, engaged reading strategy is able to guide students so that they are not only dissolved in the emotions of

17 Van de Weghe, loc. cit
19 Van de Weghe (2009: 94)
21 (Van de Weghe, op.cit, pp. 97)
22 (Van de Weghe, ibid.; pp 99
23 (Van de Weghe, ibid.; pp 104-105)
stories in prose, but it also trains them to become intelligent readers because they are able to determine the purpose of reading clearly and are able to process new knowledge by incorporating their prior knowledge.

In addition to mind and heart, flow involvement in engaged reading has an important role in motivating students to read literature. According to 24, flow is the highest level of intrinsic motivation in students. This intrinsic motivation needs to be instilled in students. Reading process is to be carried out with personal awareness and motivation so that reading does not become a burden on students, but a necessity or even a hobby.

### 3.2 The Methods of Engaged Reading Strategy

Engaged reading strategy consists of learning methods that can be applied more operationally at each stage of Trinal approach of reading. These methods are anticipation guide, starter sentence, KWLT, visual tool, and summary frames, which are explained as follows.

**Anticipation Guide.** An anticipation guide is a method that can help students to connect their understanding of the information they read. Students respond to statements that anticipate the reading process by linking them together with things they have already known about the topic they are reading at hands. In addition, the anticipation guide can also be a true-false statement that needs to be determined by students 25. The following is an example of an anticipation guide. Students can give a checkmark to state that they agree, disagree, or cannot decide.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Cannot Decide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Women have the same right to education as men.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Women have duties in the domestic sphere only.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Smart women are women who have extensive knowledge.</td>
<td></td>
</tr>
</tbody>
</table>

**Sentence Starter.** Sentence starter is a method that is held by presenting the opening sentence and students can continue the sentence based on their prior knowledge or based on new knowledge after reading prose. 26 explains that sentence starter stimulates students to follow the flow of thought that anticipates the substance or theme of the text they read. At the same time, sentence starter can also activate students’ prior knowledge to be better prepared to receive new knowledge from the text at hands. The followings are some examples of sentence starters which in general are used to activate prior knowledge of students in regulating reading goals as stated by 27.

<table>
<thead>
<tr>
<th>Table 2. Sentence Starter in the Process of before Reading</th>
</tr>
</thead>
</table>


25 Van de Weghe, *op.cit.*, pp 94-95

26 Van de Weghe *ibid.*

Goals

**Activating prior knowledge**
- I have already known that ….
- This reminds me about …. 
- This relates to …. 

**Deciding plan and goal**
- My goals are….
- My priority is …. 
- For reaching my goal, I plan to …. 

In addition, Olson and Land (2007) also formulate a sentence starter during the reading process as follows.

**Table 3. Sentence Starter in the Process of during Reading**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Sentence Starter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asking questions</td>
<td>• I wonder why ….</td>
</tr>
<tr>
<td></td>
<td>• How if ….</td>
</tr>
<tr>
<td>Predicting</td>
<td>• I hope that ….</td>
</tr>
<tr>
<td></td>
<td>• I think….</td>
</tr>
<tr>
<td></td>
<td>• If…, so ….</td>
</tr>
<tr>
<td>Visualizing</td>
<td>• I can imagine that ….</td>
</tr>
<tr>
<td></td>
<td>• In my mind, I see ….</td>
</tr>
<tr>
<td></td>
<td>• If this is a movie, …</td>
</tr>
<tr>
<td>Connecting</td>
<td>• This reminds me about ….</td>
</tr>
<tr>
<td></td>
<td>• This happens to me when ….</td>
</tr>
<tr>
<td>Interpreting</td>
<td>• For me, the meaning of it is ….</td>
</tr>
<tr>
<td></td>
<td>• I think this is representing ….</td>
</tr>
<tr>
<td></td>
<td>• I understand that ….</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• I need to read again about ….</td>
</tr>
<tr>
<td></td>
<td>• I understand that I am in the right track because ….</td>
</tr>
<tr>
<td>Clarifying</td>
<td>• I need to understand more about …</td>
</tr>
<tr>
<td></td>
<td>• There are some unclear topics; they are …</td>
</tr>
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</table>

In table 2, the sentence starter used tends to lead to the process before reading. Olson and Land (2007) also formulate a sentence starter during the reading process as follows.

**Table 3. Sentence Starter in the Process of during Reading**

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</tr>
<tr>
<td></td>
<td>• There are some unclear topics; they are …</td>
</tr>
</tbody>
</table>

In addition, Olson and Land (2007) also formulate a sentence starter for the after reading process that includes several objectives, namely (1) concluding, (2) adopting an alignment, (3) revising meaning, (4) analyzing the author's views, (5) reflecting and finding relationships, and (6) evaluating. Based on the purpose of reflecting and finding relationships, the sentence starter that can be proposed is that ‘this is relevant to my life because …’. The sentence starter fits the process of literature appreciation, particularly prose, because prose reflects real life that can also be related to the experience of students. Therefore, the appreciation made by students can reach the stage of the real-life meaning by utilizing the sentence starter.

**KWLT (Know, Want, Learn, Think).** KWLT (Know, Want, Learn, Think) starts from the anticipation guide that students need to continue in the process of during reading. KWLT is used to map what has been already known, what is to know further, what has been learned, and what students think after reading a text 28. This KWLT strategy is appropriate for facilitating students during the process of appreciation of prose as they can assemble their prior knowledge with new knowledge before, during, and after reading. The following is an illustration of KWLT chart.

28 Van de Weghe, *op.cit.*, pp 97
Table 3. KWLT

<table>
<thead>
<tr>
<th></th>
<th>what I have already known</th>
<th>what I want to know</th>
<th>what I have learned from the text</th>
<th>what I think after reading the text</th>
</tr>
</thead>
</table>

**Visual Tools (Timeline, Color Coding).** Visual tools are useful in organizing thinking more concretely. Visual tools are quite varied. Teachers can use a timeline to describe the flow of events. In addition, color-coding can also be used to sharpen the concentration of students, for example, teachers prepare three cards with different colors when giving instructions to students. A yellow card means students need to submit a summary of the reading. A blue card means students need to convey the message of the text after reading. A green card means students need to submit interesting quotes from the text.29

**Summary Frames.** Summary frames contain a series of questions that need to be answered by students relating to the activities concluded from the text.30 cite some examples of summary frames as follows.

- What information does the author convey that directs him to submit a claim?
- What claims does the author make about a particular problem or situation?
- What examples or explanations does the author provide to support his claim?
- Does the author use restrictions on his claims?

The examples of summary frames can be used to draw conclusions that students have from the prose they read. The intended claim can be in the form of an author's view of the topic being raised, for example about gender equity.

### 3.3 The Implication of Engaged Reading Strategy on Character Education

Engaged reading strategy is able to form the character of cooperation and hard work in students. By means of this strategy, the learning process can be designed in groups by utilizing the methods as explained earlier.31 suggest that linking reading activities to social interaction can help students increase motivation to read and can also improve reading comprehension.

In addition, the methods in engaged reading strategy can create active and fun learning that can increase students' motivation. This motivation can foster students' positive characters, such as curiosity and hard work that have a positive impact on their academic performance. According to32 and 33, students who have more motivation in learning can produce some positive impacts, such as, their academic activities will be more optimal, improvisation occurs in classroom learning behavior, and there will be an increase in students’ self-esteem.

29 Van de Weghe, *op.cit.*, pp 104
4 Conclusion

(1) Engaged reading strategy in literature appreciation learning is deemed appropriate because this strategy elaborates mind, heart, and flow in reading so that it trains students to become skilled readers. This will impact on the process of understanding the problem more comprehensively.

(2) Methods in engaged reading contribute cognitive, affective, and psychomotor skills in the literature appreciation activities for creative thinking with visualization, prediction, inference, understanding, and relationship to the real life. In this context, students will be able to think critically and creatively in the reception of the literary works.

(3) The implication of engaged reading strategy on character education raises the responsibility of students to solve problems on the basis of appreciation which is carried out with full responsibility. It also adequately develops social competence. Readers will comprehend literature well, broadening their insights.

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5 References


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Improving School Literacy Through Reading Friday Program

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Abstract. This study aims to describe Reading Friday program and its contribution in improving school literacy. The object of this research is Reading Friday program in Tasikmadu Junior High School in Karanganyar, Central Java. Data collection uses observation, interview, and documentation techniques. Data analysis is performed using an interactive model, during collection and after completion of data collection. The results of the study indicate that Reading Friday is a program carried out to increase the literacy of students, which was held on third Friday of each month, can be either in class or outdoor, overseen and assessed by teachers through reading notes in assignment books. Reading Friday program contributes in improving school literacy through four ways: (1) increasing students' reading interest and empowering library, (2) increasing students' productivity in school creative writings/art (3) increasing students' seriousness in learning and their test scores (4) helping students understand school subjects easier.

Keywords: Reading Friday, school literacy, reading motivation.

1 Introduction

"Once you have an innovation culture, even those who are not scientists or engineers - poets, actors, journalists - they, as communities, embrace the meaning of what it is to be scientifically literate. They embrace the concept of an innovation culture. They vote in ways that promote it. They don't fight science and they don't fight technology." ~ Neil deGrasse Tyson (astrophysicist, author, science communicator).

It was the very same innovation culture that drove Indonesian Minister of Education and Culture to sign Regulation No 23 of 2015, which kickstarted the National Literacy Program, a program that requires students to use 15 minutes of class time to read in effort to bring forth their full potential through literacy.

Tasikmadu Junior High School is founded in 1969 and located in Tasikmadu sub-district, Karanganyar regency, Central Java province; and as any other public school it is obliged to obey the regulation above. As an answer, it initiated a new program called Reading Friday in 2016.

A study on the program is important so that educators from various schools can compare notes on various approaches and their results in relationship with the National Literacy Program. This research will observe and describe the details of the program and whether or not it actually helps in improving school literacy.
2 Method of research

This research classifies as qualitative research. Data collection techniques are carried out by interviews, observations, and documentations. Object of research is Reading Friday program in Tasikmadu Junior High School, Karanganyar, Central Java.

According to Sugiyono (2010: 231), interview is a meeting of two people to exchange information and ideas through question and answer, so that meaning can be constructed in a particular topic [4]. In-depth interviews can be carried out at the right time and context that are deemed appropriate to obtain detailed and in-depth data, and can be done many times according to the needs of the researcher (Sumardjoko, 2015: 20) [5]. Interviews were conducted to explore data on planning the "Reading Friday" program and implementation. Respondents interviewed were the principal, the assistant teacher, and the Indonesian teacher. Observations were made during the "Reading Friday" activity and the results of their activities in the form of writing/student work which were displayed in the space provided. In general, the interviews were carried out in 2018.

According to Sugiyono (2010: 239), document is a record of events that have passed in the form of writing, pictures, or monumental works from someone [4]. Documentations taken as data in this study are the work of students, such as poetry and short stories. Other documents include a list of library book borrowers and library visitor lists, the activity program book, library book borrower rules, library regulations, and photos of school literacy activities.

The data validity testing technique is used to prove whether the research carried out is truly scientific research and to increase the degree of trust in the data obtained. Data validity testing technique is an important concept that is influenced by the concept of validity, reliability, and adjusted to the demands of knowledge, criteria, and paradigm itself (Moleong, 2009: 321) [6]. The validity of the data in this study was tested by a credibility test carried out by triangulation. The triangulation used in this study was source and technique triangulations.

Data analysis is carried out with interactive model, at the time of data collection and after completion of data collection. Activities in qualitative data analysis are carried out interactively and continuously to completion (Milles and Huberman, in Sugiyono, 2010: 337) [4]. The component of analysis consists of data reduction, data presentation, and drawing conclusions.

3 Research result

The result of this study describes the Reading Friday program and its contribution in improving school literacy.

3.1 Reading Friday Program

Based on observations made by researchers, Reading Friday program is carried out every third Friday of each month before the lesson begins, with the aim of increasing literacy in reading and writing or improving school literacy in general.

In this activity, all students read according to their interests. After reading, students write various tasks according to the direction of teachers from various fields of study. In addition to writing, there is a teacher who asks students to memorize the contents of the book they are reading.
The activity can be held in classes or outdoor, based on monthly schedule. In class Reading Friday is held in October, November, December and May, June. The outdoor Reading Friday is held in July, August, September and January, February, March.

In the program, students are given the freedom to read non-learning books borrowed from the library or provided by the program and guided by teachers who teach in the first hour. In activities outside the classroom, students are given the freedom to read any reading materials they like such as newspapers, magazines, story books, or other fiction books and are guided by their respective homeroom teachers.

Assessments in Reading Friday program is performed by homeroom teachers. Under the guidance of teachers, students must make a brief note about what they read in the special assignment book and later collected in their respective classes.

Teachers act as guides, directors, and companions when students are reading. In addition, teachers can also provide examples of reading activity. Based on observation, there are teachers who are seen reading and teachers who give direction to the students.

3.2 Contribution of Reading Friday in Improving School Literacy

From the results of interviews and data analysis, it can be observed that Reading Friday program contributes in improving school literacy through four ways: (1) increasing students' reading interest and empowering library, (2) increasing students' productivity in school creative writings/art (3) increasing students' seriousness in learning and their test scores (4) helping students understand school subjects easier.

Increasing students' reading interest and empowering library. The increase of students' interest in reading as an effect of Reading Friday is mentioned the following interview excerpt.

"Every teacher has responsibility for their students how to have a passion for learning. One of the contributions from the Reading Friday program is to grow students' interest in reading in order to increase their knowledge and improve their academic achievement, with various variations and learning models" (Interview with YN, April 12, 2018)

The Reading Friday activity also empower library functions, which improvement can be identified by the increasing number of visitors to the library to borrow and read books. A few interviews noted the increase:

"School literacy activities are very important as an effort to improve the quality of human resources. The Reading Friday activity proved to be able to contribute positively to our students to foster interest in reading as a provision to understand their knowledge. After the Friday Reading program, the level of student visits to the library increased, and the achievement of academic values also increased. "(Interview with TW, 11 April 2018).

Similar observation was stated by N, the Vice Headmaster of Curriculum. "After the Reading Friday program started in 2016/2017 the impact is very significant as it is evident from the interest of students to borrow books in the library increases, the level of visits to the library also increases, students' literacy creativity also increases. This is evidenced by the writings of students displayed on school wall magazines, including poems, short stories, as well as slogans with educational themes." (Interview on 11 April 2018).

This is in accordance with the following statement from the library head. "After the Reading Friday program, there is indeed an increase in student visits to the library, there are individuals and class groups. The use of library facilities depends on how the teacher can
direct students to increase students' interest in school literacy activities. But unfortunately not all teachers make use of the school library facilities." (Interview on 12 April 2018).

In addition to being able to be noted from interviews, it can also be seen from the increase in the number of students visiting the library and the increase in book borrowers, before and after Reading Friday as seen in Table 1.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Before Reading Friday</th>
<th>After Reading Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student visits</td>
<td>15-20 students / week</td>
<td>30-50 students / week</td>
</tr>
<tr>
<td></td>
<td>61 students / month</td>
<td>120 students / month</td>
</tr>
<tr>
<td></td>
<td>average</td>
<td>average</td>
</tr>
<tr>
<td>Book borrowing</td>
<td>10 students / week</td>
<td>20 students / week</td>
</tr>
<tr>
<td></td>
<td>average</td>
<td>average</td>
</tr>
<tr>
<td></td>
<td>40 students / month</td>
<td>80 students / week</td>
</tr>
<tr>
<td></td>
<td>average</td>
<td>average</td>
</tr>
</tbody>
</table>

From the table above, it can be seen that the number of students visiting libraries and book borrowers is increased by around 100% after Reading Friday program was initiated.

**Increasing students’ productivity in school creative works.** Suharyanto, Vice Headmaster in Student Affairs, stated how Reading Friday program has improved the creativity of students.

"In the past year after school literacy activities initiated, especially Reading Friday, it turned out that students' creativity grew and there seemed to be an increase compared to before the program began. I try to explore the potential of students' through the tasks that I have given that relate to the ability to read and write in the form of work displayed in the school wall magazine" (interview dated 12 July 2018).

Before Friday Reading program was initiated, there were only 5 works of writing on school wall magazine. After the program started, the works on display in the wall magazine reached 38, with details as seen on Table 2.

**Table 2.** Data on student creative works

<table>
<thead>
<tr>
<th>No</th>
<th>Form</th>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Poem</td>
<td>Old Poem</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New Poem</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Rhyme</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Short Story</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Free Writing</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Painting</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>38</td>
</tr>
</tbody>
</table>

**Increasing students' seriousness in learning and their test scores.** The Vice Headmaster in Curriculum stated that after Reading Friday was initiated, an increase in the seriousness of students in learning is observed.
"The contribution of the Reading Friday program to students' interest in reading is indeed very visible, with guidance and direction from teachers, now they have begun to have seriousness in understanding each subject matter given and influencing their academic value improvement." (Interview dated July 12, 2018)

The increase in seriousness in learning is also supported by the level of achievement before and after Reading Friday; shown in Table 3.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Academic achievement</th>
<th>Academic achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily test</td>
<td>Only 10 out of 32 students score above competence standard</td>
<td>25 out of 32 students score above competence standard</td>
</tr>
</tbody>
</table>

If observed in terms of the percentage increase in academic achievement, Reading Friday increased the scores by 150%, a very significant increase in academic performance.

The improvement of test scores is also mentioned by Yuliati Poncorini in an interview. "The contribution of the Reading Friday program to students' reading interest is indeed very visible, with the direction and guidance of teachers, now they have begun to have seriousness in understanding each subject matter given and having an impact on their daily test scores." (2018).

**Helping students understand school subjects.** Reading Friday program also helps students to understand and deepen their school subjects material, as conveyed by NAD and BS, class VIII students.

"The Reading Friday program benefited us because we were motivated by the teacher to be more enthusiastic in literacy activities, by reading, our knowledge increased and made it easier to understand the subject matter given by the teachers." (Interview with NAD, April 12, 2018).

"The Reading Friday program is held every third week, even if only once a week, but we feel the benefits. With the guidance of the teacher, we are directed to read useful books that help deepen the subject matter." (Interview on 12 April 2018)

The evidence above proves that the benefit of Reading Friday program is also felt by the students as well, not only the school and teachers.

### 4 Discussion

This section discusses the results of this research in comparison with other relevant studies; the similarity, difference, and other details.

The results of Wandasari (2017) are partially similar to the results of this study [7]. The difference is that Wandasari sees the results in focus of improving the character of students. The results obtained from the school literacy activities were that the character of students began to form, including responsibility, discipline, cooperation, and curiosity began to increase. Meanwhile, the school literacy activities in this study increase the demand for reading, academic achievement, the number of library visitors, and the increase in the number of book borrowers in the school library.
Similar research has been carried out by Christanti (2015) [8]. The results that distinguish it from this research and other studies are the types of books used. On average students only read one book in a month, and most of them are literary books, fiction and novel. Christanti conveyed input from students and teachers interviewed. Student input is the time to carry out reading should be extended with the design of activities that are not boring. Whereas the teachers suggested that technical instructions and guidelines for evaluating activities be standardized.

Lesley (2011) focuses on students' reading motivation [9]. Similar to this research, it finds school activities can foster students' reading motivation. The difference, Lesley's research did not find school activities that could increase knowledge and increase the number of library visitors, while this research did.

This study is in line with the research conducted by Lynch and Ferguson (2010) [10]. Both find activities that can improve school literacy. The difference is that Lynch and Ferguson did not state any activities that could increase knowledge and increase the number of library visitors. However, this study found school activities that can.

The results of Stevens (2006) are similar to this study [11]. Stevens states that students understand what they read, they are connected to stories, they are motivated, interested and they are actively involved in learning and enjoying every minute. There is a transfer of maturity on students aged 10-15 years who began to develop self-confidence obtained from students who are older by entering into their social groups. Young students are more motivated to develop their literacy skills

Literacy activities are not only reviewed from the implementation of activities, the types of activities, but also from who plays a role in literacy activities and how they are intended, as studied by Shohibah (2015) [12]. The results show that the role of parents and their environment in fostering literacy, namely reading interest, can be seen from the provision of facilities. In addition, parents are directly involved in the literacy activities. Thus, there is interaction between students and parents. So, families familiarize their kids with literacy habits.

Widyawati (2017) [13] also states something similar to what was conveyed by Shohibah. The difference is that Widyawati shows that those who play a role in growing literacy culture are principals, teachers, and librarians; principals have the role of making policies or programs to improve literacy culture in schools, teachers make learning programs and motivate students to love reading, and librarians provide good circulation services and library references.

Lynch and Ferguson (2010) states that the role of the teachers, obstacles to implementation effective literacy, and solutions to overcome obstacles are three things that are reflected in school literacy activities [10]. Jetton et al. (2008) stated that universities also have a role in increasing youth literacy in schools that are under their guidance [14].

Literacy activities can help someone to improve their achievements or success, as Wen Ma (2009) examined [15]. His research focuses on Chinese students who were high achievers in a relatively short time. One factor that helps is socio-cultural capital, which can help overcome the challenges of education and socialization. Another factor is literacy, where they are no stranger to books and reading culture. On every occasion the Chinese student takes the time to read. Nonetheless, the results of testing the influence between after-school literacy activities and graduating/failing students conducted by Liying et al. (2009) [16] showed a difference with the research of Wen Ma (2009). Liying states a relatively small but complex relationship between the performance of different student group tests on literacy tests, reading, writing activities after school.
Sutrisna (2018) states that online literacy can help develop iterative activities for students by using the Google Classroom application [17]. The advantages of this application are: (1) ease of accessing applications, (2) allowing lecturers to send reading assignments or literacy materials to all students quickly, (3) lecturers can use this application for discussion rooms, (4) lecturers can instruct, assign, and discuss with students online at the same time simultaneously.

5 Conclusion

Reading Friday is defined as 15 minutes reading activity for students with the aim of increasing the school literacy. The activity was held on third Friday of each month. It can be held in class or outdoor based on monthly schedule. Teachers oversee this program and provide direction and guidance plus assessing the results through notes submitted by students in a special assignment books.

Reading Friday program contributes in improving school literacy through four ways: (1) increasing students' reading interest and empowering library, (2) increasing students' productivity in creative writings and art (3) increasing students' seriousness in learning and their test scores (4) helping students understand school subjects easier.

Reading Friday is proven as an effective program to increase school literacy and this research suggest schools in general to initiate similar programs and innovate further.

References


Preparing for Quality EFL Teachers: The Disjuncture Between Policies and Practice in The Internet Communication Technology (ICT) Use in Classroom Context

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Abstract. Globalization has resulted in great consequences on mobility, competition and employability. It certainly implies high expectation and demands on quality and graduate standards for employability. Pre service teacher institutions need to reform several aspects to meet the demand of this globalised world. One significant aspect of reform in EFL and more broadly is the role of technology and how globalisation presents new challenges and tasks for teachers because technology has changed the tradition of English teaching significantly. In addition, various technological alternatives have the potential to make teaching more interesting, to widen students’ knowledge about the culture of English, to create more conducive environments and to improve teaching efficiency. Many recent studies suggest that producing quality graduates of EFL Teacher Education is challenging. Also, global agencies and policies have documented the insufficient competence of graduates of English Teacher Education institutions even though some recommendations for developing quality EFL teachers have been promoted. This paper aims at disseminating the result of a Carspecken critical ethnography study focusing on the issues and inconsistency between policy and practice on the implementation of ICT in the classroom which constitutes some challenges in preparing globally competitive EFL teacher graduates in Central Java, Indonesia. Globalization theory by Appadurai is applied to explain the presence of the disjunctures between policies and practices. Following Appadurai this study argues a strong degree of disjuncture between education policies and practice in terms of ICT use. What is desired in the global, national and local institutional policies are not always implemented optimally in classroom. Policy makers need to consider this mismatch as a concern in producing quality EFL teachers. The presence of the issues on the pedagogical dimension indicates the lack of awareness of the global message by local institutions. Therefore, this paper provides meaningful insights towards the discussion of the formation of quality EFL teachers not only locally and nationally but also in the broader context of teacher preparation globally.

Keywords: disjuncture, critical ethnography, globalisation, classroom context.
1 Introduction

Global organizations, national governments and education institutions have focused their agendas on improving the quality of education systems. Quality of education plays a crucial role in determining a nation’s competitiveness [1]. They assert that in preparing for global competition, Indonesian governments have strived to promote strategies to enhance the quality of education. The enhancement of quality education is underpinned by a view that better quality systems will produce highly competitive human resources to meet the needs of global economic competition.

The 2014 Education for all (EFA) global monitoring report mandates that quality education relies on the most appropriate training for teachers and prospective teachers. It is recommended that initial teacher education is required to prepare teachers to help students from various backgrounds and needs. Teacher education institutions are actively involved in the process of change. This implicitly means that institutions and policies play an important role in the formation of EFL professional teachers. In the interest of extending understanding of the role of policies in the formation of quality EFL teachers, this study investigates the formation of quality EFL teachers through policy documents and how they are responded to in practice focusing on the ICT implementation.

In regards to the policy implementation, there were discrepancies in the messages stated in the policies in the various levels. The focus of this study is on the formation of quality EFL teachers and the implications for quality EFL teacher education programs. Specifically, this paper identifies the differences and the disjuncture between policy and interview discussions which emerged in the data. It reflects on the challenges in constructing a coherent framing of quality EFL teachers.

Teaching practice conducted at schools in which the period of time is in simulated or actual settings is an important time for prospective teachers as they negotiate system reform [2], curriculum reform [3] and challenges to their personal identity [4]. The flow on effects of technology is an issue the student teachers must navigate during this time. One significant aspect of reform in EFL and more broadly is the role of technology and how globalisation presents new challenges and tasks for teachers because technology has changed the tradition of English teaching significantly. In addition, various technological alternatives have the potential to make teaching more interesting, to widen students’ knowledge about the culture of English, to create more conducive environments and to improve teaching efficiency [5], [6]. For example, there are advantages in using multimedia technology in teaching and learning communication skills, such as to improve students’ motivation, teaching effects, students’ understanding of western culture, teacher-student interaction, supporting contextual learning, promoting students’ communication capacity and facilitating malleable adjustment to the teaching material.

Technology-based curriculum and technological practice cannot be separated in the process of promoting effective integration of technology into the pre-service teacher education curriculum [7]. A study by Merç indicates the need for better integration of technology in EFL teacher training and a stronger link between the placement schools and the university [8]. Hismanoglu’s study of the prospective EFL teachers’ perception of Information and Communication Technologies (ICT) integration shows that those having negative attitudes to ICT integration feel inadequate to use ICT due to insufficient knowledge of ICT. The results of the study imply that training in ICT is critical for pre-service EFL teachers and EFL teachers.

Besides that, a study by Black and Goebel shows the importance of teaching language variety in the Indonesian context using ICT as a teaching media [9]. It is argued that teachers, native or otherwise, cannot genuinely be adequate role models of the sort of dialectal variety
with which learners of major languages often need to be able to cope. It would surely be even more difficult for them to illustrate the social significance of code choice in such multilingual situations as Indonesia. What is more, models of dialect variety and code choice can be supplied through audio-visual material, such as television programs.

The value of resource materials can be enhanced through computerised access and manipulation; even authentic multimedia material can achieve better results than the individual teacher. Motchnig-Pitrik and Holzinger’s study also advises the use of ICT to facilitate learning by a combination of student-centred teaching and e-learning [10]. Their case study revealed that such learning demands qualifications and social skills that are very different from those needed for conventional teaching. Interestingly, it appears that new media could be extremely well employed to support a coach or facilitator in numerous ways particularly relevant to a student-centred approach.

To summarise, the role of technology and how globalisation presents new challenges and tasks for teachers are significant aspects in reforming the tradition of English teaching. Mandated ideas existent in the global policy agenda cannot be ignored in this globalised world. The role of technology to facilitate learning is important. It eases the process of delivery to the students. In accordance with Misra and Koehler’s conceptual framework for educational technology, by building on Shulman’s formulation of ‘pedagogical content knowledge’, it is important to integrate technology with pedagogy [10]. Therefore, in this study of preparing quality EFL teachers in Indonesia, integrating technology in pedagogical content knowledge is vital in this global era. The following section discusses the Appadurai’s globalisation theory focusing on techno-scape and ideo-scape which are applied in the selected methodology [12], [21].

2 Method

This Among the influential proponents of globalisation is Arjun Appadurai. He argues that globalisation does not bring homogenisation of culture. Globalisation does not produce a single universalising global space, but spaces that are disjunct. He names these spaces as cultural flows. Appadurai saw globalisation as a fluid and dynamic phenomenon tied to worldwide migrations (both voluntary and involuntary) and the dissemination of images and texts via electronic media [11].

According to Appadurai, the new global cultural economy is complex, overlapping, and disjunctive [12]. Appadurai classified the cultural flows as five different ‘scapes’, namely ethno-scapes, media-scapes, techno-scapes, finance-scapes and ideo-scapes [12]. He assured that the five scapes emerge but are not causally ordered (Heyman & Campbell, 2009). They emerge in and through growing disjunctures. People, machinery, money, images, and ideas now follow increasingly non isomorphic paths; of course, at all periods in human history, there have been some disjuncture in the flows of these things, but the sheer speed, scale, and volume of each of these flows are now so great that the disjuncture have become central to the politics of global culture [12]. Appadurai extended his argument for disjuncture to explain the ‘non-isomorphism’ of the five global flows. The disjunctures are critical as they manifest through the concept of deterritorialisation. The idea of ‘disjuncture’ above is adopted to explain the emerging ideas among the flows that in this study are present in the global, national and institutional policy texts and the experience of teaching practice reflected by EFL pre-service teachers.
The five ‘scapes’ provide a way of understanding and rendering more visible flows over time. Ethno-scape refers to the view of people who undergo the changing world, for example tourists, immigrants, refugees, exiles, quest workers and other moving groups. These individuals are important features of the world and turn out to have influence within and between nations. Technoscapes refer to the global forms of technology, for example, the use of particular software that can be used by people around the world. This techno-scape intensifies the compression of space and time, as Giddens articulated. Ideo-scapes refer to images that deal with state ideologies, politics, and movements which counter ideologies that capture state power or a piece of it. The elements of ideo-scapes cover the enlightenment worldview consisting of chains of ideas, terms and images, including freedom, welfare, rights, sovereignty, representation and democracy.

Finance-scapes refer to the movement of global capital that flows rapidly: currency markets, national stock exchanges and commodity speculations. Media-scapes refer both to the distribution of the electronic capabilities to produce and disseminate information (newspapers, magazines, television stations, and film-production studios), which are now available to a growing number of private and public interests throughout the world, and to the images of the world created by these media. These Images involve many complicated inflections, depending on their mode (documentary or entertainment), their hardware (electronic or pre-electronic), their audiences (local, national, or transnational), and the interests of those who own and control them.

Globalisation is not a single process but multiple processes in different sectors or domains of practice [12]. In this study, the writer focuses two scapes, namely ideo-scape and technoscape out of the five ‘scapes’ – ethno-scape, finance-scape, ideo-scape, techno-scape and media-scape – assist in investigating the flow of cultural material across boundaries. The two scapes help to illustrate how globalisation is articulated in both the experience of teaching practice of EFL pre-service teachers and the policies that set up their experiences in relation to ICT implementation.

3 Approach

This paper is part of a research project that explored the formation of quality EFL teachers through the current ideas in global, national and local institutional policy texts and practice. To understand claims about what comprises quality in these various texts, Carspecken’s critical ethnography informed the data collection and analysis strategies used in the research project and thereby informed the research presented in this paper [13].

The applicability of Carspecken’s critical ethnographic approach is grounded in the identification of a dialectic process [13], [14] that led to the development of a research question to investigate the notion of quality in EFL teaching in educational policy texts in two universities in Surakarta, Indonesia. These institutions were selected on the following grounds. Aside from relatively easy access to both institutions called by the pseudonyms Full Moon University and Sun University, both universities have large teacher-training faculties in Surakarta. Each of them has an English department within which pre-service EFL teachers are trained and together both sites share a cohort of students bounded by commonalities including location (in Surakarta, Indonesia), languages (Bahasa Indonesia and Bahasa Jawa), religion (predominantly Islam), faculty structure (Teacher Training) and English Department.
The research commenced by collecting documents relating to different levels of policies. For this paper, significant documents at the national level included (state) Law No. 20/2003 pertaining to the National Education System, Government Regulation No. 19/2005 pertaining to the National Standards of Education, and Law No. 14/2005 pertaining to Teachers and Lecturers. At the local (institutional) level, the curricula of the English departments and their microteaching and field-based teaching guides were all identified as significant documents. Following Carspecken’s model, the researchers began by developing research questions as a preliminary step [13]. Generating flexible research questions that could be remodeled as the research progressed. This was complemented by interviewing EFL pre-service teachers in Indonesia with regard to their learning and practicum experience which accords with Carspecken’s dialogical data generation stage [13] and allows the construction of a preliminary analysis of the interviews to articulate prominent themes. This was followed by an examination of the relationship among the various data sources, which Carspecken addresses in describing system relations [13]. This commenced a significant phase in the criticality of this research projects methodology. In addition, the researcher applied Appadurai’s discussion of globalisation, in particular his notion of global [12], to inform the identification if not construction of the system relations across the data sources, especially policy documents used in this study.

3 Result and Discussion

In regard to pursuing its goals, The Dakar Framework suggests ICT is important in distributing knowledge and facilitating effective learning and educational development. This implies that in establishing quality teachers, it is important to integrate ICT in the learning process. ICT use must be feasible; therefore it is advised that it be provided at a reasonable price and in practical ways.

1. Information and communication technologies (ICTs) must be harnessed to support EFA goals at an affordable cost. To be effective, especially in developing countries, ICTs should be combined with more traditional technologies such as books and radios, and be more extensively applied to the training of teachers (UNESCO, 2000, p. 21).

The above quote from the EFA agenda emphasises the importance of applying technology to support the delivery of education, learning and teaching. More specifically, the potential capacity of technology facilitates the spread of information, therefore making it largely essential to integrate ICT in teacher training in an effective way. Despite the often high costs of ICT implementation, there is a strong need, as signalled above, to actualise the use of ICT to meet education goals aligned with Indonesia’s economic and education policies. But in this, there emerges a potential disjuncture between the necessity for the use of ICT and the cost of ICT, which can be conceptualised as a disjuncture between ideas flowing along the techno-scape and the realities of financial flows along the finance-scape, particularly in the context of ‘developing’ countries such as Indonesia.

Madya contends that the acceleration of development in Indonesia should be supported by technology [14]. Madya assures us that technology will certainly facilitate development in remote areas. However, she also acknowledges that limited financial capacity has made it impossible to achieve equity of educational access [15]. The lack of financial resources is a recurring issue, as is the extent to which global policy around the use of ICT for education can accordingly be thwarted at the national and local levels. For example, the schools where the pre-service teachers practiced their teaching were not always equipped with a sufficient ICT
infrastructure. The consequence of this is that the capacity of pre-service teachers to use ICT for learning and teaching varies depending on the school in which they undertake their practice teaching. Some schools are labelled by the pre-service teachers as a ‘favourite’ school, particularly so in the urban city context where schools are generally well equipped with ICT resources, so pre-service teachers could apply ICT in their teaching practice. In addition, they could adopt technology to avoid monotonous teaching methods and to build students’ interest. In this respect, their teacher training had equipped them to meet the expectations of both the National Law [16] and accompanying global messages in so far as the use of ICT to support learning and teaching goes [16], [17], [18], [19]. At the national level, Government Regulation No. 32/2013 on national education standards promoted the use of technology to support student learning [17]. In line with this national regulation, institutional policies in the form of the FBE guides of Full Moon University require pre-service teachers to be quality teachers who are able to compete through standardisation and competency examinations and to adjust to changes in educational knowledge, technology and society. The guides therefore promote the training of quality teachers by promoting the use of technologies to achieve that goal.

Aside from the reasonably well-equipped urban schools, many schools where pre-service EFL teachers undertake their practice teaching were not well resourced in terms of ICT. It could be argued that such less well equipped schools contradict the requirement for using ICT in education mandated in global and national policy texts. In these less well equipped schools, pre-service teachers arguably could not easily reach the standards for the use of ICT for learning and teaching identified in policy. In such schools even an internet connection, that would be taken for granted in other contexts, is not available (Goswami, 2008). And without an internet connection, many of the other ICT affordances arguably lose their educative value in the interconnected digital world represented in the global and national policy texts. What emerges in the context highlighted above is not only a disjuncture between flow along the techno-scape and the finance-scape, but also along the ideo-scape, particularly in relation to the idea that ICT must be used to support education. The idea of integrating ICT in teaching English is actually welcome in national and local institutional contexts, but insufficient technology hampers the implementation of the idea. As a consequence, the achievement of a globalising idea – which is that ICT must be used to support learning and teaching – is often not realised in practice at the local level in the context of pre-service EFL teacher education.

Information and communication technology is arguably crucial in English language teaching. As often recognised there are many benefits in applying technology in English language teaching [21], [22], [23]. For example, contend that globalisation has provided new challenges because technology has changed traditional practices for English teaching, which provides various technology-based alternatives, making both teaching and learning much more interesting and productive [5], [6]. Patel identified the benefits arising from the use of multimedia technology in learning and teaching to include: improvements in learning communication skills, student motivation, student understanding of western culture, teacher-student interaction, support for context-relevant learning, and the capacity to facilitate malleable adjustments to the teaching material. But despite the clear mandate for the use of ICT in education at all levels, and research identifying the value of ICT to learning and teaching, the use of ICT remains an idea that in many instances is not put into practice in pre-service EFL teacher training or in field experience in Indonesian schools [25], [26], [27]. For example:

(2) For villagers, there are a lot of challenges, like… vocabulary, furthermore technology and media used. In villages we can use meaningful [teaching] instruments, but limited internet, limited communication and electronic media as well, which is influential, because in village schools, sometimes it is unaffordable to buy the tools and that affects the teaching of English…(Smith)
The above excerpt highlights the impact of insufficient infrastructure on effectively teaching English, as mandated by Teacher Law No. 14/2005 [18], [19], particularly with an emphasis upon the use of ICT in education for the purpose of improving Indonesia’s human capital for national development.

4 Conclusion

Based While the EFA agenda of improved educational quality is quite explicit, there are still issues of difference and disjuncture at the levels of national and local institutional policy documents and at the level of practice. Enhancing the quality of education as advised in EFA may still be problematic in practice. Even though the global message is supported through its articulation in national and institutional policies and there is some agreement between policies and practice ranging from the global and national to the institutional level, there are still some disjunctures in the use of ICT in teaching English.

The differences evident across policies and practice in the use of ICT in teaching English indicate that the mandated messages from the global agenda have not been optimally achieved yet. ICT implementations is still problematic. Due to limited financial capacity, it is inevitable that inequity of educational access still occurs. This study contributes to understanding the gap between mandated messages and practice. The illustration of the issues among policy documents and practice provides a basis for finding ways of minimising the problems of development programs in Indonesia.

References


Increasing Students’ Higher-Order Thinking Skills Based On Character And Self-Concept Through Environmental Pollution Practicum

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Abstract. Higher-order thinking skills are a main part of learning assessment process. Enable to apply information they just receive, use and create new knowledge or information. This research explores the efforts in increasing higher-order thinking skills based on students’ character and self-concept through Environmental Pollution Practicum. This research was quantitative in nature, with one grup pretest-postest design. Population was students from three study programs of universities in Central Sulawesi, Indonesia, with the sample size of 120 students. Data were taken from higher-order thinking skills test, the students’ character, and questionnaire of self-concept, later were analyzed through N-Gain test. The results showed that there were increases of percentage analyse skill (C4) of 54%, evaluate skill (C5) of 53%, and create skill (C6) of 34%. Overall, the increased percentage reached 45.5%. It is concluded that Environmental Pollution Practicum can improve the students’ higher-order thinking skills based on their character and self-concept.

Keywords: Higher-order thinking skills, character, self-concept, practicum, environmental pollution.

1 Introduction

Higher order thinking skills are thinking at a higher level more than just memorizing facts or explaining about something. Higher order thinking skills can be considered as a widespread use of the mind to find new challenges and manipulate information for reaching possible answers for in new situations[1]. These skills are in line with the objectives of the 21st century learning which require students to acquire a lot of skills in terms of developing and exploring knowledge. Progress in almost all aspects of life has provided advantages for humans. In the field of education, the advantages come in form of efforts to develop learning models that can assist students to learn not only by memorizing but also more by thinking deeply and thoroughly [2][3].

Progress in all aspects of life also gives global impact on the field of education, for instance, requiring universities to produce graduates that are skilled professionally in their respective field, with broad personality traits of both the 21st century skills and competences, or generally called as the 21st century skills [4][5][6][7]. In several references of education, this phrase “the 21st century skills” refers to “readiness of college and career”, “next generation learning”, and
“deep learning”. The skills required in the 21st century learning are communication skills, collaboration skills, professionalism skills, and higher order thinking skills which consist of critical thinking, skills to adapt, and interpersonal skills. All those skills are a must for students who want to integrate themselves and develop in today’s job market [5][8].

Interpersonal skills depend on an individual’s character. A person’s character reflects values and norms that that person has, including reasons underlying his or her every behaviors. One of the factors that contribute to someone’s character is environment. Furthermore, a person’s character has three operative values. First, is value in action, or three demonstrative behaviors that are interrelated to teach other, namely moral of knowing (cognitive aspect), moral of feeling (affective aspect), and moral of behavior (psychomotor aspect). A person with good character will show the following processes: knowing which one is good, desiring to do what is good, and doing what is good [9].

Hoge defines character education as a way to adjust students’ behaviors to become well-behaved citizens. Pike adds that students are instructed and guided to have a set of behaviors which are determined as values as taught in character education. In addition to that, Marshall, et al claim that character education is continually trusted since this field enables the educators to view students in various ways through different perspectives, such as well-behaved and well-mannered students, and to practice their maturity in challenging situations[10][11][12].

Improving character-based higher order thinking skills is possible to be done by integrating character avalues in the assessment system and learning curriculum, such as by integrating character education in learning materials. That means that character education is not separated from the learning curriculum. In relation to this, a strategy often implemented by developed countries is requiring all educators, education staff, counselors, and administration staff to become good examples for students. The strategy related to the existence of a character model that is often carried out in developed countries is that all teaching staff and education staff, all guidance and counseling staff, and all administrative staff must be able to become good models [9].

A number of studies have proven that the implementation of character education in schools had positive impacts to students who previously had bad behaviors; for instance, improving their academic achievement and reducing the number of school dropouts. Overall, character education expects that students’ development must be one important component embedded in the current curriculum [13]. This research emphasizes the characteristics of attentiveness, analyticity, commitment, initiative, problem solving, innovative, curiosity, skillfulness, integrity, responsibility, neatness, mutual cooperation, accuracy, honesty, discipline, agility, work ethic, self-confidence and self-sacrifice.

Besides character, a person’s self-concept can also show his or her interpersonal skills, since self-concept is a combination of that person’s physical, personal, moral, family, social and academic domains [14][15]. A person’s self-concept is also known by several other terms, namely self-construction, self-identity, and self-perspective. Self-concept can be defined as a someone collection of beliefs about oneself that includes various elements such as academic achievement, gender roles and sexuality, and racial identities. In general, self-concept embodies the answer to “who am I” question, a lifetime question. Someone's self-concept consists of their past, present, and future self scheme. The concept of one's self consists of their self-schema of the past, the present and the future. This concept is different from self-awareness, which refers to the extent to which self-knowledge is defined, consistent, and currently applies to a person’s attitude and disposition. Meanwhile, self-concept itself can be defined as “an individual’s beliefs about him or herself, including that person’s attributes of who and what that person is”
Higher-order thinking skills are strongly influenced by self-concept, based on the assumption that someone with a good self-concept will have good thinking skills too.

Higher-order thinking skills are very important to develop. These skills enable students to apply information they receive, to see the relationship between what is supposed to be taught with their prior knowledge, to use knowledge or information they have in order to create new knowledge and information, to understand difficulties and challenges they face, and to analyze and make wise decisions as well. Higher-order thinking skills become a main part in learning assessment [17][18].

Bloom’s Taxonomy is the foundation for higher-level thinking skills, based on the notions that certain types of learning require cognition process more than the other types yet with more general advantages. Bloom’s Revised Taxonomy shows that thinking skills involve analyze skills (C4), evaluate skills (C5) and create skills (C6) which are regarded as higher level set of thinking skills[19]. Furthermore Krathwohl state that the indicators to measure higher-level thinking skills include the followings [20]:

a. Analyze
(1) Analyzing incoming information and breaking it down, or structuring information into smaller parts to recognize patterns or relationships of information with others information, (2) able to recognize and distinguish causal factors and effects of a complicated scenario, (3) Identifying or formulation questions.

b. Evaluate
(1) Evaluating a solution, idea, and method with suitable criteria or existing standards in order to ensure its effectiveness values or advantages, (2) making hypothesis, criticizing, or testing, (3) accepting or receiving a statement based on set criteria.

c. Create
(1) Generating an idea or point of view on something, (2) designing solution to a problem, (3) organizing elements to become a new structure.

The higher-order thinking skills listed previously can be improved through practical activities or practicum, because practicum cannot be separated from steps in scientific methods that enable students to practice their skills to experiment, discover, and deduce their experimental results. Practicum provides opportunities for students to practice improving their skills in order to implement knowledge they have learned previously. Practicum can also make students able to understand concepts in depth and understand science as both processes and products. Therefore, practicum has significant roles in developing higher-order thinking skills and scientific process.

The results of research done by Ikonomopoulos et. al report that practicum activities have increased graduate students’ self-efficacy. In consistent with their research, Kang also shows that practicum can increase prospective teacher students’ social identity and academic professionalism. However, Ibrahim’s research shows different results, since his research shows that there is no increase in preservice secondary school teachers’ academic achievement after conducting assisted by the use of technology and information [21][22][23].

This article discusses about the improvement of higher-order thinking skills based on university students’ self-concept and character through environmental pollution practicum.
2 Method

The research method used in this research was pre-experimental design with one group pretest-posttest design with the following formula [24].

\[ O_1 \times X \times O_2 \]

where:
- \( O_1 \) = treatment of the experimental group
- \( X \) = Pre-test
- \( O_2 \) = Post-test

The research location took place in three study programs or departments in Central Sulawesi Province: Biology Education Study Program of Tadulako University Palu, Biology Education Study Program of Sintuwu Maroso University Poso, and Environmental Health Study Program of Ministry of Health Polytechnic Palu. Population in this research was students of those three study programs who have enrolled in the course of Environmental Pollution in even semester of academic year 2018/2019. The sample taken using total sampling method was 120 students.

Data on higher-order thinking skills were obtained through essay test consisted of 9 question items distributed to test the students’ analyse skill, evaluate skill, and create skill. The test was given before and after conducting practicum on three experiments, which were water pollution, air pollution, and soil pollution. The range of score given was 0-100. The N-gain test was conducted to analyze the increase on students’ higher-order thinking skills with the following equation [25]:

\[
N-gain = \frac{\text{score of post test} - \text{pre test}}{\text{Ideal maximum score} - \text{pre test score}} \times 100%
\]

Categories of N-gain were determined through analyzing the results of pre-test and post-test using the criteria proposed by Hake [25] as presented in Table 1.

<table>
<thead>
<tr>
<th>N-gain</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g \geq 0.7 )</td>
<td>High</td>
</tr>
<tr>
<td>( 0.3 &lt; g &lt; 0.7 )</td>
<td>Medium</td>
</tr>
<tr>
<td>( g &lt; 0.3 )</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 1. N-gain categories.

Data of the students’ character were obtained from observations while participating in Environmental Pollution Practicum activities. The character values assessed were attention, analytical, commitment, initiative, problem solving, innovative, curiosity, skillfulness, integrity, responsibility, neatness, mutual cooperation, accuracy, honesty, discipline, agility, work ethic, self-confidence, and self-sacrifice. The score was given using a Likert scale of 1-5. Criteria for the students’ character were based on modifying Riduwan’s criteria [26] which are presented in Table 2.

<table>
<thead>
<tr>
<th>Interval of score</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>81 – 100 %</td>
<td>Very Good</td>
</tr>
<tr>
<td>61 – 80 %</td>
<td>Good</td>
</tr>
<tr>
<td>41 – 60 %</td>
<td>Average</td>
</tr>
</tbody>
</table>

Table 2. Character categories.
Data of the students’ self-concept were obtained from distributing questionnaires consisted of 20 items, which were statements on students’ academic ability in favorable and unfavorable questions. The score was given using a Likert scale of 1-5. The students’ self-concept was determined by calculating the highest and lowest score as presented in Table 3.

<table>
<thead>
<tr>
<th>Interval of score</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 – 100</td>
<td>Very high</td>
</tr>
<tr>
<td>69 – 84</td>
<td>High</td>
</tr>
<tr>
<td>53 – 68</td>
<td>Medium</td>
</tr>
<tr>
<td>37 – 52</td>
<td>Low</td>
</tr>
<tr>
<td>20 - 36</td>
<td>Very low</td>
</tr>
</tbody>
</table>

Table 3. Self-concept categories.

3 Research Result and Discussion

3.1 Improving Increased Higher-Order Thinking Skills Through Environmental Pollution Practicum

Table 4 displays the data on analysis skill (C4) that were taken before and after the Environmental Pollution Practicum was conducted.

<table>
<thead>
<tr>
<th>University</th>
<th>Pre test</th>
<th>Post test</th>
<th>N-gain</th>
<th>%</th>
<th>Category of increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Health Polytechnic of Palu</td>
<td>59</td>
<td>82</td>
<td>0,55</td>
<td>55</td>
<td>Medium</td>
</tr>
<tr>
<td>Tadulako University</td>
<td>37</td>
<td>76</td>
<td>0,62</td>
<td>62</td>
<td>Medium</td>
</tr>
<tr>
<td>Sintuwu Maroso University</td>
<td>50</td>
<td>73</td>
<td>0,46</td>
<td>46</td>
<td>Medium</td>
</tr>
</tbody>
</table>

As seen in Table 4, there was an increase of percentage for analysis skill (C4), which was around 46%-55% and categorized as medium. This increase means that practicum could increase the students’ skills to think, deeply stimulated their curiosity about what they were learning at that time, and gave them new experiences as well. Through Environmental Pollution Practicum, the students could witness the impacts of environmental pollution on living creatures, thus giving them the sensation of real life learning. They felt that they had been challenged with new challenge and tried to look for information that was related to the practicum topic, as shown in Figure 1.
Figure 1 shows that the students were able to analyze the impacts of water pollution on biota, combined their prior knowledge with information they were studying at the same time, and described a real life situation based on its context. These results prove that the learning objectives expected were achieved through practicum. Also, this is consistent with Krathwohl’s statement about analysis skill as an ability to break down certain materials into clearer components. This ability can take form in analyzing elements (analyzing parts of materials), analyzing relationships (identification of relationships), and analyzing the organization of principles (organizational identification)[20].

Next, Table 5 displays the data on evaluation skill (C5) that were taken before and after the Environmental Pollution Practicum was conducted.

<table>
<thead>
<tr>
<th>University</th>
<th>Pre test</th>
<th>Post test</th>
<th>N-gain</th>
<th>%</th>
<th>Category of increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Health Polytechnic of Palu</td>
<td>26</td>
<td>68</td>
<td>0.55</td>
<td>55</td>
<td>Medium</td>
</tr>
<tr>
<td>Tadulako University</td>
<td>29</td>
<td>71</td>
<td>0.59</td>
<td>59</td>
<td>Medium</td>
</tr>
<tr>
<td>Sintuwu Maroso University</td>
<td>38</td>
<td>67</td>
<td>0.46</td>
<td>46</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Table 5 shows that there was an increase of percentage for evaluation skill (C5) ranged from 46%-59% and categorized as medium. This means that students showed good evaluation skill. This evaluation ability is based on one example of students’ test answer given to them after practicum, as seen in Figure 2.
Higher-level thinking skills on the C5 cognitive dimension (Evaluation skill) in Figure 2 shows that the students were able to make an evaluation of certain situation, and make decisions based on what they had learned through practicum. Also, Figure 2 proves that practicum activities were able to improve the students’ thinking skills and understanding of subject matter, since practicum is a series of scientific activities including formulating problems, designing experiments, assembling tools, conducting experiments, observing and interpreting data obtained. Practicum therefore, can make the students discover knowledge through exploration of their natural surroundings.

Furthermore, the improvement of creation skill (C6) taken before and after the Environmental Pollution Practicum was conducted is shown by Table 6.

As seen in Table 6, the increase of percentage for create skill (C6) was ranged around 28% to 42% and categorized as low and medium increase. These findings show that the students were not fully able to create something new based on their experiences while participating in practicum activities. The skill to create is related to creative thinking process; however, this skill does not totally affect the students' ability to create something new. This is also proven by the students’ test answer on the C6 cognitive dimension given after the practicum, as seen in Figure 3.
Figure 3 shows that the students’ ability to create something new was still limited to what they had received during practicum. Create skill is indicated by the ability to create new product by organizing several elements into new forms or patterns that are different from before. This is consistent with Krathwohl’s [20] explanation about create skill, which is the ability to generate and produce. Generating is an activity that represents problems and finds alternative to required hypotheses. Furthermore, generating is related to divergent thinking as the core of creative thinking. Meanwhile, producing leads to planning to solve a given or faced problem. Producing is closely related to other dimensions of knowledge, namely factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. Overall, the increase of higher-order thinking skills through Environmental Pollution Practicum is shown in Figure 4.

Figure 4 shows a visible increase on three cognitive dimensions which are analysis skill, evaluation skill, and create skill. The increased percentage was around 34%-54%, which
shows that the students have understood the concepts, been able to apply information they received, and been able to create information and knowledge. Practicum activities have been proven to provide extensive experience for the students to improve their cognitive, affective, and psychomotor skills. Improving cognitive skills means that the students can train themselves to understand the theories taught to them, can integrate different theories, and apply those theories to real situations. Next, improving affective skills means that the students can plan their learning activities independently, collaborate, appreciate and communicate information related to their fields of knowledge. Later, improving psychomotor skills means that the students are able to prepare tools, install and use certain instruments, thus practicing their thinking skills to master the use of those tools and instruments.

3.2 The Students’ Character and Self-Concept during Environmental Pollution Practicum

The results of the students’ character analysis shown during Environmental Pollution Practicum are displayed in Table 7.

<table>
<thead>
<tr>
<th>University</th>
<th>Score of Character (%)</th>
<th>Category of Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Health</td>
<td>80,5</td>
<td>High</td>
</tr>
<tr>
<td>Polytechnic of Palu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tadulako University</td>
<td>82</td>
<td>Very high</td>
</tr>
<tr>
<td>Sintuwu Maroso University</td>
<td>79,9</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 7 shows that the characters shown by students during the Environmental Pollution Practicum were well-behaved and well-mannered. The scores prove that the students have been through a learning process to understand, accept and act based on the values of virtue and responsibility towards themselves and others. This is also in accordance with the definition of character education by the Ministry of National Education who states that character education is a system of instilling character values in the communities of school, which includes components of knowledge, awareness or willingness, and actions to perform these values towards God the Almighty, one-self, others, environment, and the nation in order to become a wholeness human being [27].

The results of the students’ self-concept during Environmental Pollution Practicum are displayed in Table 8.

<table>
<thead>
<tr>
<th>University</th>
<th>Score of self-concept (%)</th>
<th>Category of Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Health</td>
<td>76,43</td>
<td>High</td>
</tr>
<tr>
<td>Polytechnic of Palu</td>
<td>78</td>
<td>High</td>
</tr>
<tr>
<td>Tadulako University</td>
<td>78</td>
<td>High</td>
</tr>
<tr>
<td>Sintuwu Maroso University</td>
<td>80</td>
<td>High</td>
</tr>
</tbody>
</table>
Table 8 shows that the students’ self-concepts as the results of this research were categorized as high, proving that the students already possessed high confidence in their academic abilities. Their high confidence was shown by their ability to answer the questions given, thus it can also be said that most of the students already had good self-concept of their academic abilities. Also, they already had good cognitive development compared to secondary level students. University students already have deep understanding on what they experience or how they will react to the stimulants they get from their surrounding environment, where one of the stimulants is practicum activities. This is also in line with Yosup et al’s definition about self concept [15].

3.3 Improving Higher Order Thinking Skills Based on Character and Self-Concept

The Students’ Character and Self-Concept during Environmental Pollution Practicum

The results of the students’ increase on their character-based higher-order thinking skills during Environmental Pollution Practicum are displayed in Table 9.

Table 9. Increase on character-based higher order thinking skills through environmental pollution practicum.

<table>
<thead>
<tr>
<th>Character</th>
<th>Number of students</th>
<th>of N-gain</th>
<th>Increase percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>64</td>
<td>0,48</td>
<td>48</td>
</tr>
<tr>
<td>Good</td>
<td>56</td>
<td>0,42</td>
<td>42</td>
</tr>
<tr>
<td>Pretty good</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not good</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 9 shows that the increases on higher-level thinking skills before and after the Environmental Pollution Practicum were almost the same, which was 48% in the category of Very Good Character with 64 students and 42% in the category of Good Character with 56 students. These results are in line with Jeynes’ research result which proves that character education has an influence on higher education students’ learning achievement, while their character does not give different effect on each student. Another supporting research result is from Zubaidi who states that character is an integration of intelligence, personality and nobleness. Character can build someone’s habits to always give his or her best as an achievement instilled with noble values. Furthermore, Lickona also adds that good character is supported by knowledge of goodness, desire to do what is good, and doing good deeds [28][29][30].

The results of the students’ increase on their higher-order thinking skills based on self-concept during Environmental Pollution Practicum are displayed in Table 10.

Table 10. Increase on higher order thinking skills based on self-concept through environmental pollution practicum.

<table>
<thead>
<tr>
<th>Character</th>
<th>Number of students</th>
<th>of N-gain</th>
<th>Increase percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>22</td>
<td>0,54</td>
<td>54</td>
</tr>
<tr>
<td>High</td>
<td>84</td>
<td>0,44</td>
<td>44</td>
</tr>
</tbody>
</table>
Table 10 shows that the highest increase in higher-order thinking skills based on self-concept was in the category of Very High with 22 students (54%), while in the category of High was 85 students (44%). Furthermore, there were 13 students in the category of Medium (41%), and no increase in the categories of Low and Very Low. From these increased percentages, it can be said that the students with very high self-concept also had a good level of self-confidence, resulting good academic abilities. These results are in line with Dagnew’s research which proves that self-concept has a significant relationship with academic ability. Also, the students’ performance are influenced by various factors, among others, are self-concept and motivation, due to a new paradigm of learning which assumes that all students can and should learn at higher level. The results are also supporting the research from Chao et al who also find that self-concept and efficacy are the most significant factors in student learning achievement [31][32].

The results of the increased percentages on character and self-concept based higher-order thinking skills through Environmental Pollution Practicum are displayed in Figure 5.
Overall, the increased percentage of higher-order thinking skills based on character and self-concept reached 45.5%, categorized as Medium. Thus, it is proven that both character and self-concept have significant roles in improving the students’ higher-order thinking skills through Environmental Pollution Practicum.

4 Conclusion

This research shows that through Environmental Pollution Practicum, there is an increased percentage of higher-order thinking skills on C4 cognitive dimension (analyse) of 54%, C5 (evaluate) of 53%, and C6 (create) of 34%. Furthermore, the average number of increased percentage on character and self-concept based higher-order thinking skills is 45.5%.

For future research, it is suggested to continue practicum activities in regard to improving students’ create skill, as well as to conduct further research on factors that influence students’ lack of product creation skill in practicum activities.

Acknowledgment

The authors would like to thank rector of Sintuwu Maroso University for support financial this study. We also to thank the head of the Biology Department of Tadulako University and the Department of Environmental Health, Ministry of Health, Palu.

References


Increasing public of education awareness about the importance of bringing medical ID cards at healthcare through audiovisual media

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Abstract. A medical ID card is a patient's identity card in a health service which contains patient medical record number. The function of this card is to search medical record documents belonging to patients who have been treated in the health service. As a supporting tool, medical ID card brought by patients is expected to facilitate filling officers to find patient medical record documents so the services can be effective and efficient. One of the inhibiting factors the use of medical ID card is the lack of appeals from registration staff to patients to always carry medical cards. This condition complicates filling officers to retrieve medical record documents according to medical record numbers and the identity of patients who register. For this reason, it is necessary to conduct socialization as an effort to increase public awareness to treat and bring medical cards so there is a continuity of patient health information, which one through the use of an audiovisual media, namely video. Videos are displayed in simple animations with a short duration containing a message about the importance of caring and carrying a medical ID card when seeking treatment. Through socialization in the videos, it is expected that people will be easier to receive and understand the message conveyed so public awareness about the importance of medical cards will increase.

Keywords: Medical ID Card, Socialization, Awareness.

1 Introduction

According to the World Health Organization (WHO), health is a state of well-being that includes physical, mental, and social conditions which are not only free from illness or disability [1]. In the globalization era, health is the main factor that must be met by the majority of population with the aim of having a long life expectancy. Thus, the higher the health needs of each individual, it will affect the activities in health care facilities. Crowded patient visits will affect the service concerning effective and efficient, both for patients and health care facilities [2], [3].

A registration system is the first service given to patients by health care. The process of patient registration services in health care is influenced by three factors, namely human resources, facilities and infrastructures, and Standard Operating Procedure (SOP) [4]. Services provided at the registration, when the patient is coming the first time to the hospital is supported by facilities and infrastructure, one of them is a medical ID card. Each patient has a medical ID card as an identity card in a health service. Through this card, medical record documents of patients who have already been treated at the healthcare can be searched because there is a
2 Literature Review

A medical ID card is an identity card that is owned by a patient in health care. The compliance of officers in asking medical ID card can accelerate the queue so it can increase patient satisfaction. This identity card function is to search for medical record documents belonging to patients who have already been treated at the health care. The arrival of the patient to health care that bringing a medical ID card will speed up the registration officer to look for the patient's medical record documents so there are expectacions to avoid excessive patient accumulation [10].

Patients who come to health care institutions that bring a medical ID card will personify ongoing patient health information. That is because, in a medical ID card, listed the patient's medical record number which aims to facilitate the search for the patient's identity by registration staff in the registration unit. Registration staff will submit the patient's medical record number to the filling officer then to retrieve the patient's medical record file. Therefore, the medical ID card will make officer filling easier in finding medical record documents because of the availability of medical record numbers [4], [7].

The medical record is an important database that is used as a basis or guideline in providing services and treatments to patients. There are two forms of recording medical records, manual and digital, with their respective strengths and weaknesses [14]. Consistency of medical
record reporting will make doctors, nurses, and other health personnel easier to monitor the health and do treatment for patients. Based on accurate medical record which includes health status and a history of care and treatment of patients, treatment of patients in a health care can be done comprehensively [15].

According to PERMENKES (Peraturan Menteri Kesehatan) Nomor 269 /MENKES/PER/III/2008, medical records are files that contain notes and documents, including patient identity, checkup results, notes of treatment that has been given, and other actions and services that have been given to the patient. Medical records contain accurate health information so it can be used by doctors, nurses, and other health workers as a guiding basis for taking medical treatment of patient. Patients have the right to determine who knows their health records [15], [16].

Public awareness in carrying medical ID cards can be improved in several ways. In simple terms, changing activities with community goals is done through changing knowledge and attitudes in a better direction. This study relates to the awareness of carrying medical ID cards, so the changes in community activities are carried out through learning and teaching events called learning [17].

Learning can be delivered through socialization with the community as the object [12], [13]. Socialization is held with the aim of several things, namely [13]:
1) To produce basic and applied knowledge intensively.
2) To change a part of knowledge that needed effectively.
3) To create humanity and value of the provisions governing innovation.

In line with the development of technology, the process of delivering learning can be done easily by using media in the learning process. Media functions are to distribute information from the giver of the message to the recipient of the message, both soft file or hard file. The use of media is considered to help learning in this study because the information delivered can be understood by the community easier. If this condition is realized, there will be a behavior change of the community in bringing medical ID cards when they need treatment at a health care [18]. This medical ID cards could be one of the learnings facilities. In particular, earning facilities gave any contribution to learning outcomes indirectly [19].

One of the uses of the media to communicate learning is through audiovisual media. Audiovisual media is defined as a communication media that combine several elements of text, sound, graphics, images, photographs, animation, and moving videos. Based on previous studies, audio-visual media is effective for describing the content and encouraging reflection on people who see and hear audiovisuals. This creates a reflection in a positive attitude in a sustainable manner [11], [18]. In this study, reflection is an increase in public awareness in carrying medical ID cards. The advantages of using audiovisual media, namely: 1) enriching and improving learning methods; 2) expanding the implementation of education; and 3) reducing funding for learning media because of the use of technology [20].

Audiovisual media that use video can describe a process. In this study, the video will show the process of why a medical ID card needs to be taken by patients every time they seek treatment at health care. A medical ID card that is carried by patients when seeking treatment at a health care will actualize the ongoing patient health information in accordance with the medical history listed. In addition, videos can also describe a theory through colored animation where the representation of video is 3-dimensional (3D).

Some weaknesses can be found from the use of audiovisual media. Videos that are played too fast will cause the patient as the video audience to have difficulty in following well-played videos. This is because video shows that have been played through are difficult to playback,
unless video playback is done in entirety. To produce video in good quality, high costs are required in processes video making and tool maintenance [18].

An object of the video to increase public awareness in bringing medical ID card is patients and visitors in health care. Videos are displayed on a television screen in the patient's waiting room. Background of the selection of targets and place where the video shows are because the waiting room is one of the places in the health care that is always crowded with patients and visitors. With the condition of the waiting room that always crowded, it is expected that the video playback carried out is more effective, efficient and comprehensive [18], [20].

The expected outcome of the video playback is the increasing public awareness of bringing medical ID cards when they need treatment at health care. With the appearance of awareness of bringing medical ID card, people have realized the importance of health information in sustainable medical record.

3 Approach

This study uses an approach through a literature review. Keyword in article search, namely: "Medical ID card", "Educational Video", "Audiovisual Media", "Medical Record Document", "Waiting Time of Service" and "Quality of Health Service". Search results of keywords found several articles. Articles were pre-selected based on the results of the research conducted and adapted to the topics raised by the author. Approach method used for the literature review is shown in Figure 1.

Fig 1. Summary of the literature review process

4 Findings And Result

One of the quality services in health care facilities that need to be improved is at the patient registration unit [9]. The registration unit is the main place that patients visit when patients seek treatment at health service [4], [10]. The registration unit has a function or role as the service provider who is first received by the patient or family. Good or bad quality of service will be assessed at the place of patient acceptance [4], [5], [8], [9]. Thus, the patient at the registration unit will spearhead the service of a health facility [8].
The patient's identity in a health care facility is characterized by ownership of the medical ID card to search patients' medical record documents [4]. Use of medical ID card at the time of treatment is very important for the registration officer to provide the patient's medical record file [5], [7]. If the patient does not bring the medical ID card, provision of the medical record file will also be longer, so the services provided by the doctor to the patient become obstructed [7]. The more patients who do not carry a medical ID card, the longer the registration staff will be in providing medical records. The faster the provision of medical record documents to the polyclinic, the faster the services provided to patients [5], [7].

In providing services on the registration unit, officers often find difficult to give service to patients who do not carry medical ID cards [7]. This is due to the length of time used by registration officers to find medical record numbers in the register book and computer. Based on Keputusan Menteri Kesehatan Nomor 129 Tahun 2008 concerning Standar Pelayanan Minimal (SPM), standards for the provision of the outpatient medical record files is 10 minutes, and the service of medical records for inpatients is 15 minutes [5].

At the patient admission unit, patient will do patient's admission process by registering as one of the patients [21]. There are two types of patients, old patients and new patients. Old patients are patients who have already been treated, so they can immediately register and new patients are patients who are first treated and must register as new patients to make a medical ID card [21], [22]. It because patients who seek treatment must have a medical card [22]. Registration officer will carry out an identification process for collecting patient identity data. This will be done either for new patients or old patients. The list of patient registrations is given by the admin to the Medical Record (MR) officer, then the MR officer looks for the patient's medical record document.

If medical record document of patient is exists, the medical record officer submits the patient's medical record document to the nurse. But if patient's identity is not found, the officer will make a new medical ID card so patient will be considered a new patient. Flow of the utilization of patient medical ID card will be explained in Figure 2.

**Fig. 2. Patient medical ID card ownership**

This can be detrimental to patients and health care facilities. The disadvantage for the patient is the examining doctor does not know the patient's disease history so it must be re-examined and hampered the services to be provided by health workers. The disadvantages for health care facilities are patients with one name can have more than one number so it can increasing the number of stored medical records [3], [5], [7], [21], [22].
According to a review of previous studies, awareness of patients, especially old patients in carrying medical ID card when returning to health care facilities is still lacking [23]. Therefore, one method that can be used to discipline patients in bringing medical ID card when they seek treatment is through the playing of educational videos. This videos about the importance of bringing medical ID card at health care providers when they seek treatment. By showing educational videos, people can learn through events that seem to be experienced by themselves. This causes memories of the material delivered through educational video to become easy to remember. In addition, videos are effective to be used as a learning media in mass, individuals, and groups [24].

Video media was selected as a learning media developed because video media was relatively easier to operate [25]. Video is one type of audiovisual learning media that stimulates the functioning of sense of hearing and sense of sight [24]. As an audiovisual media, video can display sound, images, and motion at once. Video ability to visualize material, effective to help convey material that is dynamic.

Public awareness of education is an important aspect in building the character of a nation [25], [26]. The use of educational videos as a learning media is able to provide clarity of messages because people see objects to learn in concrete ways. In addition, the use of video educational media can increase motivation and retention (memory and absorption). Video media is an interesting media for counseling because displays of audiovisual and images are one of the preferred methods in communication, both for men and women and also for people who are low and high educated [13], [24]. Introduction appearance of the video in this study is illustrated in Figure 3.

![Figure 3. Display of the introduction video](image)

The content contained in the video is introduction, function of medical ID card, importance of bringing medical ID card when seek a treatment, relation between medical ID card and medical record documents, and relation between patient satisfaction and health care workers. These video contents are packaged in a 1.5-minutes video and played at waiting room in registration unit of health service facilities. Time allocation for each content is explained in Table 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>Video Content</th>
<th>Duration (Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Function of Medical ID card</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Importance of carrying medical ID card when seeking treatment</td>
<td>30</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
Contents that contained in the video, namely:

1. Introduction
   In this section, definitions and a brief description of medical ID card with 5 seconds duration will be displayed. Introduction in the video is a simple animation (illustration).

2. The Function of Medical ID card
   The next video content explains about medical ID card function, namely:
   - Continuous patient health history.
   - Make health workers easy to take medical treatment.
   - Avoiding redundancy of medical record documents.
   - Increase efficiency and effectiveness that have an impact on service quality.
   The four medical ID card functions are displayed in the video in the form of writing points with simple animation that will appear one by one. Duration of the content on medical ID card function is 10 seconds.

3. Importance of carrying medical ID card when seeking treatment
   Videos about this content are allocated for 30 seconds. Video footage is shown in a simple illustration of why patients need to bring medical ID card when seeking treatment at health care facilities. In addition, it also shows what effects can be caused if the patient does not bring the medical ID card. Thus, it is expected that public awareness in carrying out medical ID card will increase due to understanding the use of medical ID card.

4. The Relation between medical ID card and medical record documents
   Through the utilization of medical ID card, patient's medical record document at a health care facilities can be sustainable. The duration of this content is 30 seconds through video illustrations concerning the description of how a continuous medical record document.

5. The Relation between patient satisfaction and health care
   The use of medical ID card will increase the effectiveness and efficiency of healthcare facilities officers in serving patients. This condition will impact patients satisfaction because they do not need to take a long time to wait for treatment services. Duration of this content is 15 seconds through a video illustration of how the response and impact that felt by patients when carrying medical ID card during treatment.

Through this educational video, it is expected that there will be an increase in patient awareness about the importance of bringing medical ID card when seeking treatment, especially for old patients. Thus, the patient's medical history listed on the medical record document can be sustainable and can facilitate health workers in doing the medical treatment. In addition, patients who are disciplined to bring medical ID card can avoid the redundancy of medical record documents and improve quality of service.
5 CONCLUSION

The patient who wants to seek treatment must have a medical ID card, both new and old patients. A medical ID card can facilitate registration officers in finding patient medical record documents so it can speed up the service. In addition, with the medical ID card, patient’s medical history from the first to the last treatment can be recorded in the medical record so that doctors and medical personnel can provide treatment quickly and precisely. However, there are still many patients who are not aware of the importance of bringing medical ID card during treatment. Thus, need an education that can increase patient awareness. One of educational method that can be applied is through audiovisual, namely video media. The use of educational videos can clarify the message to be conveyed and be more memorable so can be easily accepted by all persons.

References


INDONESIAN TEACHERS CLASSROOM ASSESSMENT METHOD

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Abstract. The aim of this study was to find out the Indonesian Teachers Classroom assessment method in helping their students to monitor their own learning, enhancing teaching and improve learning and measuring the level of students’ achievement. To meet the goal of the study, survey design was adopted to gather descriptive and comparative data. Electronic survey questionnaire using e-serv free survey tool was built to get the data set. 200 secondary and high school teachers in central, west and east Java were sent e-questionnaire and 58 were returned. The study found that the assessment method that is most often used for once a month is an assessment portfolio with 50.94%. The most used method for once a week is a filling gap test, and the method that is used most often for daily is short answer with 49.06%. In addition, the majority of Indonesian Teacher used self assessment in helping their students to monitor their own learning. Moreover, performance assessment was the most highly used assessment in enhancing teaching and improve learning. Finally, multiple choice and essay test was the most common used of assessment method to measure the students learning outcome.

Keywords: Indonesian Teachers, Classroom Assessment, Method.

1 Introduction

Assessment is very important in the teaching and learning process in the classroom. A good assessment will give an idea of the actual conditions of life. Assessment is also one of the activities carried out to measure and assess the level of achievement and effectiveness of the learning process. Assessment is also used to determine the strengths and weaknesses that exist in the learning process.

A professional teacher must be able to master the types and methods of assessment that are appropriate for their students. The selection of the right method will have an impact on achieving the objectives of the assessment. Thus, the teacher must use a variety of assessment methods and techniques that are in accordance with the learning objectives and characteristics of the learning experience.

There are some assessment methods that can be used by teachers, among the assessment methods that are usually used by the teacher can be divided into two, traditional and alternative assessment. Traditional assessment usually relates to Traditional evaluation usually relates to written testing, such as multiple choice, matching, true/false, fill in the blank, etc. Traditional assessment such multiple choice and quizz is essential as it provides an overview of the learning of a student in a grade or rank form at a specific subject.
Alternative assessment referred to as performance tests or authentic evaluations, are used
to determine what students can and can not do. In other words, an alternative assessment
measure implemented more skill than it measures understanding. Alternative assessment
provides fresh methods to motivate and inspire learners to discover and utilize their own and
the world around them..

2 Research Methodology

The purpose of this study was to explore teachers’ classroom assessment method in
Class. To meet this goal, survey design was adopted to gather descriptive and comparative
data. Electronic survey questionnaire using e-surv free survey tool was built to get the data
set. 200 secondary and high school teachers in central, west and east Java were sent e-
questionnaire and 58 were returned. Descriptive analyses including frequencies, percentages,
and means were used to summarize the distribution of the data, while thematic data analysis
using Creswell model was used in analyzing all the qualitative data.

3 Result and Discussion

The result will give an overview on the frequent of classroom assessment method
conducted by teachers in their teaching and learning Process. Assessment method deals with
the purpose of the assessment will be also discuss he.

The of the teachers frequency in using classroom assessment methods can be seen in
following table :

<table>
<thead>
<tr>
<th>Classroom Assessment method</th>
<th>Never</th>
<th>Monthly</th>
<th>Weekly</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. True/False Test</td>
<td>11.32%</td>
<td>49.06%</td>
<td>22.64%</td>
<td>16.98%</td>
</tr>
<tr>
<td>2. Multiple Choice Test</td>
<td>1.89%</td>
<td>41.51%</td>
<td>47.17%</td>
<td>9.43%</td>
</tr>
<tr>
<td>3. Filling Gap Test</td>
<td>11.32%</td>
<td>32.08%</td>
<td>45.28%</td>
<td>11.32%</td>
</tr>
<tr>
<td>4. Short Answer</td>
<td>1.89%</td>
<td>11.32%</td>
<td>37.74%</td>
<td>49.06%</td>
</tr>
<tr>
<td>5. Matching</td>
<td>5.66%</td>
<td>26.42%</td>
<td>47.17%</td>
<td>20.75%</td>
</tr>
<tr>
<td>6. Essay</td>
<td>0%</td>
<td>33.96%</td>
<td>33.96%</td>
<td>32.08%</td>
</tr>
<tr>
<td>7. Performance Assessment</td>
<td>1.89%</td>
<td>43.40%</td>
<td>33.96%</td>
<td>20.76%</td>
</tr>
<tr>
<td>8. Portfolio Assessment</td>
<td>24.53%</td>
<td>64.15%</td>
<td>7.55%</td>
<td>3.77%</td>
</tr>
<tr>
<td>9. Project Based Assessment</td>
<td>30.19%</td>
<td>50.94%</td>
<td>16.98%</td>
<td>1.89%</td>
</tr>
<tr>
<td>10. Self Assessment</td>
<td>7.55%</td>
<td>39.62%</td>
<td>35.85%</td>
<td>16.98%</td>
</tr>
<tr>
<td>11. Peer Assessment</td>
<td>18.87%</td>
<td>37.74%</td>
<td>28.30%</td>
<td>15.09%</td>
</tr>
<tr>
<td>12. Learning log</td>
<td>50.94%</td>
<td>30.19%</td>
<td>13.21%</td>
<td>5.66%</td>
</tr>
<tr>
<td>13. Journal Assessment</td>
<td>32.08%</td>
<td>49.06%</td>
<td>11.32%</td>
<td>7.55%</td>
</tr>
</tbody>
</table>

From the data above, it can be seen that Project based learning and Journal assessment
(30.19% and 32.08%) are assessment methods that are rarely used by teachers, while the
assessment method that is most often used for once a month is an assessment portfolio with
50.94 %. The most used method for once a week is a filling gap test, and the method that is
used most often for daily is short answer with 49.06%
In addition to this, as can be seen in table 2, the method used to help students monitor their learning. The results obtained from the survey mention if the teacher uses self assessment in measuring student learning outcomes, while learning log is a method that is rarely used.

Table 2. The percentage of assessment method to monitor students learning

<table>
<thead>
<tr>
<th>Assessment method</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Assessment</td>
<td>38.95</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>24.21</td>
</tr>
<tr>
<td>Learning Log</td>
<td>6.32</td>
</tr>
<tr>
<td>Reflective Journal</td>
<td>15.79</td>
</tr>
<tr>
<td>Portfolio</td>
<td>14.74</td>
</tr>
</tbody>
</table>

As can be seen in table 3 below, teacher uses performance assessment to enhance teaching and improve learning, while learning log is a method that is rarely used by teacher.

Table 3. Assessment methods to enhance teaching and improve learning

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Assessment</td>
<td>30.16</td>
</tr>
<tr>
<td>Portfolio Assessment</td>
<td>10.32</td>
</tr>
<tr>
<td>Project Based Assessment</td>
<td>16.67</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>16.67</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>13.49</td>
</tr>
<tr>
<td>Journal</td>
<td>12.70</td>
</tr>
</tbody>
</table>

Table 4 shows the teachers assessment methods in measuring the students learning outcome. The result shows that multiple choice and essay test are the most common uses, while journal was the least popular one to measure the students learning outcome.

Table 4. Assessment method to measure learning outcome

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Response (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>True/ False Test</td>
<td>10.14</td>
</tr>
<tr>
<td>Multiple choice Test</td>
<td>15.46</td>
</tr>
<tr>
<td>Gap Filling Test</td>
<td>9.18</td>
</tr>
<tr>
<td>Short Answer</td>
<td>14.98</td>
</tr>
<tr>
<td>Essay</td>
<td>16.43</td>
</tr>
<tr>
<td>Performance Assessment</td>
<td>13.53</td>
</tr>
<tr>
<td>Project Based Assessment</td>
<td>8.70</td>
</tr>
<tr>
<td>Portfolio Assessment</td>
<td>7.25</td>
</tr>
<tr>
<td>Journal</td>
<td>4.35</td>
</tr>
</tbody>
</table>
4 Conclusion

The assessment method that is most often used for once a month is an assessment portfolio with 50.94%. The most used method for once a week is a filling gap test, and the method that is used most often for daily is short answer with 49.06%. In addition, the majority of Indonesian Teacher used self-assessment in helping their students to monitor their own learning. Moreover, performance assessment was the most highly used assessment in enhancing teaching and improve learning. Finally, multiple choice and essay test was the most common used of assessment method to measure the students learning outcome.

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Effect Of Teacher Training And Level Of Education
On The Quality Of Learning

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Abstract - Private school teachers’ lack of enthusiasm to attend and participate in professional development trainings has motivated the study to investigate whether teacher training and education has positive impact on learning quality improvement. This study aims at describing the effect of teacher training and education on learning quality. It is designed as a quantitative study carried out in a private senior high school with questionnaire as research instrument. Data analysis was performed with statistical instruments. The present study found the low participation of private school teachers in attending professional development training and teacher education. In fact, some teachers have never joined such trainings. The finding also reveals teacher training and education have a positive impact on improving the quality of learning activities. Nevertheless, this study is limited on a small population since it was carried out only in one private school.

Keyword: teacher training, level of education, quality of learning

1. Introduction

Pursuing an education is one of God’s commands as well as a manifestation of human worship [1] and also teacher has the prominent role in the education process [2]. Education is a conscious effort to prepare learners by guiding, teaching, and/or training them for their role in the future [3]. It is an endeavor to guide learners toward moral knowledge and moral actions [1]. Briefly, it is an endless divine duty for human to gain knowledge about the entire Earth and Sky through the process of guidance, teaching and practice in order to understand moral values and more essentially, to speak and behave according to those values.

Education is a noun, while the verb is to educate—which is the task that must be carried out by an educator. The task of educating children is primarily conducted by parents-mother [4] and community in particular, and it is the duty and responsibility of the State in general—in this context, religious figures [5] and/or educators. Law No. 14 of 2005 on Article 10, paragraph 1 concerning Teachers and Lecturers, states that as professional educators, Teachers have the main task of educating, teaching, guiding, directing, coaching, assessing, and evaluating learners in formal early childhood education, primary and secondary education.

Furthermore, Hayes, Mills, Christie and Lingard suggested that the main tasks of teachers are to educate, continuously improve student achievement, and ensure the quality of education as well as leaning outcomes [6]. Consequently, teachers are required to have the competence and skills [3] which can be developed through a learning process since they are the main source of student’s learning activities. Primarily, the indicators of professional teachers include: 1) mastering the knowledge of the subject being taught, namely students; 2) having class management skills; 3) continuously improving personal competence and skills through independent learning or courses; 4) conducting research to produce new knowledge; 5) being aware of student progress [7]. In this era, teachers are encouraged to do a deep learning in the context of 21st century learning [8].
One of the main concerns in Indonesia, however, is the low quality of national education—which is claimed to be lower than Vietnam’s. As a result, teachers are often questioned regarding the poor quality of national education, since it is linked to teacher’s lack of competence and skills[9]. They are deemed to neither sufficiently master the subjects nor being able to utilize and implement the basic principle of appropriate teaching [10], hence their instructional strategies are poor [11] and exacerbated by the absence of principal’s guidance, leading to teacher’s full authority in carrying out a class [3]. The quality of learning is indicated from teacher quality standards thus the government has to continuously improving the quality of teachers. As the spearhead of the learning activities, teachers are required to improve the quality of learning and creativity, and to innovate as well. The role of the teacher as a professional educator is crucial, ranging from improving the quality of the learning process to determining the student achievement in the process.

The quality of learning can be interpreted as the linkage among teachers, students, material, learning environment and learning media to attain optimal learning processes based on a predetermined curriculum [12]. In this context, teachers must be able to bring changes to students [13], including the changes in their behavior [14]. Furthermore, the improvement of learning quality entails several matters, i.e., curriculum renewal, textbook development, advanced teaching methods, teacher education and material facilities from school, administration, interaction between school and communities, teacher quality and interrelated education development. One of the indicators of successful learning quality improvement is indicated by the teacher’s ability in utilizing learning media, for instance attractive posters based on the subject matter for creating an effective learning [7].

Teachers are the key to improving the quality of education [4], one of which is in the classroom. Nevertheless, there are several factors that influence the quality of learning, including level of education, experience, job desk, employment status, work ethic, welfare and infrastructure [15]. In addition, learning innovation training and learning media preparation can also support the improvement of learning quality [16]. Some factors also affect professionalism of teachers, including level of education, training and equalization programs, upgrading program, good relationship among colleagues, collaboration and links, work ethic that prioritizes high-quality services to satisfy the customers, and adoption of innovations in the use of the latest communication and information technology [17].

One of the factors that affect the quality of learning is the teacher’s capacity to improve the competence and skills through their participation in various trainings organized by schools and/or institutions. Such trainings include curriculum development training, learning media training, class management training, seminars, workshops and related activities. Through these activities, teachers will be able to develop their competence, skills, and attitudes in carrying out the learning process. In addition, teacher’s level of education is related to the improvement of learning quality. It refers to the level of formal education that must be carried out by teacher candidates before entering the educational world. Law No. 14 of 2005 article 8 stipulates a teacher to have academic qualifications, competencies, educator certificates, physical and spiritual health, and the ability to realize the national education goals.

Despite of its significance, research on teacher training is relatively rare because it is probably a less interesting topic [18] but teacher training is always the key for the teacher professional development [19] and have impact in the future generation [20]. In the most current technology development, teacher training should adapt the teacher training by using technology to push the teacher competencies [21]. This government must provide the assessment for teacher competency comprehensively so that it can increase the teacher perception, in turn improve the quality of learning [22]. Furthermore, the classroom quality also affects the quality learning
[23]. Even so, research on teacher training and education level is required for supporting government policy. Teacher training is estimated to affect the quality of learning since teachers can develop skills and competences, gain new insight about knowledge, skills and attitudes in teaching. In addition, the level of teacher education is also estimated to have impact on the quality of learning. The higher the teacher’s level of education, the higher the number of teacher’s participation in relevant professional development trainings. As a result, there is a gradual process of improving the quality of learning.

Initially, a preliminary study was carried out in the field. It involved observations at the classroom and in-depth interview with teachers relating to the topic of the present study. The results of observation conducted in Class X Accounting 3 indicated that the strategies used by the teacher in delivering the material of Accounting for Service Company was less interesting. The students had off-topic conversation, and were daydreaming and inattentive during the class. Consequently, they had difficulty in understanding the material just explained by the teacher. Moreover, the learning environment was not conducive since some students brought snacks and drink in the classroom and the teacher neither provide nor relate the material with real life examples. The preliminary study also obtained the data from SMK Muhammadiyah 2 Klaten Utara in which there were 45 teachers with different educational backgrounds (S1 and S2) and participation in assorted trainings.

The objectives of the present study: (1) to determine the effect of teacher training on the quality of learning in SMK Muhammadiyah 2 Klaten Utara, (2) to determine the effect of teacher’s level of education on the quality of learning in SMK Muhammadiyah 2 Klaten Utara, and (3) to determine the effect of teacher training and the level of education on the quality of learning in SMK Muhammadiyah 2 Klaten Utara.

The research hypotheses are: (1) teacher training has impact on the quality of learning, (2) the level of education has impact on the quality of learning, (3) teacher training and the level of education has impact on the quality of learning.

II. Method

The respondents are the entire population. In the present study, 45 teachers of SMK Muhammadiyah 2 Klaten Utara 2 became the subjects since this study included population research thus the total population were involved. The dependent variable is the quality of learning (Y), while the independent variables are teacher training (X1) and the level of education (X2). These variables, typically, can be measured so that numbered data can be analyzed using statistical procedures [24]. Instruments for collecting data are questionnaires and documentation. Furthermore, the stages are: 1) preparing the questionnaire; 2) composing the questionnaire; and 3) determining the criteria of scoring. Testing the questionnaire uses reliability and validity tests. The technique for the pre-test consists of normality and linearity tests with a significance level of 0, and multicollinearity measured by tolerance and variance inflation factors (VIF). Multiple linear regression analysis technique for data analysis is done using hypothesis test of T-test and F-test. Furthermore, the coefficient of determination is determined to predict the contribution of the independent variable to the dependent variable, as well as relative contributions and effective contributions. The present study is expected to obtain positive, valuable, and statistically accountable results without triggering any pointless argumentation.

III. Results and Discussion

The results of the pre-test or normality test were used to find out whether the data from the sample derived from the population was normally distributed or not. The data is normally
distributed if the p-value is less than 0.05. The data analysis indicated the residual of 0.965, which is greater than the significance level of 0.05, therefore it can be claimed that the data is normally distributed.

The second hypothesis test is the linearity test used to decide whether two or more variables have a linear relationship and whether the relationship is strong enough. The data have linear relationship if the p-value is greater than 0.05 or at a significance level of 0.05. The results of linearity test were as follows:

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Sig</th>
<th>Std. Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The effect of teacher training on the quality of learning</td>
<td>0.592</td>
<td>0.05</td>
<td>Linear</td>
</tr>
<tr>
<td>The effect of the level of education on the quality of learning</td>
<td>0.083</td>
<td>0.05</td>
<td>Linear</td>
</tr>
</tbody>
</table>

The third pre-test is multicollinearity test used to identify correlations between independent variables of two regression models. If the tolerance value is less than 0.1 and, simultaneously, the VIF value exceeds 10, the multicollinearity is regarded problematic. In the present study, the results of the multicollinearity test were as follows:

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>19.016</td>
<td>.000</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>57.492</td>
<td>3.023</td>
<td>.537</td>
<td>.4651</td>
<td>.000</td>
</tr>
<tr>
<td>TEACHER TRAINING</td>
<td>.081</td>
<td>.017</td>
<td>.537</td>
<td>4.651</td>
<td>.000</td>
</tr>
<tr>
<td>LEVEL OF EDUCATION</td>
<td>.974</td>
<td>.308</td>
<td>.365</td>
<td>3.161</td>
<td>.003</td>
</tr>
</tbody>
</table>

After the pre-tests have been conducted, hypothesis testing is carried out. The data are analyzed using multiple linear regression analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression coefficient</th>
<th>T_value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>57.492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher Training</td>
<td>0.081</td>
<td>4.651</td>
<td>.000</td>
</tr>
<tr>
<td>Level of Education</td>
<td>0.974</td>
<td>3.161</td>
<td>.003</td>
</tr>
<tr>
<td>F_value</td>
<td>16.531</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R^2</td>
<td>0.440</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
After a multiple linear regression analysis was done, the hypotheses were tested using T-test and F-test. The first was used to determine the significance of the correlation between independent variables (teacher training and level of education) on the dependent variable (the quality of learning).

The results of T-test for variable of teacher training (X₁) show that $t_{\text{value}} (4.651)$ is greater than $t_{\text{table}} (2.018)$, therefore $H_0$ is rejected. It implies that teacher training has impact on the quality of learning, proving the first hypothesis is true. Furthermore, the results of T-test for variable of the level of education (X₂) show that $t_{\text{value}} (3.161)$ is greater than $t_{\text{table}} (2.018)$, therefore $H_0$ is rejected. It suggests the effect of the level of education on the quality of learning, proving the second hypothesis is true.

Subsequently, F-test was conducted to determine the significance of two variables of teacher training and the level of education in simultaneously affecting the dependent variable (the quality of learning). The results of F-test show that $F_{\text{value}} (16.531)$ is greater than $F_{\text{table}} (3.22)$, therefore $H_0$ is rejected. It suggests that teacher training and the level of education simultaneously affects the quality of education, which implies the third hypothesis is true.

The coefficient of determination test is used to decide the magnitude of the effect of independent variable on dependent variable. Based on the data analysis, the coefficient of determination ($R^2$) was 0.440. It indicates that the quality of learning is influenced by teacher training and the level of education, simultaneously, by 44%. Moreover, the remaining 56% is influenced by other variables excluded from the present study. The relative contribution to teacher training variable was 29.70% while to the level of education was 70.30%. Meanwhile, the effective contribution to teacher training was 13.07% and to the level of education was 30.93%.

The effect of teacher training found in the present study is relevant to Fatah Syukur (2012: 90) whose study affirms the importance of teacher training to support teachers in understanding what and how professional teacher is, and improving their personality, individual performance, progress in career, effective behaviors, as well as competence and skills. Similarly, the present study reaffirms Fazalur Rahman (2011), who concluded that the programs of teacher training have positive impact on the quality of learning, emphasizing the importance of continuous training programs and the provision of broader opportunity for teachers to attend such programs due to its highly significant relationship to the improvement of learning activities and student performance.

In the context of the level of education, the result of the present study is relevant to Hasanah (2012: 52) in which the level of education is the benchmark to assess teacher’s professionalism, in accordance with the provisions of the Law on Teacher and Lecturer. It also confirms the finding reported by Tri Nuruni (2014) which states that the level of education has a positive impact on the performance of teacher. Moreover, teachers must be in charge for subject areas based on their qualifications and academic background. Those graduates from faculty of history must teach history subjects, while those graduates from English department must teach English subjects, not vice versa. It is very influential on the performance and quality of students since teachers who deliver subjects without relevant educational background will hinder their students in understanding the subject. Briefly, the level of education is crucial on the quality of learning in the classroom.

Similarly, the findings of the resent study also reaffirm previous study carried out by Murniati (2016) concerning the main goal of teacher education and training, which is improve teacher’s knowledge, skills, and motivation or attitudes/behaviors and to develop the competencies of participants regarding their job desks and relevant duties. The present study reinforces the more teachers and the more often they attend professional development programs,
the better the quality of learning. As a result, students will have a better understanding and sharp insight to a knowledge, and eventually, they can attain more achievement and be naturally contented by the experiences with professional teachers.

In overall, the results show that by participating in training and education programs for teachers, they will be more professional and be able to improve the quality of learning. Ultimately, the high quality of learning will guide and assist students to learn optimally and perform learning activities effectively.

**Conclusion**

A study on the effect of teacher training and the level of education on the quality of learning has been conducted. Specifically, several points are concluded as follows:

a. Teachers with experiences in attending training programs have a better performance and, consequently, they are able to create or manage a conducive learning based on the need of the class. Moreover, professional development trainings support teachers to provide a constructive, acceptable environment for learning. As a result, the students will pay attention to the materials delivered by the teacher, instead of daydreaming, having off-subject conversation, or being busy with mobile phone.

b. That teachers who have experience in training tend to have good learning performance, in turn can create or organize learning that is appropriate to students’ learning needs. Teachers who have experience in career coaching training tend to have quality learning that can be accepted by students, students are not sleepy in class, do not speak alone, do not play cell phones and concentrate on what is taught by their teacher.

c. The academic background that is linear to the subject area being taught by a teacher will improve the quality of learning and, eventually, will assist the student to have better performance. Briefly, the linearity between the academic background and the field of duty should be emphasized by policy/decision makers in assigning a teacher. They include the principal, the local office of education and culture, the provincial office of education and culture, and the ministry of education and culture. Private schools, particularly, should gain more attention instead of being neglected by the policy/decision makers.

d. The academic background and the attendance of professional training programs relevant to the field of duty simultaneously have a positive impact on the fluency of the teacher to carry out the task. Teachers with academic background linear to both the subject delivered to the class and training programs will be more prolific and effective in transferring the materials to students. Ultimately, the students are able to receive the lesson optimally.

**References**


Developing Learning Model of Life Skills-Based Courses in University

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Abstract. This study aims to arrange the course learning model with the life skills perspective in every learning process at Higher Education. Thus, graduates are expected to have qualified life skills value and benefit value in which learning model starts from syllabus, Lecture Quality Plans (called RMP) and learning model implementation applied in Teaching-Learning Stage for Genre-Based Approach. The method used was research and development. Data were collected through observation, in-depth interviews, document studies, and policy studies. Data validity was maintained by conducting the triangulation of sources, methods, investigators, and theories, while data analysis in sequential periods used SWOT analysis, interactive analysis, and implementation analysis. The results revealed that 1) The results of the field test and feasibility test of the syllabus in the Teacher Training and Education Faculty of Universitas Muhammadiyah Surakarta (called FKIP UMS) showed that all courses could include life skills in which not all life skills should be included in learning, then, at the level of learning process implementation and evaluation, it could focus not only on developing academic skill or vocational skill (hard skill) but also on aspect of developing life skill components which could be fully included. Implementation of Special Skill Learning Outcome (called CP-KK) of the courses could use various learning methods and assignment forms, and also life skill content could be developed in a complex manner. 2) The results of field tests and feasibility tests on RMP on the courses indicated that the use of learning methods including learning approaches, strategies, and techniques could use various approaches. Many approaches are based on academic competence, vocational competence, and also on cross-curriculum competency (social and personal competencies). 3) Implementation of stages could show the existence of stages specifically, sustainably, and consistently to simultaneously develop the four components of life skills (social, personal, vocational and academic competencies). The learning model can be implicitly mentioned in the syllabus and RMP.

Keywords: Learning, learning experience, life skills.

1 Introduction

Data from the Central Bureau of Statistics (called BPS in Indonesia) in August 2015 showed that undergraduate unemployment rates reached 6.40 percent from 7.56 million people. While the Statistics Official News No.41/05/th.XXII dated May 6, 2019, showed that the average Open Unemployment Rate (called TPT in Indonesia) from February 2016 to February 2019 has decreased respectively: February 2016 (5.50%), February 2017 (5.33%), February 2018 (5.13%) and February 2019 (5.01%). While the character of the working population according to the level of education is reported: University 12.61 million people (9.75%), Diploma 3.65 million people (2.82%), Vocational High School 14.63 million people (11.31%), Senior High
School 23.30 million people (17.86%), Junior High School 22.97 million people (17.75%) and Elementary School 52.40 million people (40.51%). This means that there is a lack of graduates who cannot meet the demands of the workforce. Dwi mentioned there is a lack of life skills [1]. This is reinforced by the statement of the Minister of Manpower, M. Hanif Dhakiri, who considers the Higher Education only oriented to the mastery of science and technology. Then what is the significance of life skills for job seekers?

The National Association of Colleges and Employees in 2002 survey pinpointed that there are at least nineteen abilities needed in the world of work. The interesting thing about the survey is the achievement index as one of the manifestations of academic ability as the performance value of higher education institutions is in the 16th position. While the order of 1-7 is occupied by life skills, such as; communication, integrity, cooperation, interpersonal, work ethic, initiative, and adaptation. The government through Government Regulation Number 19 Year 2005 had responded to the importance of life skills for students. Article 13 stated that life skills education must be included in the curriculum including personal, social, academic and vocational skills. This means that higher education is not only mastering knowledge and technology but also developing certain skills, attitudes, and values that can be reflected in the graduates’ lives. Viewed from the life facts nowadays, it is showed; 1) the occurrence of changes in life in society as a result of technological development and the social environment which has narrowed the opportunities for the development of social skills and personality and; 2) the adjustment to life competition (both personal life and work life) requires mastery of hard skills and soft skills [2].

Some universities in implementing the message of article 13 are still half-measures. At the level of the preparation of the curriculum and syllabus, it most has included the development of hard skills and soft skills, but at the level of the implementation of the learning process, it is difficult to carry out well. In the learning process, it tends to emphasize knowledge aspects but emphasizes only a little aspect of skills, while, life skills are not included yet. This includes what happened at the Universitas Muhammadiyah Surakarta in Teacher Training and Education Faculty (called FKIP UMS). The results of the team’s review of the curriculum and syllabus show that all courses have actually contained life skills, but at the level of the implementation of the learning process and evaluation, it is still focused on developing academic or hard skills which have not included aspects of life skills development yet. Based on the description above, the problem of this research was focused on “How to develop courses learning model based on life skills?” The focus of this research is then detailed in three stages. The first stage was focused on identifying and analyzing syllabus and Lecture Quality Plans (called RMP) and analyzing the implementation of life skills-based learning at the FKIP UMS. The second stage was developing the draft model (develop a preliminary form of the model) and the third stage was drafting the syllabus, RMP and life skills-based learning courses that are implemented in the Teaching-Learning Stage for Genre-Based Approach. At the end of this study, it compiled the course learning model based on life skills implemented in the Teaching-Learning Stage for Genre-Based Approach which for the further stage was disseminated and implemented in learning.

The innovation targeted in this study is to contribute to the development of course learning models that support the goal of national education to form a plenary human being through education oriented to life skills-based learning. The application of life skills-based learning models from the results of the study is very beneficial for education at the Teacher Training and Education Faculty in creating plenary graduates.

The World Health Organization (WHO) defined life skills as “the abilities for adaptive and positive behavior that enable individuals to deal effectively with the demand and challenges of
everyday life”. A life skill is the ability of one to behave positively and adaptively that can be used effectively to deal with the demands and challenges of survival. UNICEF emphasized that “life skills is a behavior change or attitude development approach designed to address a balance of three areas: knowledge, attitude, and skills”. A life skill is considered as an approach to change or behavior development aimed at forming someone to have a balance between knowledge mastery, attitude, and skill.

Related to life skills perspective learning, it is an effort to empower human beings with all the competencies they have to carry out positive activities to improve a better quality of life [3]. Life skills will have broad meaning if the learning activities designed to provide a positive impact on university students to help to solve life problems as well as to overcome the life problems proactively and reactively to find the right solution [4][5]. To achieve these things, it needs to implement broad-based educational principle that is not merely oriented to the academic or vocational field, but also provides learning how to learn as well as learning how to compare and not only learning theory but also practicing to solve everyday life problems (Bentley in Asmani [3]).

This study develops a life skills perspective model from Bentley which will be implemented in learning university courses related to the scientific basis of the art of teaching. In detail, it is described in the form of schematics as follows:

Teaching-Learning Stages for A Genre-Based Approach is a learning approach based on various steps in which this approach is widely used for skills formation so it is very appropriate to be adopted for learning that will help students mastering life skills because it emphasizes more on mastery of skills and application in socio-cultural [6].
This approach is more based on the achievement of competencies, namely academic competence, vocational competency and cross-curriculum competency which are categorized social and personal competencies. Four stages are carried out to provide opportunities for students to gain learning experiences through individual, paired and group activities, including Building knowledge of field in which students are gradually invited to build an understanding of what is learned and the things associated with it. Modelling, it means students will understand something easily if introduced to things that already exist or are similar to models to build their understanding of something. Joint construction, in this stage, it is to accelerate mastery of what is learned in which students are involved in various activities in a large or small group, and/ or in pairs, to gain experience from others. The last stage is Independent construction. It is to strengthen understanding and skills through individual learning experiences.

The learning model that can be used is an active learning model that emphasizes student-oriented, and is multi-model for each stage, according to the character of the courses and expected competencies. Learning models include: problem based learning, cooperative learning, collaborative learning, project based learning, contextual instruction, small group discussions, simulation, discovery learning, and directed learning. Thus, in a gradual, sustainable, and consistent manner can simultaneously develop four components of life skills consisting of social, personal, vocational and academic competencies.

As viewed from a message by the Republic of Indonesia Law No. 20 Year 2003 that education is a conscious and planned effort to realize a learning atmosphere and learning process so that students actively develop their potential to have religious-spiritual powers, self-control, personality, intelligence, noble character and skills needed by themselves, society, nation, and state. It is appropriate for the learning process to be more oriented to life skills-based learning in which it is no longer based on a supply-driven approach. In the supply-driven approach, what is taught tends to emphasize on school-based learning which is not necessarily fully suitable with the real-life values faced by students. A suitable approach is a demand-driven approach in which what is taught is a reflection of real-life values faced by students and will be taught through the Teaching-Learning Stage for Genre-Based Approach.

2 Method

The type of research used was Research and Development means the research process used to develop and validate research products [7]. The steps of this model include ten activities, include; 1) Preliminary study, 2) Research planning, 3) Initial product development, 4) Initial field trial (limited), 5) Revision of the results of limited field test, 6) Broader field test, 7) Revision of field test results, 8) Feasibility test, 9) Revision of the results of the feasibility test, and 10) Dissemination and socialization of the final product.

3 Result and Discussion

Syllabus of life skills-based courses in FKIP UMS

The results of the field tests and feasibility tests of the curriculum and syllabus of the courses in FKMS UMS showed that all courses could contain life skills. At the level of implementation, the learning process and its evaluation as contained in the syllabus were not only focused on developing academic or hard skills but also could fully incorporate aspects of life skills
development. In implementing the Special Skills Learning Outcomes (called CP-KK), each course could use various learning methods and assignments in which the life skills content is quite complex to be included in the courses as examples of courses contained in the syllabus in the following table:

**Table 1. Syllabus of five courses of FKIP UMS Process**

<table>
<thead>
<tr>
<th>Course</th>
<th>Life skills Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy of Education</td>
<td>Awareness of self-existence as a God being, social being, and environment being (KD)</td>
</tr>
<tr>
<td>103402/2 credits</td>
<td>Awareness of self-potential and encouragement to develop (KD)</td>
</tr>
<tr>
<td></td>
<td>Information seeking skill (KBr)</td>
</tr>
<tr>
<td></td>
<td>Processing information &amp; making decision skill (KBr)</td>
</tr>
<tr>
<td></td>
<td>Wise and creative problem-solving skill (KBr)</td>
</tr>
<tr>
<td></td>
<td>Listening skills (KK)</td>
</tr>
<tr>
<td></td>
<td>Speaking skills (KK)</td>
</tr>
<tr>
<td></td>
<td>Reading skills (KK)</td>
</tr>
<tr>
<td></td>
<td>Writing skills (KK)</td>
</tr>
<tr>
<td></td>
<td>Skill as a colleague (KBk)</td>
</tr>
<tr>
<td></td>
<td>Skill as an empathetic leader (KBr)</td>
</tr>
<tr>
<td>Management of Education</td>
<td>Awareness of self-existence as a God being, social being, and environmental being (KD)</td>
</tr>
<tr>
<td>302302/2/2 credits</td>
<td>Awareness of self-potential and encouragement to develop (KD)</td>
</tr>
<tr>
<td></td>
<td>Personal skills (KP)</td>
</tr>
<tr>
<td></td>
<td>Information seeking skill (KBr)</td>
</tr>
<tr>
<td></td>
<td>Processing information &amp; intelligently making decision skill (KBr)</td>
</tr>
<tr>
<td></td>
<td>Wise and creative problem-solving skill (KBr)</td>
</tr>
<tr>
<td></td>
<td>Listening skill (KK)</td>
</tr>
<tr>
<td></td>
<td>Speaking skill (KK)</td>
</tr>
<tr>
<td></td>
<td>Reading skill (KK)</td>
</tr>
<tr>
<td></td>
<td>Writing skill (KK)</td>
</tr>
<tr>
<td></td>
<td>Skill as a colleague (KBk)</td>
</tr>
<tr>
<td></td>
<td>Skill as an empathetic leader (KBk)</td>
</tr>
<tr>
<td></td>
<td>Skill for identifying variables &amp; relationships with one another (KA)</td>
</tr>
<tr>
<td></td>
<td>Formulating hypotheses skill (KA)</td>
</tr>
<tr>
<td></td>
<td>Designing &amp; carrying out research skill (KA)</td>
</tr>
<tr>
<td></td>
<td>Basic vocational skill (KV)</td>
</tr>
<tr>
<td></td>
<td>Special vocational skill (KV)</td>
</tr>
<tr>
<td>Curriculum and Learning</td>
<td>Special vocational skill (KV)</td>
</tr>
<tr>
<td>302303/2 credits</td>
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Notes:

KD : Self-Awareness (Personal Skill/ Generic Life Skill)
KBr : Thinking Skill (Personal Skill/ Generic Life Skill)
KK : Communication Skill (Social Skill/Generic Life Skill)
KBk : Cooperation Skill (Social Skill/Generic Life Skill)
KA : Academic Skill (Specific Life Skill)
KV : Vocational Skill (Specific Life Skill)

2. Lecture Quality Plan (RMP) of Life Skills-Based Courses

The results of the field test and feasibility test on RMP in the course showed that the use of learning methods in the form of learning approaches, strategies, and techniques can be varied. A more competency-based approach means to achieve academic, vocational, and cross-curriculum competencies that are social and personal. The stages to provide opportunities for students to obtain learning experience can be done through individual activities (often), in pairs (rarely), in groups (sometimes) through four stages including: First stage, through the Building knowledge of fields in which students are gradually invited to build an understanding of what is learned and the things associated with it. This stage is done to explore and introduce topics/media/cases/literacy to be discussed. If the text/media/case/literacy to be taught is a procedure, then the lecturer and students are involved in conversations related to the text/media/case/literacy. Learning activities developed include: 1) Brainstorming. It is to develop students’ readiness and understanding of text/media/case/literacy to be conveyed, 2) developing students’ understanding of vocabulary/relevance between cases in the media/relevant problematic/relevant literacy development, 3) visual sequencing (students compile images in visual media), 4) discussion of visuals related to context (studying the relevance of visual images to context), 5) discussion of experiences in indigenous culture (study of relevant experience in local culture), 6) discussion about experience in the target culture (relevant experience study in language culture), 7) exercise of general text identification (practicing recognizing text/media/problem/general literacy with the type of text/media/problem/literacy to be discussed), 8) exercise of text/media/problem/literacy categorization (categorization of text/media/problem/literacy extracted), 9) predicting activities (the practice of text/media/problem/subsequent guess literacy) and 10) suitable activities (practice making match pictures with words, words with synonyms, etc.), and 11) introductory activities (the practice of introducing text/media/problematic/literacy writing formats).

In the second stage, through Modelling, students are introduced to things that already exist or are similar to models to build their understanding of something. Modelling is oriented to concentration, increased motivation, delivery of competencies, direction, instructions, signs, and examples. Students are easier to understand something if introduced to things that already exist or are similar to models to build their understanding. This stage is the stage of exposure to the material being taught. At this stage, the skills being trained are analyzing types of text/media/problematic/literacy, reading, and writing.
Life skills-based learning activities developed in the Modelling stage include: 1) The lecturer shows the model through exposure to text/ media/ problem/ literacy and mentions it in other forms/ synonyms/ models/ categories, then prepares it in front by explaining; 2) After hearing directly from the lecturer, the role then switches from lecturer to student. Students get the opportunity to demonstrate and practice their abilities. There are two choices that the lecturer can give to students. The first choice is students are asked to repeat the whole procedure/ object/ material that has been explained, and the second choice is students are asked to answer questions related to the procedure/ object/ material that has been explained. 3) When the class goes on the writing cycle stage, students are introduced to the language of writing the text through the reading method (exposure information by reading). Students are given examples of procedures/ objects/ material and the lecturer explains particular things to them, especially the generic structure of the text/ media/ problem/ literacy. 4) When the class is in the oral cycle (listening and speaking), the lecturer provides modeling to students. For instance, how to make a title, how to arrange an organizational structure, etc. 5) Demonstrate visually, auditorily and kinaesthetically how to make something by practicing it directly. 6) Students get the opportunity to demonstrate and practice their abilities to demonstrate based on the modeling.

Third, Joint construction means to accelerate mastery of what is learned in which students get the opportunity to carry out various activities in groups both large, small and/or in pairs. this is done to obtain experience from others. Life skills-based learning activities that are developed in the Joint construction phase, include:

a) To stimulate student curiosity, activities that can be carried out include: (1) Asking complex questions/problems that have several possible answers. This is intended to stimulate student curiosity about the material to be taught. The questions can be daily questions such as how to do things, definitions, ways of working (procedures). (2) Encouraging students to think, make schemes or diagrams, and make a general assumption. (3) Accommodating all student assumptions. It means creating curiosity about the real answer. As a variation, ask students to pair up and make predictions collectively.

b) To stimulate students to learn independently by: (1) Delivering the text/ object/ material model to students, accompanied by several questions/problems in sequence from simple to complex. (2) Providing opportunities for students to study the text/ object/ material model independently. (3) Asking students to mark material that they do not understand and arrange questions in writing as much as the material marked. (4) Providing opportunities for other students to respond to the questions until all student’s questions have been discussed. (5) Providing explanations as a means of stabilization of answers to student’s questions. (6) Asking students to solve problems independently, (7) Asking students to present answers to the problems given and allowing other students the opportunity to comment or suggest other possible answers. (8) Providing clarification or stabilization of answers to questions. If students face difficulties, the lecturer needs to provide some information that guides them.

c) To stimulate students to study in pairs, through activities: (1) Providing opportunities for students to choose partners, (2) Giving different problems to each partner to solve, (3) Asking each pair to exchange answers and make new answers for each problem, and also correct each partner’s answer, (4) Asking each pair to return the answer to the owner if all partners have written new answers, (5) Providing opportunities for the pairs to compare the answers of each pair with the answers from other pairs in the class. (6) Asking all students to choose the right answer for each question and present the best answer. (7) Giving reward a student who has the best answer.
d) To stimulate students to learn together in the group through activities such as (1) Providing opportunities for students to study text in a small group or large group, (2) Asking students to write down unknown things in the form of questions. (3) Providing opportunities for discussion groups to discuss questions from each group member. (4) Giving the task of problem-solving to each group, with clear instructions. (5) Giving roles to group members to work in groups, for example as a facilitator, note-taker, spoke person, and timer. (6) Providing opportunities for each group to solve problems and present the results of discussions in front of the class.

e) To stimulate students to learn in the form of learning tournaments, using (1) Divide students into some groups of two to eight students. Make sure that the group has the same number of members. Ask each group to name the group. (2) Provide teaching materials to the group to learn together. (3) Make several questions that can test the level of understanding of the material provided. Use a format that facilitates self-assessment, (4) Ask students in each group to answer individually. (5) Ask group members to check the answers of friends on the team. (6) Conduct class discussions to determine the correct answer to the question. (7) Ask students to count the number of questions they answer correctly and ask them to give a score. (8) Ask students to combine their scores with their team members to have a group score. (9) Announce the score of each group and give rewards or prizes or applause to the group that gets the highest score.

This tournament can be done with the number of rounds varying and the time of each round can be varied but make sure that each round of students carries out a study session. With student agreement, the lecturer can give penalties (punishments) to students who provide wrong answers with a reduction in value (eg. -1 or -2) and give value to students who do not answer.

In the fourth stage of Independent construction, the students get the opportunity to strengthen their understanding and skills through individual learning experiences. Life skills-based learning activities developed in the Independent/Individual Construction stage are students start to apply their learning knowledge and experience independently. This activity is the highest stage in mastering the material which means as the ability to independently produce an oral or written monologue text. If it is deemed necessary, the lecturer can add activities to make text conversations independently under the theme being taught. At this stage, text sharing is expected to occur by displaying text and discussing it in the lecture. This activity as part of building a positive attitude, to mutual respect for the peers’ performance. The stages of this activity are carried out through (1) forming groups with some texts learned by students, (2) providing opportunities for each group to obtain much information, concepts, or skills to be conveyed to other students. (3) providing the opportunity for each group to arrange ways to present or teach the texts to other students. (4) giving students the opportunity to summarize or make an overview of the lecture that day, (5) motivating students to review lecture material and or complete assignments independently or in groups, (6) giving each group the opportunity to present their lecture, and give appreciation for their efforts, (7) as an alternative to learning this model is to ask students to teach or provide guidance to other students individually or in small groups.
The learning model used in the course is an active learning model that emphasizes student-oriented, and is multi-model for each stage, according to the character of the courses and expected competencies. The implementation of the stages can show the existence of stages specifically, sustainably, and consistently to develop simultaneously the four components of life skills (social, personal, vocational and academic competencies). Learning models can be specifically or implicitly mentioned in the learning model, for example; problem based learning, cooperative learning, collaborative learning, project based learning, contextual instruction, small group discussion, simulation, discovery learning, or directed learning.

The results of field test and RMP feasibility test of several life skills-based courses can be stated that each course in carrying out Learning Outcomes in Lecture is conducted through indicators, while, delivering teaching material is done using different learning methods in the form of approach, strategy, and technique. Based on the analysis results of the RMP course, it can be stated that the Learning Method (approach, strategy, technique) chosen by most courses include:


The learning approach used by each university course is based on various steps and is oriented to the formation of skills so that most courses have led to learning that will help students master life skills because they emphasize mastery of skills and application in socio-cultural.
3. Learning implementation of life skills-based courses

The implementation of the learning of education model based on life skills perspective that is implemented in subjects related to the scientific basis of the art of teaching can be reported as follows, (1) The learning model can fully use active learning model that emphasizes on Student Oriented, and in the learning process can be multi-modeled for the learning stage, so, the direction of learning objectives leads to the expected character of the lesson topic and competency. In developing life skills-based learning, almost all courses can be implemented with life skills-based learning especially those related to Specific Life Skills, including academic skill and vocational skill. Furthermore, it can develop a life skills perspective model that has broader educational principles which are not only oriented to academic skills (identifying variables and relationships, formulating hypotheses and designing and carrying out research skills) or vocational skills (basic and specific vocational skills) only. (2) Learning in each subject can fully lead to four components of life skills which include: a) Personal skill, in which some courses routinely carry out learning that leads to Self-Awareness that includes awareness of self-existence of as a God being, social being and environmental being; and awareness of self-potential and encouragement to develop. Learning implementation in each opening activity of the lecture begins with reading prayers and short sura in the Quran led by one of the students based on a schedule prepared by them. For students who are not fluent in reading, there will be self-awareness and encouragement to develop themselves to read the Quran. For Thinking Skills consisting of information-seeking skill; processing information & intelligently making decision skill; and wise and creative problem-solving skill, almost all courses use this approach as a means to develop student life skill in which the methods used are very varied including (1) constructivistic, (2) cooperative learning individual model, (3) reviewing concepts, discussing problems, discussing various elements and functions based on expert opinion, (4) reviewing components, concepts and applications, (5) observing, (6) explaining and reviewing material, (7) question and answer, (8) group discussions, (9) demonstrations, (10) group and individual assignments, (11) lectures, (12) class discussions, (13) paper presentations, (14) method: Active learning, Strategy: reading guiding strategy, (15) Method: discussion, Approach: Active learning, strategy: Problem Based Introduction, (16) method: discussion, Approach: Active learning, strategy: Snowball Throwing, (17) method: discussion, Approach: Active learning, strategy: learning starts with a question, (18) method: discussion, approach: Active learning, strategy: everyone is here teacher strategy (19) method: assignment, approach: Active learning, strategy: everyone is a teacher here; (20) methods: discussion, approach: Active learning, strategy: role playing, (21) method: discussion, Approach: Active learning, strategy: jigsaw, and (22) method: discussion, approach: Active learning, strategy: Student Teams Achievement Devision (STAD). b) Social Skill, this skill includes communication skills (listening skill, speaking skill, reading skill and writing skill); and cooperation skills (skill as colleagues and skill as an empathetic leader). Implementation for Social Skill each course can use a method such as a group discussion, assignment presentation and report (powerpoint and written), preparation of the paper, group/ independent/ paired assignment, questioning. c) Academic Skills include the skill to identify variables & relationships with one another, skill to form hypotheses; and skill to design & carry out research. Almost all courses incorporated in educational courses have not implemented these skills yet in the learning process because these skills are closely related to research methodology where this course is included or conducted in the third or fourth semester, while, the Education courses are held in semester one or two. d) Vocational skill, this skill is divided into two skills including basic vocational skill and specific vocational skill.
4 Conclusion

The results of field test and RMP feasibility test and course syllabus indicate that all courses can be included in the scope of life skills in which at the level of learning process implementation and evaluation can be focused on developing academic or vocational skill (hard skill), and can fully incorporate aspects of life skill development. In implementing Special Skills Learning Outcomes (called CP-KK), each course can use various learning methods and assignments that have sufficient soft skills.

The results of the field test and RMP feasibility test in several courses show that the use of learning methods in the form of learning approaches, strategies, and techniques used a varied approach. A competency-based approach means to achieve academic, vocational and cross-curriculum competencies that are social and personal competency. Stages to provide opportunities for students to obtain learning experience through individual, in pairs or group activities are through four stages which include: the first stage is through the Building knowledge of the field. It means students are gradually invited to build an understanding of what is learned and things associated with it. In the second stage, through Modelling, students are introduced to things that already exist or are similar to models to build their understanding of something. Third, Joint construction is to accelerate mastery of what is learned in which students are provided the opportunity to carry out several activities in large or small groups and/ or in pairs. This is done to obtain experience from others. While the fourth stage, namely Independent construction, means students get the opportunity to strengthen their understanding and skills through individual learning experiences.

The learning model can fully use active learning model that emphasizes Student Oriented, and in the learning process, it can be multi-model for the learning stage so that the direction of learning objectives can lead to the expected character of lesson topic and competency in developing life skills-based learning almost all courses can be implemented through life skills-based learning especially those related to Specific Life Skills including academic skill and vocational skill. All things considered, it needs to develop a life skill perspective model and has the broader educational principle that is not only oriented to academic skill (identifying variables and relationships skill, formulating hypotheses skill and designing and carrying out research skill) or vocational skill (basic and specific vocational skill).

The implementation of the stages has shown that there are stages that are specific, sustainable, and consistent to simultaneously develop four components of life skills (social, personal, vocational and academic competencies). Learning model specifically or implicitly can be mentioned in the learning model, as an illustration; problem based learning, cooperative learning, collaborative learning, project based learning, contextual instruction, small group discussion, simulation, discovery learning, or directed learning. Learning in each course can lead to four components of life skill including Personal Skill, Social Skill, Academic Skill, and Vocational Skill.

5 Acknowledgement

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References


Undergraduate’s Perception toward Corporal Punishment

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Abstract. This study is conducted to find out the undergraduate’s perception toward the corporal punishment that may happen in the school. The subjects of the research are sixth semester students of English Department of Teacher Training and Education of Universitas Muhammadiyah Surakarta. The data were collected through close and open questionnaire and analysed using content analysis. Based on the analysis of the data, it is concluded that most undergraduates experienced corporal punishment in the previous education before studying in the university. The experience of suffering corporal punishment leads the undergraduate’s perception toward the corporal punishment.

Keywords: Undergraduate, Perception, Corporal Punishment

1 Introduction

Discipline is believed as something to be developed in the school. It is very important for the success of the students in education. As mentioned by Rosen [7] discipline is something to develop self-control, behavior, and character. In addition, Eggleton [3] states that discipline is used to make students obey the rules and build good behavior. Corporal punishment is usually related to school discipline even though the term discipline itself needs to be redefined by education actors. [8], [7]. School disciplines with any security methods, school rules, and corporal punishment, are frequently used by the teachers as methods of managing students’ conducts in class (Cameron, [2].

Although discipline is important, but it is necessary for the teacher to avoid punishment in conducting discipline to the students. The use of punishment is irrelevant to the Convention on the Right of the Child. According to the Convention on the Right of the Child, the child should grow up in a family environment, in an atmosphere of happiness, love and understanding, and is protected against all forms of discrimination or punishment on the basis of the status, activities, expressed opinions, or beliefs of the child's parents, legal guardians, or family members [9].

In practice, the results of a case study in Tanzania showed that 86% of the teachers preferred Corporal punishment and continue using it as the only alternative punishment strategy although the majority of students agreed that corporal punishment should be eliminated. It is due to the condition that it is harmful and causes students skip classes and absent. The study recommends the appropriate use of harmless strategies of executing corporal punishment [5].
There is also no evidence that corporal punishment promotes children’s learning in the classroom. In some cross-sectional study, school children who received one or two types of school corporal punishment scored lower on some subject matter. The other evidence also shows that children who attended a school that allowed corporal punishment (slapping, pinching, hitting with a stick) had lower lower intrinsic motivation than children who attended a school that did not allow corporal punishment [9].

Corporal punishment, however, is still used by teacher in classroom and school activities. In this article, the writer will discuss the perception of some undergraduates toward corporal punishment. This will also discuss their background experiences when they became students and were suffered with corporal punishment.

2 Method

The research was conducted to 53 undergraduates of English Department in Teacher Training and Education of Universitas Muhammadiyah Surakarta. The data were collected through close and open questionnaires and was analysed by using content analysis.

3 Result and Discussion

Based on the results of calculations on the questionnaire, there were 92.5% of respondents who had received physical punishment from the teacher. Only 7.5% had never been subjected to physical punishment. The punishment given by the teacher varies from teacher shouting, directing students to push up, ordering students to do scout jumping, pulling ear, hitting student with a ruler, ordering student to run around the school field, hitting student with wood, ordering student to front roll, hitting the student’s hand by using thick paper, and ordering student to clean the school environment.

The causes of the corporal punishment also vary including being busy in class, not doing assignments, talking to friends when the teacher explains, and being late to attend the class. Moreover, there were some conditions that need to be clarified before the teacher gives an action. The following are the examples of the cause of punishment: protecting a friend who is on bully, not cutting nails, broken tables, and late. Moreover, one of the respondents stated that she did not know why she was punished.

From those who were punished, there were 43% of the respondents stated that they were once have been punished by their teacher, 47% stated that they were sometimes punished by the teacher, 6% of the undergradates stated that they were frequently punished by their teachers, while 4% of them had never been punished by the teacher. It indicates that most of the undergraduates were punished when they were students in elementary or secondary level. Based on the questionnaire an undergraduate that has never been punished thought that punishment is needed, while another thought that punishment is not needed. Based on the respons of the undergraduate who has never been punished that agree punishment is needed, the kind of punishment that must be applied should not be a corporal punishment. However, most of the students who had ever been punished with corporal punishment agreed that corporal punishment was needed. Based on the description above there was some possibilities that the experience of corporal punishment gives effect to the undergraduate’s perception on the punishment.
There were also some perceptions of the undergraduates on the effect of the punishment to their physical and psychological condition. Based on the result of the questionnaire, there were 31% of the undergraduates who stated that the punishment hurt them physically, while 69% stated that it did not hurt them physically. However, the punishment gives worse effect to their psychological condition. Based on the analysis of the questionnaire, it is found that there were 44.2% of the undergraduates that thought punishment gave psychological effect to them. There was higher percentage of the undergraduates who felt that the punishment gave worse psychological effect toward them (44.2%) compared to the physical effect (31%). It is relevant to Robinson that question the effectiveness of corporal punishment and underline the side effects of corporal punishment such as running away, fear of teacher, feelings of helplessness, humiliation, aggression and destruction at home and at school, abuse and criminal activities [6]. Gershoff also attributes corporal punishment to increased aggression and lower levels of moral internalization and mental health and adds that adults who were corporally punished when children are more likely to be criminals, be violent with their sexual partner, and spank their own children [4]. The psychological effects may be more harmful than physical effects. Therefore teacher should examine the reasons for student behavior problems to solve this problem because many factors contribute to student behavior problems apart from the poor school and classroom management.

When they were asked about whether the corporal punishment has positive impact to the students, 56.2% agreed that it has positive impact toward students while 43.8% disagreed that it has positive impact toward students. Although the ratio is almost the same between the number of those who agree that punishment has a positive effect on students and those who disagree that punishment has a positive effect on students, the majority of respondents see punishment as an alternative that has a positive impact on students.

The questions are also given about whether they will give corporal punishment to their students if students commit violations or break the rules. There are 85.7% of undergraduates who stated that they would punish the child, while 14.3% of them stated that they would not give punishment. This description indicates that the majority of the undergraduates has a potential condition to punish the students when the students break the rules.

The result of the study indicated that there are some corporal punishments that are irrelevant toward the action. As an example of the above findings, there is a child who was punished of defending a bullied friend. A respondent also experienced corporal punishment for not cutting his nails. It is relevant to the result of Agbenyega reports on the practice of corporal punishment in two basic schools in the Greater Accra District in Ghana [1]. The findings reveal that an overwhelming majority of the teachers (94%) use corporal punishment to enforce school discipline. The results further indicate that the majority of the teachers in both school sites administer corporal punishment to students who perform poorly in academic work. This shows that punishment is sometimes considered to be carried out unfairly on children.
4 Conclusion

Based on the above discussion, it can be concluded that although many countries have ratified CRC, the case of corporal punishment still happens. The teacher’s treatment toward disobedient students and the potential practice of corporal punishment may be caused by the teachers experiences from suffering corporal punishment when they became students. Therefore, it is recommended that there must be socialization of positive discipline as the alternative of building student’s character instead of using corporal punishment.

References

Exploring School Preparedness to Develop Safe School in Disaster-prone Areas

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Abstract. Schools become one of the public facilities that are vulnerable to disasters. Damage school facilities can cause the future of the young generation to be threatened. Schools in disaster-prone areas must have preparedness in coping disasters so children will safe and comfortable while in school. This research is a mixed research, with principals and teacher as respondents. Data collection techniques using questionnaires, interviews, and documentation. The variables used to measure school preparedness are policies, emergency response plans, disaster warnings, and resource mobilization. The results of the study indicate that the preparedness of schools to realize safe schools has an unprepared index, with a value of 50.8. Aspects that need to be improved to develop safe schools include the presence of emergency response plans, disaster warnings, and resource mobilization. Schools still very limited in providing disaster warning systems and disaster training, so they must prepare policies, infrastructure, and suprastructure of disasters.

Keywords: Safe school, preparedness, disaster area

1 Introduction

Indonesia is a "market" of disasters; numerous types of disaster befall Indonesia. Based on the data from BNPB (The National Disaster Management Agency) in 2016, the disasters doubly increased, compared to those in 2007; there were 816 disasters in 2007, while in 2016 it increased to 1985. Indonesian Disaster Information Data (DIBI) in 2019 states that the occurrence of disasters in the period of 2018 - 2019 is 5221. The number of those disasters cannot be avoided by the Indonesian people considering the types of disaster are mostly geological disasters, namely earthquakes, landslides and volcanic eruptions. These types of disaster cannot be stopped by humans; humans can only minimize the impacts of those geological disasters.

Disasters are incidents that cause victims, both casualties and property. In the period of 2018 - 2019, there are around 5086 Indonesians became the victims of disasters (DIBI, 2019).
The large number of victims of the disasters is due to the low level of disaster preparedness that is owned by Indonesians. Community groups that have a high level of vulnerability to disasters are children and women [7]. The cause to this is that children have less access to disaster preparedness, mitigation and rehabilitation [1]. Children's access is very limited; they are not able to independently access disaster information and are very dependent on adults around them. Moreover, children’s vulnerability to disasters is because of their limited understanding of the risks around them, which results in the absence of preparedness in facing disasters [9]. This increases the disaster vulnerability of children.

Children spend most of their time in school, however, as many as 250000 schools or 75% of total schools in Indonesia are in disaster-prone areas (BNPB, 2019). It made school building become one of the buildings that are subjects to disasters. Of all available public facilities, children who are in school during a disaster are the most vulnerable group [11, 15]. In 2015, there were around 26856 school units that have minor to serious damage due to the disaster. The damage to those schools can threaten millions of future generations [5]. When school buildings are damaged, children and young people cannot continue their education. Disaster risk reduction in schools becomes very important given the condition of Indonesia which is subject to disasters [13].

Based on the data, there are still many schools that are not safe for children. A learning environment that has a positive and safe impact is very necessary for students to learn [17], especially in disaster-prone areas. The ultimate goal in education is to prosper and delight students, therefore, the school does not only function as a place to carry out the learning process; it must be able to pay attention to the security and to teach social behavior. Safe schools must be able to balance the physical and psychological security so that a positive learning environment is realized [17].

Safety as a behavior to protect children from risk. Children's safety becomes a special concern because children do not have fear and do not know the consequences of their actions. Elementary school students are students who are in the middle childhood period [6]. Middle childhood period shows that elementary school students have conditions that are psychologically vulnerable, therefore, students will easily experience stress during a disaster. The school environment has a direct impact on student’s welfare. Schools play an important role in disaster management, this is because schools are a source of knowledge and able to improve the students' knowledge and skills in facing the disasters. The teacher is able to encourage the students to develop their psychological responses in disaster perception situations.

Schools can be utilized in disaster risk reduction efforts. Through education, everyone's attitudes and behavior may change. Students who have gained the understanding of disasters will have more knowledge, decreased levels of anxiousness related to hazards and more accurate perceptions of disaster risk [19, 20]. Safe schools must ensure that the learning process goes well, teachers are able to teach and students can learn in a safe environment, so that the students fear can be reduced. Safe schools are the optimal foundation in social, emotional and academic learning. It is because the school’s climate is safe, participatory, and
responsive to each student's activity [21]. Feeling safe at school can enhance classroom engagement, academic success, and overall student well-being [3, 18, 23].

The learning process cannot be carried out in an unsafe environment. To create a safe school environment, especially in disaster-prone areas is a big challenge for schools. Everyone in the school environment must be able to encourage the realization of a safe school, so students will feel more comfortable in school. The teacher is the one among others who is at the forefront of student’s safety issues. The teacher is a person who is very close to the students and able to interact every day with them. However, the teacher often does not know how to help the students in disaster situations. The preparedness of the school in improving the ability to deal with disasters is indispensable for schools in disaster-prone areas, so the students can safely and comfortably learn. The preparedness of schools to realize the safe schools is very important considering 66 million children worldwide are affected by the disaster [8]. Schools have an important role in promoting student’s safety in risk reduction strategies because schools can be easily reached by students to gain knowledge about disaster risk, causes and safety procedures [4]. Therefore, there is a needed for school preparedness in coping disasters, especially for areas that are in disaster prone areas.

2 Research Method

This research was a mixed research, aimed at obtaining a systematic picture of the preparedness of schools in creating safe schools in disaster-prone areas. This research was conducted in Karanganyar Regency, with two schools as the research locations: Muhammadiyah Elementary School Jatiyoso and Muhammadiyah Islamic Elementary School Munggur. Both schools have the higher risk of disaster than the other elementary schools in the area. Muhammadiyah Elementary School Jatiyoso has a risk of landslides, while Muhammadiyah Islamic Elementary School Munggur has a risk of tornadoes. The total respondents in this study were 18 teachers and 2 school principals. The sample used is a saturated sample, so that all teachers and principals of the two schools participated in this study. The data collection techniques used were using questionnaires and doing observations.

The data analysis techniques used was descriptive statistical technique. It was started by measuring the level of disaster preparedness of the teachers and principals. The variables in measuring the level of disaster preparedness for principals include: disaster preparedness policies, emergency response plans, disaster warnings, and resource mobilization; while variables for teachers include: knowledge of disasters, activity plans of disasters, and disaster warnings [10]. The level of disaster preparedness was categorized into 5, namely very ready, ready, almost ready, less ready and not ready (Table 1). From the results of the statistical analysis, the school's preparedness in creating the safe schools in disaster-prone areas was then analyzed.
Table 1. Level of Disaster Preparedness by LIPI

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very ready</td>
<td>80 - 100</td>
</tr>
<tr>
<td>2</td>
<td>Ready</td>
<td>65 - 79</td>
</tr>
<tr>
<td>3</td>
<td>Almost ready</td>
<td>55 - 64</td>
</tr>
<tr>
<td>4</td>
<td>Less ready</td>
<td>40 - 54</td>
</tr>
<tr>
<td>5</td>
<td>Not ready</td>
<td>&lt; 40</td>
</tr>
</tbody>
</table>

3 Result and Discussion

3.1 The Level of the Teachers Preparedness

Teachers are often regarded as people who must be modeled on this matter, therefore the preparedness of teachers in facing disasters greatly influences students' preparedness in facing disasters. If the teacher’s preparedness in facing the disasters is good, the preparedness of the students will be also good, and the vice versa. Furthermore, the teacher has a great responsibility in guiding the students at school. The guidance is not only related to the learning skills but also the social skills. One of the guidances can be in the form of providing knowledge and actions taken during a disaster. Based on Fig. 1, there is an index of 65.33 which indicates that the teacher’s knowledge related to disasters were in the ready category.

The high index of disaster knowledge possessed by teachers is influenced by their experience of facing disasters. Experience, knowledge, and preparedness are inseparable things; they will always relate to each other. Teachers who are in disaster-prone areas definitely know the condition of the areas, even most teachers have been victims of disasters. The experience in facing the disasters is ultimately utilized by teachers to provide knowledge to the students so that the number of the disaster victims can be minimized. Experience will encourage the realization of adaptation in facing the next disasters. By having a disaster experience, a teacher is able to improve his perception regarding disaster risk and is able to strengthen the motivation in disaster preparedness behavior.

Knowledge about disasters can improve teacher’s understanding regarding disasters. Understanding is different from knowledge. Understanding shows that every teacher knows the precautionary actions and the impacts of each action so that the teacher is able to provide good examples to students. The deep understanding of disaster encourages teachers in disaster-prone areas to be able to integrate all the knowledge they have in developing disaster preparedness plans. The teacher's perception of the disaster preparedness plan has an index of
87.74, and is categorized as very ready. The disaster preparedness plans cannot be realized without knowledge and understanding related to disaster. With a good understanding of disaster, the teacher is able to develop a disaster preparedness plan. Disaster preparedness plans will help teachers and the community to always prepare themselves in disaster emergency situations so that the number of the disaster victims can be minimized.

Experience in facing disasters encourages teachers to be more sensitive to early warning systems and makes them more enthusiastic about collaborating in disaster management [2]. In this research, the teacher's perception of disaster warning has an almost ready category, with an index value of 60.3. The low level of teacher’s perceptions on disaster warnings indicates that there was only a limited number of the availability of disaster warning devices in the school. Moreover, it also implies that the devices were rarely available in the schools. Karanganyar Regency is a district that is prone to landslides and tornadoes, however, the availability of the disaster early detection devices is still very limited. The teachers had good knowledge and understanding of disasters, therefore the teachers know the indication of landslides and tornadoes. The disaster warning device that teachers knew and often used when disaster occurred was kentongan. By using kentongan, the teacher were able to provide the information regarding the disaster to the community, especially to the elementary school students. During the learning process, the teacher always gave the students an understanding of the condition of the area and the use of kentongan. To minimize the number of the disaster victims, the elementary school students must know the meaning of each knock of kentongan.

![Fig. 1. Perception of Teachers Preparedness](image)

**3.2 The Level of the Principal’s Preparedness**

The principal is a leader in an educational institution. The school principal who is responsive to disaster problems can encourage the realization of disaster-safe schools, because the principal is a person who is able to formulate the policies in a school. All policies prepared by the school will require the approval from the principal. The principal’s preparedness in facing disasters can be measured through the preparedness policies, disaster warnings and emergency response plans.
In realizing disaster-safe schools, school principals must be able to prepare disaster preparedness policies. The policy will be related to disaster-related regulations in a school. The disaster preparedness policy has an index of 45.83, with the less ready category. This was indicated by the lack of efforts to increase the teacher's knowledge and skills regarding disaster preparedness and budget allocation for school preparedness. Disasters are often considered as "God's act", therefore the school does not have any preparedness in facing disasters. Well-studied emergency practices tend to increase the possibility that staff and students will respond in an informed and predictable manner when they are in real emergency situations at schools. Students will find it easier to know disaster information if it is supported by the disaster policies in school. As students have very limited access to information from outside the school, the disaster policy in their school will greatly encourage their preparedness in facing disasters.

The low index of disaster policy ultimately led to the low index of emergency response plan. The emergency response plan only has an index of 37.50. The proof to this was the absence of maps of landslide and tornadoes evacuation routes and temporary evacuation sites, and there were only evacuation marks. According to Reference 15, students need evacuation routes and temporary evacuation sites so that if disasters occur, people can go to temporary evacuation sites quickly through the right route to reduce the victims’ risks. Not only did the schools fail to provide a route and temporary evacuation site, they also rarely conducted disaster training for teachers and students. The absence of disaster training resulted in the lack of teachers and students’ knowledge and understanding in facing the disasters.

The emergency response plan will be related to the early warning system in the school. If the school has a good disaster emergency response plan, the early warning system will also be good. Based on Fig. 2, the index of early warning system only reached 27.27, which indicates that early warning was in the not ready category. The schools provided a very limited disaster warnings; the schools usually only used kentongan as a disaster warning device. The development of science and technology had not been able to be utilized properly by the schools in disaster-prone areas. If students are late in getting disaster information, students will be more vulnerable to become victims of the disaster. The collaboration between schools, government, and private institutions in realizing early warning devices is needed.

The fact that the schools are located in disaster-prone areas did not encourage the schools to implement policies for integrating disaster material in the relevant subjects or in extracurricular activities. The integration is done to increase students' knowledge and understanding in facing the disasters. Without the integration, the students will not get the updated information of the disasters.
3.3 The Level of School’s Preparedness in Realizing Safe School

The level of school preparedness in facing disasters in Karanganyar Regency is on less ready level, especially in terms of school’s principals. This can be seen from the low aspects of preparedness policies, emergency response plan, and early warning device. The principal had not been able to formulate the disaster policies in accordance with the conditions of the region. Disasters can occur in any place and any time, and if the school does not have the preparedness in facing the disaster, the number of the victims will increase. With the disaster policy in school, teachers and students are able to obtain and implement the disaster information that they already known. The teachers often do not apply the disaster knowledge they have when there are no policies that regulate the disaster in their schools. In this research, teachers have a better index than the principal. The teacher had experience in facing disasters, therefore teacher’s preparedness in facing the disasters was better. Teachers must always be involved in developing disaster-safe schools, especially for schools in disaster-prone areas. The teacher is a person who is close and able to guide students while in school so their role is highly preferred.

4 Conclusion

Indonesia is a country that has a very high disaster risk, however, many schools are still in disaster-prone areas. Schools in disaster-prone areas should be able to become safe schools because students will be easier to learn if they are in safe situations or conditions. Elementary school students are a group that is very vulnerable to disasters. If the school does not have the preparedness in facing disasters, students will be easier to become the victims of disasters. School’s preparedness in developing safe schools requires collaboration between teachers and principals. Even though the teacher has a good preparedness index (71.12), if it is not matched by the good preparedness of principal, a safe school never realized. The principal in the study location has a “not ready” category, with an index value of 36.87. The improvement of the
principal’s understanding of disasters in disaster-prone areas is needed. This understanding can be used by the principal to make disaster policies and plans so the students are able to become a disaster resilient generations. A disaster resilient generation will be realized if the school is able to become a disaster-safe school.

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References


The Effectiveness of the Use of Learning Strategies in Delivering the Materials of Disaster Guide Book in Senior High Schools and Vocational High Schools

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Abstract. Disaster is a natural thing in Indonesia. High vulnerability to it must be balanced with extensive knowledge of disaster, particularly, that of students. They are subjects who are vulnerable to disasters. Disaster education has been being implemented in the learning system by the use of disaster learning guide book in Klaten Regency. This research was conducted to determine the effectiveness of disaster learning guide book in encouraging the students' disaster preparedness. Quasi experimental design was employed in this research. The form of the design used was Nonequivalent Control Group Design. The respondents of this study were students of three senior high schools and those of two vocational high schools. The data analysis techniques used were pre-test and post-test. The results indicate that the use of learning strategies to deliver the materials of disaster guide book in Klaten Regency had various levels of effectiveness. The use of several active learning strategies always shows better results than the conventional learning/lecture. Active learning strategies can be used to deliver disaster materials in both senior high schools and vocational high schools on the grounds that the students had a deeper understanding of disasters.

Keywords: effectiveness, disaster preparedness, disaster guide book, learning strategies

1 Introduction

Disasters can occur anywhere and anytime. A disaster is an unavoidable event and will definitely cause victims. Indonesia experiences various types of disasters, both ecological and geological disasters. From 2018 to 2019, there were around 5,244 disasters and 5,086 victims because of them disasters (Indonesia Disaster Information Data, 2019). The data indicate that Indonesian people possess low preparedness in facing the disasters. Rinaldi (2009) [1] states that the level of preparedness of Indonesian society belongs to the very low category, which is represented by the number of victims when a disaster occurs. Even though the government has carried out socializations about disasters, it has not effective yet in increasing the level of the society’s preparedness.
Disaster preparedness is closely related to the capacity of the society in facing disasters [2]. If the society has a high level of disaster preparedness, the impact of disasters can be minimized, and when community preparedness is low, conversely, the impact of the disaster will be greater. School is one of the public facilities that is vulnerable to disasters. Facts prove that students are among the vulnerable groups during disaster situations. They are the next generations of the nation, so they should be able to be resilient in facing the disaster considering the condition of Indonesia territory which is very vulnerable to various types of disasters. Every disaster, especially those belongs to natural disasters, will be very difficult to be predicted. Therefore, the next generation must have a prepared and resilient attitude in facing the disasters.

Disaster preparedness can encourage the realization of society resilience in facing disasters. To encourage the increase of disaster preparedness, disaster education begins to be taught to senior high school and vocational high school students. Disaster education is one of the direct efforts in reducing disaster risks [3]. Schools play a very important role in reducing disaster risks because schools are the source of knowledge. Schools have a crucial role in promoting student safety as a strategy to reduce disaster risks [4]. Students are able to gain knowledge and understanding of various sciences through the learning activities, and teachers have the competence to encourage them to develop responses towards the disasters.

Disaster education becomes a strategy of many countries for disaster risk reduction. Based on the global report in 2013, disaster education has been integrated in the national education curriculum in many countries [5]. In Indonesia, many schools located in high disaster prone areas have integrated disaster education in their school activities. It is also effective in reducing the loss of property and educating the society about the dangers and risks off the disasters so it increases the society’s resilience and prevents the disaster tragedies in case they reoccur[6].

Disaster education is a complex education because it is rule and law-crossing; it has two dimensions and is positioned within the framework of safe school policy [7]. The complexity of the disaster education system definitely requires human resources who are able to properly and correctly carry out the disaster education program. The disaster education requires a combination of social and science education. The social education trains the students to develop a caring attitude towards other people and the science education is related to the basic knowledge about disasters. The importance of disaster education encourages the Japanese government to integrate it to the education through the introduction of the environmental conditions of where the students live and by undergoing disaster simulations [8]. Disaster education must be started since the early period. This is based on the fact that in every year, a number of 66 million children worldwide are estimated to be affected by disasters [9].

Disaster education will build the students' understanding of the causes, characteristics, and danger impacts, and develop various competencies and skills to enable them to proactively contribute to the process as an effort of disaster prevention and mitigation. The existence of the disaster education is able to change the students' attitudes and behaviors towards various things in life. It is able to encourage people to get to better understand the safety culture during a disaster situation [10]. Someone who learns about disasters has a more extensive knowledge and therefore, will reduce the level of the panic and has the right perception of disasters [11] [12]. Recently, the understanding of the impacts of disasters on children, vulnerable groups, and student companions is an important stage in building resources and disaster programs [13]. Therefore, disaster education must be carried out even though there are various challenges on its management.
Among the countries that have integrated disaster education in schools is Japan. The Japanese government focuses the disaster education on the understanding of the disasters through a scientific approach [14]. The approach encourages students to be more active in the learning activities by building a new knowledge or integrating it with their previous knowledge. Disaster education requires an active, interactive, and action-oriented learning that prioritizes learning experiences and saves emotional learning of students. The existence of the disaster education aims to encourage the students to be active in facing disaster risks, by exploring locality and society, also the social, economical, and political structure and dynamics. There are numerous approaches to integrate the disaster education in schools, one of them is through the use of disaster guide book.

The efforts made in improving the knowledge of disasters must be supported by the existence of guidelines or teaching materials on disaster. The use of teaching materials can make it easier for the teacher to deliver the materials to the students through learning strategies and media. Teaching materials that are supported by the use of learning strategies and media will facilitate the teachers to be more effective and efficient in the learning process. In addition, the students can also actively participate in the learning of the disaster materials through the learning strategies and media employed by the teacher. A disaster guide book has been released by the Regional Disaster Management Agency (BPBD) Klaten in accordance with the regulation of the Regent of Klaten Number 6 of 2014. The disaster guide book was applied to schools in Klaten because Klaten is a regency that is prone to volcanic eruptions and earthquakes. Disaster guide books which contain diverse information about disasters are greatly beneficial to the students in order to understand disaster. Ironically, students are often lazy to read them. Students have various types of learning style, and each learning style has its benefits and shortcomings. Teachers as the providers of disaster information must be able to deliver the whole disaster materials contained in the disaster guide book. Teachers need a strategy in delivering disaster material, therefore, this study focused on the use of strategies in delivering disaster material for senior high school and vocational high school students.

2 Material and Method

This study used experimental research method with quantitative approach. An experimental research study is conducted to determine the effect of certain treatment towards others in a controlled condition [15]. The experiment design used was Quasi Experimental Design. The form of the quasi experimental design used was Nonequivalent Control Group Design. The data analysis techniques were carried out using pre-test and post-test. The pre-test aimed to determine the students’ ability or knowledge before learning the materials of Disaster Learning Guide through the learning strategies and media at the high school level in Klaten Regency. By contrast, the post-test aimed to determine the students’ ability or knowledge after learning the materials. The results of the pre-test and post-test were examined using statistical test to obtain the effectiveness of the learning strategies for the delivery of the materials from the Disaster Learning Guide teaching materials.
3 Result and Discussion

The Klaten Regency Disaster Guide Book released by the Regional Disaster Management Agency is the first disaster guide book and is used as a disaster guide in Klaten Regency. The guide book is a handbook for the schools in Klaten Regency in order to improve their preparedness towards disasters. The Klaten Regency Disaster Guidebook has been used by several schools in Klaten Regency, but the identification of the learning strategies that can be used to teach the materials of the book has never been done. The combination of the use of the Klaten Regency Disaster Guidebook and the application of the appropriate strategies are expected to increase the preparedness of students in the school. The use of the disaster guide books and the application of the strategies of delivering the knowledge to each sample school is explained as follows:

A. SMAN 1 Karanganom

The research to examine the effectiveness of the Klaten Regency disaster guide book at SMA Negeri 1 Karanganom involved one control class and one experimental class. The classes that participated were X MIPA 1 class as the control class and X MIPA 2 class as the experimental class. The number of the students in the control class was 27 students, while that of the experimental class was 31 students. The study was conducted for two lesson hours (90 minutes). It began with a pre-test in both the control class and the experimental class to determine the level of the students' initial knowledge about disasters. In the next stage, the materials derived from the Klaten Regency disaster guide book were learned. The methods in delivering the materials were categorized into two, namely lecture method in the control class and True and False method in the experimental class. In the final stage, the researchers carried out the post-test to measure the students' knowledge level after learning the materials through different strategies.

In the experimental class, the learning process used True or False strategy, where each student was given a paper containing some statements related to the materials. Before the paper was distributed, the students were given 20 minutes to read, understand, and discuss the learning materials. Then, the researchers distributed the aforementioned papers to each student. The students were given 3 minutes to analyze the statements on their paper and had to determine whether they are true or false. After that, they expressed their opinions about the statements on the paper they hold (whether they were true or false) followed by the explanations to their answers. They did it in turn according to the song count. Then, the researchers gave feedback to the explanation from each student. This session lasted for 35 minutes.

![Graph showing comparison between Control Class and Experimental Class]
The use of the True or False strategy in the learning process had a positive impact. The improvement of the learning outcomes in the experimental class was proven to be higher than that of the control class which used conventional method or lecture in its learning process. The use of the True or False strategy encouraged each student to dare to express their opinions and to discuss so they experienced a more active and effective learning. The comparison of the increase of the learning outcomes using True or False strategy and that using the conventional method can be seen in Figure 1.

In the experimental class, the learning process used True or False strategy, where each student was given a paper containing some statements related to the materials. Before the paper was distributed, the students were given 20 minutes to read, understand, and discuss the learning materials. Then, the researchers distributed the aforementioned papers to each student. The students were given 3 minutes to analyze the statements on their paper and had to determine whether they are true or false. After that, they expressed their opinions about the statements on the paper they hold (whether they were true or false) followed by the explanations to their answers. They did it in turn according to the song count. Then, the researchers gave feedback to the explanation from each student. This session lasted for 35 minutes.

The benefits of True or False strategy that could be observed by the researchers included the fact that the students became more active, that can be proven by the existence of good interactions between the students and their peers and between the students and the teacher. Moreover, the students also dared to give their opinions and respond to the arguments expressed by their classmates. Furthermore, the students were able to solve the problems both individually and in groups. In the learning process, the students had a discussion to find the most appropriate answers, so it stimulated them to be able to complete the tasks given to them. In addition, the interaction between the students and the teacher was well established. Also, the learning became more fun. The shortcoming of the True or False strategy is that it tends to require a long time.

B. SMAN 2 Klaten

The research study to determine the effectiveness of the use of the learning strategies for the delivery of the materials contained in Klaten Regency disaster guide book at SMA Negeri 2 Klaten used control and experimental classes. X MIPA 4 class was chosen as the experimental class and X MIPA 5 class was the control class. 25 students were participated as the samples of the control class and the other 25 students belongs to the experimental class. The study was conducted by utilizing two lesson hours (90 minutes) in each class. At the early stages of the study, the students were given a pre-test to determine the students’ initial knowledge. In the next stage, the students learned the materials derived from the Klaten
Regency disaster guide book. The students in the experimental class were treated by using role playing strategy, while in the control class the researchers used conventional/lecture strategy. The last step of this study was carrying out a post-test to find out the changes of the students' level of knowledge after they learned the materials about disaster.

The delivery of the materials in the experimental class was initially carried out inside the classroom which began with the explanation of volcanic eruptions, types of eruptions, signs, and early warnings that must be done before until after the eruption. The materials were delivered for 15 minutes. After the materials were explained, the researchers gave a scenario to the students to learn before practicing it outside the classroom. The researchers appointed a director whose job was to organize and direct the characters, i.e. all students who became the research samples. Together with the director, the students did the exercises based on their respective roles until the final preparation inside the classroom, before staging outside the classroom. The training and the final preparation were carried out for 20 minutes with the aim that all students understood their respective roles and the things that must be done by the role. The Role Playing was carried out for 30 minutes. The director directed the characters to play their roles in sequence, based on the scenario prepared by the researchers.

The average value of the Post-Test of the experimental class was 86.56 with a value increase of 30.24, while that of the control class was 67.84 with a value increase of 13.92. The grounds to this was that during the learning process using Role Playing strategy, the students were more active, dared to present in front of their peers, and directly involved in the process of playing their respective roles. The comparison of the increase in the learning outcomes of the conventional and role playing strategies is presented in Figure 2.

![Fig. 2. The comparison of the increase of the value of the pre-test and the post-test using conventional/lecture strategy (control class) and the Role Playing strategy (experimental class) at SMAN 2 Klaten](image)

Among the benefits of the role playing strategy that can be observed by the researchers was the fact that the students were more active in the learning process. Furthermore, the students did not only listen to the materials delivered by the teacher, but also practiced them. In addition, the students were able to cooperate with all students in playing their roles guided by the director who had been appointed by the researchers. Moreover, the students were free to express when delivering the dialogue when they present the role. Also, it increased the confidence to present and do the dialogue in front of other students. Additionally, the learning was not monotonous and saturated the students, because they learned not only indoors, but also outdoors. Some shortcomings of the role playing strategy were that (1) the learning atmosphere became crowded and noisy when the students practiced acting out their roles and
C. SMAN 1 Klaten

Testing the effectiveness of the strategies used in delivering the materials of the Klaten Regency disaster guide book at SMA Negeri 1 Klaten used one experimental class and one control class. The class used as the experimental class was X IPS 2 class, while X IPS 1 class was the control class. The number of the students of the experimental class was 25, and that of the control class was also 25. The experimental class used role playing strategy when the researchers delivered the materials, while the control class used conventional/lecture strategy. Before delivering the materials from the Klaten Regency disaster guide book for each class, the researchers gave a pre-test to the students to find out the students' initial knowledge before being given the treatment. The pre-test took 10 minutes and was then followed by the core activity of providing the materials to the students in the control class and experimental class using different strategies. The post-test was conducted to determine the differences in the level of the students' knowledge about disasters, before and after they were treated.

The increase of the average value of the post-test compared to that of the pre-test in the experimental class was higher than that of in the control class. Providing the materials about earthquake disaster through Role Playing strategy to the students of experimental class fostered the students' understanding of the provided materials and helped them comprehend to the performed roles. Figure 3 shows the comparison of the increase of the learning outcomes between the control class and the experimental class at SMAN 1 Klaten.

![Fig. 3. The comparison of the increase of the value of the pre-test and the post-test using conventional/lecture strategy (control class) and Role Playing strategy (experimental class) at SMAN 1 Klaten](image)

The benefits of role playing strategy based on the direct observations done by the researchers at SMAN 1 Klaten were that: (1) the learning process was more fun, that was shown by the attitude of each student who acted out their role happily; (2) the students were more active in the learning process (in the Role Playing process, the students actively moved and asked questions then did their roles); (3) the students interacted with each others and fostered a sense of solidarity (the students helped each other to put the paper indicating the
character’s name in Role Playing); the students’ skills and attitudes in solving problems were more developed, which was shown by the class leader as a director who was skillful in arranging the Role Playing preparation; (5) the learning materials were more memorable and durable in the students’ memories (after the students carried out the Role Playing and then they were evaluated, the learning materials contained in the role playing was more memorable to them); and (6) the students’ imagination was trained e.g. when the students played the roles spontaneously, they made a good move in accordance with the pronunciation of the script.

The shortcoming of the application of the role playing strategy was that the students who were appointed to play some roles felt embarrassed when performing certain scenes i.e. the student who acted as the teacher was embarrassed when playing in front of the peers who acted as the students. Moreover, the learning atmosphere was crowded; during the Role Playing, the students were influenced too much by the atmosphere and they were so happy that they laughed too hard and became noisy. In addition, when they were outside the class, some students were busy chatting with their friends. At the time they did not play the role, they were chatting and joking with their friends. Also, it required relatively long time. Role Playing requires preparation; the students had to do the rehearsal and then carry out their roles so that the implementation took relatively long time.

D. SMK Muhammadiyah 2 Klaten Utara

The research at SMK Muhammadiyah 2 Klaten Utara involved extracurricular Disaster Mitigation Team. This extracurricular activity has existed since 2015. Students who took the extracurricular activities were divided into two groups, with each group consisted of 20 students. The division of the groups aimed to determine the use of the Klaten Regency disaster guide book with two different treatments. Group A of the extracurricular Disaster Mitigation Team was the experimental class who learned using Numbered Heads Together (NHT) learning strategy, while group B was used as the control class and learned by lecture conventional strategy. The students were given the pre-test to determine the students’ initial knowledge before being treated. The delivery of the disaster materials employed different strategies, but the same materials given to the control class and experimental class. At the end of the study, the students underwent a post-test to determine the changes in the level of the students’ knowledge after being given the materials using different strategies.

The NHT (Numbered Heads Together) learning strategy was done by delivering the materials first by the researchers, then the students were formed into 5 groups, each group was given 1-5 head numbers that must be worn. The researchers gave a number of questions about the delivered and explained materials of disaster to the head number who was mentioned by the researchers, and groups 1-5 must be prepared to answer it. The student who was given the opportunity to answer the question was fastest to raise their hands.
The research study conducted in the experimental class using Numbered Heads Together (NHT) strategy could increase the students' knowledge of disaster materials. The increase of the knowledge in the experimental class was proven by the increase of the average of the post-test value which was higher than that of the control class. The graph of the increase of the post-test value between the control class and the experimental class can be seen in Figure 4. The result shows that the increase of the knowledge level of the experimental class was higher because of the use of Numbered Heads Together strategy which required the students to interact, explain, and work together in small groups henceforth the researchers gave several questions to each group, so the students became more active in the class.

E. SMK Kristen 5 Klaten

The research study conducted at SMK Kristen 5 Klaten aimed to determine the comparison of index card match learning strategy and conventional/lecture strategy in learning the materials existed in Klaten Regency disaster guide book. The students who were targeted in this study were the students who took extracurricular activities of the Disaster Alert School. They were divided into two groups: Group A as the experimental class and group B as the control class. The experimental class in this study applied the index card match learning strategy, while the control class used conventional/lecture strategy. In the initial stage, the students were given a pre-test question to determine the students' initial knowledge, then they experienced treatment by getting the similar materials with different learning strategies between the experimental class and the control class. In the final stage, the students were given a post-test to measure the students' knowledge after being treated so that the increase of the knowledge level between the experimental class and the control class could be measured.

The implementation of the index card match strategy was done by distributing separate index cards containing questions and answers in which the students were asked to read and understand the contents. After the students understand the contents of the index card, the students were asked to look for the pair of the obtained index card. The students who had already gotten their partner cards were then asked to sit together and were forbidden to tell the contents of the card to the other friends who were not their partners. After all couples sat down, the students were asked to quiz their friends. The students who had not yet gotten their index card pairs were asked to come forward and line up. The students lining up in front then sequentially look for their index cards pairs. For those who had found the index card pairs and

![Fig 4. The comparison of the increase of the value of the pre-test and the post-test using conventional/lecture strategy (control class) and the NHT strategy (experimental class) at SMK Muhammadiyah 2 Klaten Utara](image)
the time to look for it was up, they kept sitting in a row in front. The students who had been sitting with their index partners then presented or challenged the other partners. The students who wanted to challenge the other partners were asked to raise their hands.

The test results of the average difference between the control class and experimental class are presented in Figure 5. The class that applied the Index Card Match strategy obtained an average of 71.25\%, while that with conventional learning obtained an average of 62.20\%. It means that the student’s learning outcomes of which learning process employed the Index Card Match learning strategy was better and improved compared to the one employing the conventional learning.

![Fig. 5. The comparison of the increase of the value of the pre-test and the post-test using conventional/lecture strategy (control class) and the index card match strategy (experimental class) at SMK Kristen 5 Klaten](image)

4 Conclusions

The use of learning strategies to deliver the materials contained in Klaten Regency Disaster Guide Book had different levels of effectiveness. The use of several active learning strategies always shows the better results than the conventional learning/lecture. It can be concluded that the use of active learning strategy can be used to deliver the disaster materials in senior high schools and vocational high schools because the students had a better improvement in understanding the disasters.

Acknowledgement

The researchers would like to thank the Ministry of Research and Higher Education for funding this research so that this research could be carried out properly. The researchers would also express their gratitude to the students who participated in this research and the partner schools who were willing to work with the researchers.
References

The Nature of Truth: Investigation of Logic and Belief

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Abstract. Truth is very closely related to beliefs and facts. Belief depends not only on logic but also on supporting empirical facts. The truth of Sunnatullah (the truth of natural law) is the source of the science truth which always develops. The truth of this science is pragmatic and temporary which means that the prior truth that remains to be believed can be rejected by the current truth through strong arguments. These truth theories continuously attempt to find out the truth of science. The truth of Dinullah which is truth of the religion of Allah (Islam) leads to the discovery of the nature of truth. This truth only applies to humans as spiritual beings; hence, a truth in the form of "Al-Haq" from God can be believed and rejected by humans.

Keywords: truth, science, religion, beliefs, facts, sunnatullah, dinullah.

1 Introduction

The problem of truth deals with one’s belief or group’s belief. Truth is interpreted as constancy of heart and honesty. If someone believes in something, he considers it to be right or contains truth. According to Bertrand Russell [24], pragmatically, truth is a relationship between belief and fact(s). These two parts have their respective roles [1], [2], [3], [4], [5].

The argument can be supported by the logic of language. If someone says and believes: “The mango tree in front of my lecture yesterday hit the car,” then his sentence is irrational. This irrationality is based on the reality that a mango tree as an immovable planted object is impossible to walk and crash. No one will believe in such expression. Although the sentence is structurally justifiable but it is semantically unacceptable. That is, meaning is very important in sentences [6], [7], [8], [9], [10], [11], [12].

The acceptance to a belief lies in the problem and not the structure. As a matter of proof, it is determined that 5 x 5 = 20. The result of the calculation of multiplication is mathematically wrong. People who believe in the results of these calculations may not have facts. If the facts are traced to the process of events, it will have the truth. For instance, the search is as follows: there are 5 people that each of them carried 5 eggs. The first person carried 5 items, the second person carried 5 items, the third person carried 5 items, the fourth person carried 5 items, and the fifth person carried 5 items. The sum is 5 + 5 + 5 + 5 + 5 = 25. Thus, people who believe that 5 x 5 = 20, the logic is wrong and the belief is incorrect. On the other hand, people who believe that 5 x 5 = 25, the logic can be accepted and the truth is correct.
In Bahasa Indonesia, kebenaran (truth) is derived from benar (true) or is synonymous with betul (correct). Nonetheless, the word kebetulan (fluke) is semantically different from the word kebenaran (truth). The terminology kebenaran (truth) has inward substance and kebetulan (fluke) is in accordance with outward matters. Those two words (benar and betul) are antonymous with the word salah (wrong). Something that is not benar nor betul (incorrect) means that it is salah (wrong). One believing an incorrect matter has wrong logic.

The difference between a true and logical belief with the false ones can be illustrated as follows. A person who has had hajj (Yahya) and a person who has not been hajj (Jonah). Yahya told about the pleasure of Haji, so his belief can be correct. However, if the one who told about hajj was Jonah, then his belief could be wrong because he never relied on facts. Jonah only relies on other people's logic and stories. Therefore, to lead to true belief not merely uses logic but there needs to be empirical facts. Empirical facts are facts that can be experienced directly by humans using the five senses.

A mother stated that her milkfish had been stolen by a cat. The mother's statement contains truth but is substantially wrong, because it uses human logic. The question is whether cat can be called a thief or not. The use of the word stealing is always related to religious norms. That is, the act of stealing violates religious norms whereas cats as animals live freely and do not have social and religious norms like humans. Thus, actions that violate social and religious norms for humans cannot be applied to animals. Humans have agreed values [13], [14], [15], [16], [17].

The truth of a statement needs to be supported by facts so that it will lead to true trust. True belief has a significant relationship with facts and truth. Meanwhile, false beliefs have no particular relationship with facts and truth. That people live and die is fact and truth, that people are hungry and full is fact and truth, the sun is fact and truth, Allah Almighty is fact and truth, prayer is fact and truth. Satan is also fact and truth. Therefore, we believe that Satan exists and that belief in the existence of Satan is the truth.

2 Truth in Science

The act of asking basically has gotten into the scientific area. The act of asking, answering, and explaining can only be done by intelligent beings. Intellect can be efficacious if it has been supplied by knowledge. A person who has reason is not necessarily knowledgeable, but someone who has knowledge must have reason. Science is a branch of “knowledge.” Everything that is known about objects is knowledge. To find out the object, knowledge is required through some predictions or empirical assumptions. Assumptions in science are needed as basis and the cornerstone for the analysis of a knowledge that will eventually find the truth, namely the truth of science. The truth does not have to get into the same conclusion as the assumption has - conclusions can be obtained differently from the assumptions. The same conclusions and different assumptions can be determined to have "found the truth".

The case leads to some examples, for instance, a language institution formed a team to conduct research on Javanese dialects in Banyumas and Tegal. Coincidentally, the chair and members of the research all came from Surakarta region which also spoke Javanese of Solo dialect. Researchers have assumed that the Javanese language of Banyumas and Tegal dialects is exactly the same, which is known by the people of Solo with the term “ngapak language”. The facts found in the field shows that they were different from the assumptions. The research team found many differences between the Javanese language of Banyumas dialect and Tegal...
dialect. The difference is precisely found in all fields of linguistics such as phonology, morphology, syntax, and semantics. Consider the following example.

a. *Saya sudah lapar sekali.* (Bahasa Indonesia) (I am very hungry)

   *Enyong wis kencot banger.* (Banyumas)

   *Enyong wis ngelih nemen.* (Tegal)

b. *Kamu sekarang sudah tidak dapat menipu lagi.* (Bahasa Indonesia) (You cannot tell a lie anymore.)

   *Kowe saiki wis teyeng nglomboni maning.* (Banyumas)

   *Kowen saiki wis belih bisa goroh maning.* (Tegal)

c. *Kereta apinya tidak sampai-sampai.* (Bahasa Indonesia) (The train has not come yet)

   *Sepure ora gutul-gutul.* (Banyumas)

   *Sepure ora anjog-anjog.* (Tegal)

d. The word “bagaimana” (“how” in Bahasa Indonesia) equals to *kepriwe* (Banyumas) and *kepriben or kepriben* (Tegal)

e. The word “pulang” (come home) is meant as *bali* (Banyumas) and *balik* (Tegal).

Based on observations in the field, the team found that Banyumas people had difficulty communicating with Tegal people. Many vocabularies between the two Javanese languages and the dialect are also very different. The team concluded that the Javanese language of Banyumas dialect turned out to be very different from Tegal Javanese dialect. The results of these research are facts and truths collected from observations in the field. Therefore, truth can be different from the assumptions because reality in the field indicates the existing facts. Thus, the truth will be related to reality [18], [19], [20].

The known facts in science are not facts observed in practice as a whole, but only a partial explanation of observation. Therefore, the truth of science is relative and pragmatic. The truth that is believed in the past can be turned down in the present. It is due to the existence of scientific research or new discoveries that can take down the truth in the past which might be declared wrong in the present. For example, it was believed that the earth was flat but now the truth is rejected as it is now believed that the earth is round. With the argument that the earth is rotating (rotation), only round objects can make a rotation on the axis.

In the area of language, in Bahasa Indonesia the use of words of ‘analisa’ (for English word analysis) and ‘hipotesa’ (for English word hypotheses) can be justified in the past but now the correct words are *analisis* and *hipotesis*. Another example regarding this case is that people in ancient times made boats only from wood since a theory that is trusted and justified is that water cannot hold objects that has heavier gravity than the density of water. As a result, the theory stating that objects made of iron can float in water is wrong. Therefore, it was previously believed that only boats from wood could float in water. In fact, now many boats from iron or so-called sea ships roam a vast ocean. Thus, the truth that is believed in the past that only boats that could float in water were taken down after the existence of a ship made of iron. So, to determine the new truth must take down the previous truth to be declared a mistake.

Falsehood and truth are always in contrast. Science is learned not to get a falsehood but to get the truth. However, searching for the falsehood within something based on justified theories is also a process to obtain the truth. All knowledge about something to obtain the truth is included in the category of science. Imam Raghib Al-Ashfahani (in Qardhawi, 1999: 88) states that science is knowing something with its essence. In principle, the nature of science obtains the truth of science. Any learning is substantially planting science upon its wits. The expected results are to obtain "the fruit of knowledge", namely the ability of the truth from the knowledge that is learned.
It can be exemplified that people who study shamanism or witchcraft are basically looking for the truth of the knowledge, that is, they try to find how to perfectly master the science of shamanism in accordance with their theories. If the shamanic knowledge has been mastered perfectly, it can be stated that they have learned correctly. Otherwise, he always finds mistakes in learning.

If they have mastered the knowledge then challenge people with the knowledge of the shaman does, then what must be blamed is not the mastery of the knowledge yet the misuse of the knowledge itself. It does not mean that learning the knowledge of witchcraft and shamanism is true as the mastery of that knowledge rather causes mədərə (loss) than the benefits. Another example is that mastering the science of karate does not mean that it is wrong. If used to hit innocent people, then it is wrong. A match can also be useful to ignite lights when the electricity goes out but it can also harm the community if it is misused to burn houses. Even a kitchen knife can be used to cut chicken meat (right) but it will be wrong if it is used to stab people. Thus, something is used according to function [21], [22], [23].

Humans are creatures who are required to seek knowledge to supply their reasoning. Intellect can be useful if it has been filled with knowledge. The nature of human knowledge mentioned in epistemology discusses how knowledge is obtained, by what method is it acquired, and what criteria of truth are expressed. From some of these sections, it is necessary to know the truth criterion of science or often called the "Theory of Truth". According to Katsoff (in Kaelan, 1998: 10) the theory of truth has three types: (1) the theory of coherence truth, (2) the theory of correspondence truth, and (3) the theory of pragmatic truth. Then, one more according to Lean, namely the theory of the evidence truth.

a. Theory of Coherence Truth

Coherence is a theory of truth which states that a statement is considered true if the statement is coherent (related) to the previous statement that is considered true. The logical relationship between the present statement and the previous statement is always based on consistent argumentation criteria. If there is consistency in argumentation within a statement, then the statement is true. A fact proves that everything that is dirty, whether it is a place or food, can cause disease. People who are always physically ill will be fragile and easily complain so they can lower gratitude for feeling less comfortable in their lives. Long before modern times, the Prophet had stated that cleanliness was part of faith.

b. Theory of Correspondence Truth

Correspondence is a theory of truth which states that a statement is considered true if the statement corresponds to the material referred to. Someone stated that the sea water was salty. The statement can be true after conducting verification (testing) to prove that the sea water is indeed salty. A lecturer proudly praised his student "Fulan is very good in English." The statement of the lecturer can be verified through the written or spoken test of English to Si Fulan. If Fulan is able to answer well, then the lecturer’s statement is true.

c. Theory of Pragmatic Truth

Pragmatic is a theory of truth which states that a statement is considered true if its statement has practical benefits for human life. Abadani states that the telephone is very important. As evidence, a father has 12 children and was seriously ill, then the family at home contacted him by telephone to all his children who were out of the city to go home soon. A few hours later, all children can gather to wait for their sick father. Therefore, Abadani’s statement is true that telephone is very important because it has practical benefits for human life.
Television has practical uses for humans, so the statement “television is very necessary for human life to know the political situation” is true.

d. Theory of Evidence Truth

Evidence is a theory of truth which states that a statement is considered true as contained in the object. For instance, humans are the intelligent creatures and possess an element of rokhani that animals do not have. The statement is true, because the truth is evident (clear and tangible) with the object, that is, the human being as the object of the statement does have reason and rokhani. Therefore, it is very clear and tangible that humans are intelligent; hence, there is no need to verify to prove this statement. The bird flies; kuti lang is a bird, so it can fly. The aforementioned statement must be true because its statement is an irrefutable logic of nature which is included in the level of evidential truth. Thus, we directly can know facts and truth as the proof of truth.

The four truth theories discussed in epistemology are the basis for obtaining scientific truth. The truth of science always relies on human logic which always links nature and facts. Indeed the facts known in science are temporary realities and are an explanation of some observations. This is caused by observations of humans who are very limited, imperfect and not absolute. Thus, the reality that we hold is basically a mere hypothesis until humans discover new realities to strengthen the truth of their knowledge to a certain level. Sullivan in (Khan, 1982: 41-42) argues “The agreement on scientific theories stipulates that the notion of a valid scientific theory is a working hypothesis that is fully successful, but it still allows the whole theory to fall out. Therefore, the theories that we are currently looking at are nothing but an analogy based on our limited means of observation. And the problem of reality (facts) in the world of science is still a pragmatic problem”. Thus, it can be concluded that the truth of science is pragmatic until it discovers new facts to be considered as truth and so on. It is because human problems and their knowledge will be destroyed at the same time with the destruction of this universe which is called as the "doomsday".

3 Religion Truth

Truth is always related to "matter of trust." If we believe something, then something is considered true. In science, to change the right to be sure needs a proof. Science is basically the path to understand, which is sure. Someone who understands correctly within his heart, both about truth and error, is basically sure. People who believe means that they have no doubts (doubtful) and are also not prejudiced (dzan). So, belief is a loss of doubt and prejudice. We are convinced of the error of Darwin's theory and we are convinced of the truth of the Koran that Adam was the first man. We also believe that Satan is a creature who always denies and tempts humans, and angels are creatures who are always obedient to Allah SWT. The reach of human science cannot enter the supernatural realm of demons and angels. However, we believe that both creatures exist and are the truth of religion (Islam). The truth of religion gets into the conscience and is processed by the power of reasoning, that is, emergence of a belief is called as "faith". Therefore, the truth of religion relies on faith.

To achieve belief in the truth of religion, the matter of belief, which is in the Qur'an according to Qardhawi (1999: 145), can be classified into three types (1) 'ilmul-yaqin, (2) 'aimul-yaqin, and (3) haqqul-yaqin. The steps of belief can be exemplified: Someone tells you that he has a mango that tastes very sweet, you are not doubtful about the person's story ("ilmul-
yaqin). Afterward, the person shows his mangoes and you are sure (‘ainul-yaqin). Next, the person lets you eat it and it turns out it is really sweet. (haqqul-yaqin).

Ibnul Qayyim (in Qardhawi, 1999: 147) says that our knowledge of heaven and hell is classified as 'ilmul-yaqin'. That the heaven is shown in time to the people "muttaqin" and witnessed by all beings, and that the hell is shown to the ungodly and witnessed by all beings are classified to ‘ainul-yaqin’. If the heaven people are put into it, and the hellish people are put into hell, then that is 'haqqul-yaqin'. The belief that God exists and is single is haqqul-yaqin. The main key to belief in the truth of religion is faith, while science is a supporter of the belief in the truth of the religion of God Almighty.

According to human logic, the truth is single. If there are two things considered to have the truth, one of them is a mistake. Therefore, if there are two contradictory things then (1) it is not possible to both be true, (2) it is impossible that both of them are wrong, (3) the correct one of them. Humans cannot achieve perfect truth because of their limitations. Humans only come to the truth in part of that single truth. The truth comes from God Almighty. According to Al-Baqarah's letter 147, it states that "Truth is from your Lord". The truth according to the Koran is called "Al-Haq". Everything that comes from God is al-haq (truth). When humans get the truth basically comes from God, on the contrary if it gets falsehood, it means it denies the truth of God. In the Qur'an the truth is divided into two kinds, namely the Sunnatullah Truth and Dinullah's Truth [28]. These two truths are not theories of truth but the nature of truth.

a. Sunnatullah Truth

The sun, earth, moon, and planets in the universe are circulating according to natural law. Likewise, the human realm as a physical being will always follow natural law. Human blood is red, that is, it dies if it runs out of blood. Every object thrown anywhere will surely fall to earth. Everyone must believe and justify such natural law. People of any religion must believe and justify that rice will not grow in a desert without water. On the other word, natural law is a truth that can be recognized by humans from any group and religion. The truth is called the Truth of Sunnatullah or the law of nature. In other words, the truth of Sunnatullah will be trusted and recognized by all humanity, both humans who are classified as unbelievers and those who believe.

Human body is only a vehicle for rokhani. The human body will return to be buried under the land and the rokhani will face the God. Humans as physical beings will follow the sunnatullah and as a rokhani creature will apply the law of Allah, namely the law of religion of Allah.

b. Dinullah Truth

We are sure that the religion that God supplies is Islam. For those who believe in the truth of the religion of Islam, there is no doubt for them. In contrast, for the unbelievers, the truth of Islam is only a hoax and nonsense. They do not only hesitate but are sure that Islam was wrong. In the reality of human life, there are only two groups: those who are grateful and those who are kufr. Humans as rokhani beings will follow God's religious law. The truth of God's religious law (Islam) is called the Truth of the Holy Prophet. God's religious law will regulate human attitude and behavior because human behavior comes from its rokhani. In order to create harmony and order in life, the rokhani needs to be guided, admonished, and poured with akhlakul karimah and Nur Illahiyah teachings.

Humans as physical beings always follow the law of sunnatullah and all acknowledge the truth. As a rokhani creature, he follows the law of Allah, but there are those who believe and some who deny the truth. As stated in the Qur'an, Surat An-Insan, verse 3 "Indeed we have shown them the right path but there are those who are grateful and some who are kufr". The truth of God's religious law (dinullah) has the difference in its acceptance as there are those who
refuse and some who are convinced. Why are there people who pray and do not pray? Why are there people who believe and some who do not believe that Muhammad was the Messenger of Allah? For Muslims, prayer and the belief on Muhammad as Rasulullah are the truth. Conversely, it is a lie and mistake for others. For Christians, Isa is Jesus and is believed as God. However, for the Muslims, Isa is a Prophet.

The question that arises is which is the truth among such differences of beliefs? If you are a Muslim, you will certainly believe the truth about prayer, Muhammad as an Apostle, and Jesus as only a prophet not God. However, a Christian certainly will not believe the truth about prayer, Muhammad as an Apostle, and he believes that Jesus is God. Therefore, the truth of Allah must be based on faith and no verification is needed, likewise believing in the truth of science. When the Prophet Muhammad preached continuously to deliver the truths of Islam, the infidels were even more determined to oppose him. Next, the letter Al-Kaafirun verse 6 came down: “for you your religion, and for me my religion”.

People who do not believe in God are included to be atheists and those who believe that God is one are called as monotheists. Islam is a monotheistic religion, which only has one God that is Allah. In the truth of Allah, it is not easy to convince people of different religions – even to convince an atheist. Below is illustration of the truth of dinullah in the debate about God's Existence between Islamic Youth (IY) and Atheist Youth (AY).

<table>
<thead>
<tr>
<th>IY</th>
<th>Do you believe the existence of God?</th>
</tr>
</thead>
<tbody>
<tr>
<td>AY</td>
<td>No, I don’t. Why do you believe in God as he does not exist.</td>
</tr>
<tr>
<td>IY</td>
<td>Yes, because God is fact and truth</td>
</tr>
<tr>
<td>AY</td>
<td>Where is the fact?</td>
</tr>
<tr>
<td>IY</td>
<td>I, you, and all humans are His creatures.</td>
</tr>
<tr>
<td>AY</td>
<td>It is a lie. Humans are created by themselves through their fathers and mothers.</td>
</tr>
<tr>
<td>IY</td>
<td>Like the Sun and the Earth. Are they created by themselves?</td>
</tr>
<tr>
<td>AY</td>
<td>Yes, that is right. All is through the natural process.</td>
</tr>
<tr>
<td>IY</td>
<td>Then, who processes it naturally?</td>
</tr>
<tr>
<td>AY</td>
<td>Yes. The nature it self.</td>
</tr>
<tr>
<td>IY</td>
<td>Okay. Do you believe in the death of human?</td>
</tr>
<tr>
<td>AY</td>
<td>Yes, I do as I frequently saw the dead people.</td>
</tr>
<tr>
<td>IY</td>
<td>Then, where do they go after the death?</td>
</tr>
<tr>
<td>AY</td>
<td>Yes, they just go.</td>
</tr>
<tr>
<td>IY</td>
<td>So you do not believe in the occurrence of doomsday and the day of judgment. God does not exist, so does the doomsday or the day of judgment.</td>
</tr>
<tr>
<td>AY</td>
<td>Therefore, I am fortunate and you are unfortunate. Why am I unfortunate and are you fortunate? Is that really true?</td>
</tr>
<tr>
<td>IY</td>
<td>Let's be logical. If my belief is true that God exists then I get a good reply and enter the heaven because I have obeyed His command. Meanwhile, you will get a bad reply, tortured by Allah Almighty, and be put into hell. You understand my best friend, didn’t you?</td>
</tr>
<tr>
<td>AY</td>
<td>Okay. Second logic. If your belief is true that God does not exist, I will remain lucky and I will not be tortured because there is no day of judgment. Likewise, heaven and hell do not exist. So, whether or not the God exists, I am still lucky and you are the one who loses.</td>
</tr>
<tr>
<td>IY</td>
<td>(thinking for a while). Oh yes, you are then logic and rational, buddy.</td>
</tr>
</tbody>
</table>
Indeed, the truth of Islam is logic and rational. Islam is a religion of logic—no religion for those without logic. That is the message of my Prophet, Muhammad Rasullah saw, a true teacher.

Am I too late to be in your religion?
Not yet, it is never too late in Islam. Alhamdulillah.

4 Conclusion

The truth of the natural law 'Sunnatullah Truth' used as the source of the truth in science requires empirical evidence and verification for proof. Meanwhile, the truth of the religion of God 'Dinullah Truth' is always based on faith and the true nature of truth. People who are not believers or unbelievers certainly cannot find the true nature of this truth.

The truth of the science and truth of religion is always compatible and not contradictory. Islam is the religion of reason, so Muslims are required to seek knowledge with their logic and reasoning. If there is a conflict or difference, the possibility of the knowledge is not correct, or the understanding of the verse is not correct.

References


Towards Designing a Rabbani Education for Ummah: An Overview on Some Major Issues in Indonesia

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Abstract. Education is a fundamental aspect in building a civilization. The human role as actor of education will determine development and lack of nation. Education system becomes an important indicator in shaping people educated and superior. The aim of this study is to highlight some major issues in Indonesia such as social justice, politic, economy, and education that built by incorrect concept of knowledge. Rabbani education is one model that emphasizes religious values to reach the peak of civilization as the best nation (Ummah Wasatan). Rabbani is solution for Ummah, particularly in dealing with major social problems such as corruption, violation of human right, scandal and poverty. This paper used qualitative method by using a descriptive approach to obtain the true data. The most important result is Rabbani education can be implemented in the curricula of Indonesia’s education as the main spirit in performing a comprehensive, progressive and affective education.

Keywords: Designing; Rabbani Education; Ummah Wasatan; Major Issues; Comprehensive; Progressive and Affective.

1 INTRODUCTION

Indonesia was known as the world’s largest island country, with more than seventeen thousand islands. With over 261 million people, it is the world’s 4th most populous country as well as the most populous Muslim-majority country. Before 1949, it was a colonial territory, the Netherlands East Indies, Borneo and Timor are partly Indonesian territory. The largest islands include Sumatra and Celebes, but Java outweighs all others politically and economically. All suffered from rebellions and fighting with Dutch troops after the proclamation of formal independence, in 1945. The indigenous people fall into three groups, distinct both culturally and linguistically, though all are Muslim; Javanese live in the eastern two-thirds of the island, Sudanese to the west, and Madurese in the north-east. Additionally they are about one to two million Chinese, prominent as traders and industrialists, settled in the towns. A substantial number of Hadramaut Arabs are traders and Muslim teachers. It obviously indicates that the laying of a cornerstone of education took place by Arab traders [1].

Development of information and technology over centuries has given a significant influence for Indonesia’s education system. In spite of the fact that Indonesia’s expenditure on science and technology is relatively low, at less than 0.1 % of GDP (2017), and the result says that it is not considered as a leading country on the subject, but Indonesia is among the largest countries by number of Internet users, with estimation 88 million users in 2016 where the penetration was begun in the early 1990s.. It shows us that media freedom, communications
system and rapid of technology increased considerably in the sixteen years. What the most important to give highlights to this quickness is technology has changed the manually education system to digitally form which led to the complexity of method, but try to construct the human’s thinking of way instantly that never expected. It emphasizes to the outcome and the product of education, and pay no attention to the process and the solving problem. This actually is a big problem in our education system. Islam as we know that opens widely the accessibility of knowledge by integrated system between revelation and science.

Rabbani education is one of the outstanding terms the writer would like to disclosure its basic principles, main objectives and prominent approaches for our academic discourse today. It is believed that this discussion will give a new contribution in the hope of good understanding and implementation of concept which is beneficial for all generation.

2 MEANING AND CONCEPT

The Arabic word, Rabbānī is derived from three letters: Ra, Ba, Ba; and al- Rabb refers to the Allah as the Lord and the Owner of everything. His unity of lordship includes all creation. Al- Rāghi washi- Asfahi (425 C.E) said: the original meaning of al- Rabb is al- Tarbiyah (education), make something grow by time to time towards the limit of perfection. Ibn Manzūr (1311 C.E.) mentioned: Literally al- Rabb refers to: al- Mālik (the Owner), al- Sayyid (the Master), al- Mudabbir (the Arranger), al- Murabbi (the Keeper), al- Qayyim, and al- Mun‘īm (the Giver of blessing). As for Ibn an- Anbari came to divide al- Rabb into three types: al- Mālik, al- Sayyid al- Mutā’, and al- Muslih (who do righteous deeds). While the plural form of al- Rabb is Arbāb and Rubūb.

According to the interpretation of scholars in the book of Fākhīr al- Din al- Rāzi (1210 C.E.) as known as Mafātīḥ al- Ghayb (Keys to the Unseen), and later nicknamed Tafsīr al- Kabīr (The Great Commentary), al- Rabbānī leads to the several meanings: Sibawayh (796 C.E.) said: It is attributed to God which means who have knowledge about Him, and who is steady on his obedience to Him. Addition both letters Alif and Nun indicates to an exaggeration of expression (al- Mubālaghah, is make something seem larger or more important than it really is), or perfection of character such as Sya’rāniyyun (who has long hair), Lahyāniyyun (long bearded man) and Raqabāniyyun (stubborn). Based on the al- Mubarrad’s opinion: al- Rabbāniyyūn is a plural form meant: They are the lords of knowledge, and Rabbāniyun is a person who keep knowledge and keep mankind; who teach the people, educate them, do righteous deeds for them, and give great concern to their matters. Ibn Zaid mentioned: al- Rabbāniyyūn are the guardians of Ummah and the Scholars.

Actually, the word Rabbāniyyūn is listed in three verses of Quran:

Firstly, in the Sūrat Āli ‘Imrān (The Family of Imran): 79: “On the contrary (he would say): “Be you Rabbāniyyūn (learned men of religion who practice what they know and also preach others), because you are teaching the Book, and you are studying it”. Means, the Messenger (pbuh) recommends the people to be Rabbāniyyūn. Ibn ‘Abbās, Abu Razīn and several others said that Rabbāniyyūn means, “Wise, learned, and forbearing”. Secondly, in the Sūrat al- Māidah (The Table Spread With Food): 44: “And the rabbis and the priests (too judged for the Jews by the Taurāh (Torah) after those Prophets”, wherein Rabbāniyyūn refers to the worshippers who are learned and religious, and Ahbār refers to the scholars. Thirdly, in the Sūrat al- Māidah (The Table Spread With Food): 63: “Why do not the Rabbis and the religious learned men forbid them from uttering sinful words and from eating illegal things.
Evil indeed is that which they have been performing”. The Rabbāniyyūn are the scholars who are in positions of authority, while the Ahbār are the regular scholars [5].

As for the verb form rabba yarubbu was stated in a short Hadīs: (laka ni’matun tarubbuhā), it means: “For you a blessing, so keep it and take care of it”, as the Man educates and keeps his son.

In conclusion, Rabbānī education has brilliant and outstanding characteristics which attempt to conduct the people to the holistic progressive, and affective education. This special attribute indicates strongly that education must be seen holistically and must be performed perfectly. The holistic view means education must to reach all levels of society in the city and village, must able to absorb Rabbānī principles: belongings, keep, nurture, educate, supervise, protect, provide, and control, as contained in the second verse of al- Fātihah: “All praise and thanks are Allah’s the Lord of the ‘Alamīn (mankind, jinn and all that exists)”. Lord: The actual word used in the Qur’ān is Rabb. There is no proper equivalent for Rabb in English language. It means the One and the Only Lord for all the universe, its Creator, Owner, Organizer, Provider, Master, Planner, Sustainer, Cherisher, and Giver of security. All occurrences of “Lord in the interpretation of the meanings of the Noble Qur’an actually mean Rabb and should be understood as such.

Education also must move forward and continuously about how to develop knowledge and curriculum based on the benefit of Ummah. While the perfect performance leads to the integrated system by focusing on the three components: intellectual question (hard-skill), emotional question (soft-skill), and spiritual question (good awareness and practice), and the most important is that education has to resolve the people’s problems completely and fairly, and it able to escape them from the shadow of materialism, hedonism, and capitalism.

Based on the sacred purposes, the main direction of Rabbani education is to be Ummah Wasatan (the community of the middle way). Sayyid Qutb – he is a Egyptian author, a great thinker, educator, Islamic theorist, poet, and a leading member of the Egyptian Muslim Brotherhood (Ikhwān al- Muslmīn) in the 1950s and 1960s, and he died on 29th August 1966 as a Martyr of Islām - commented clearly the meaning of Ummah Wasatan which actually is a specific embodiment of the vicegerent on earth. He said in his book (In the Shade of the Quran): The community of the middle way: The Muslim community is balanced in the sense that it is not rigid or dogmatic. It holds fast to its ideals and traditions, and to the sources of religion and way of life, while fostering change and progress in all fields. Its framework is balance and moderation. It is a society raised on learning, education and rich cultural and social traditions [6].

In the Indonesia context, the term Ummah Wasatan can be interpreted in Indonesia language as “sebuah masyarakat Islām yang sebenar–benarnya” with a reason that Ummah Wasatan walk on a balance of life, they enjoin what is right and forbid what is wrong, so they are the real Islamic community. This term was mentioned by Muhammadiyah Organization (Persyarikatan Muhammadiyah) in its Article of Association (in Article III: Purpose, Objectives and Activities, 2005) that Muhammadiyah’s purpose and objective is uphold and respect the dignity of Islam and to develop a real Islamic community [7]. In the contemporary Indonesian context, Muhammadiyah identifies itself with moderate Islam, adopting a position between extreme-liberalism and extreme-Islamism, as well as in the politic has adopted a neutral stance towards all political parties in Indonesia, refusing affiliate with any of them, as it did on several occasions [8].

The concept of moderate Islam is often seen to be equivalent with the Arabic term al- Dīn al- Wasat in the Quran (2: 143). There is a coherency or a same linkage between both Ummah Wasatan and real Islamic community, or al- Dīn al- Wasat and moderate Islam. In
other word, Rabbani education system and Muhammadiyah organization both has a same direction is to develop a community of the middle way that move forward in balance and moderation based on the Islamic values and the Lord’s principles.

2.1 Lordship Principles

Before presenting the Islamic view on this section, a prolegomenon about the cornerstone of the entire faith of Islam will be started by giving the meaning of the Tawḥīd as the first pillar of Islam. It is strongest connected with the belief in God, because the unity of God must be put in the view of belief.

Tawḥīd is the acceptance and firm belief in only one God, who is one Lord, one Creator, one Owner, one Sustainer, etc. When something is made one it is called a “unity”. However, Islamically Tawḥīd means to believe that Allah is the one and only God in all of the things that we do to please Him. For example, prayer should only be to Allah, sacrifice should only be done in Allah’s name, charity should only be given for Allah’s pleasure and Jihād should only be fought for the sake of Allah’s religion. Here, it is called Tawḥīd al- Ulūhiyyah (the Oneness of God). In the meantime, Tawḥīd al- Rubūbiyyah (the Unity of Lordship) means that we accept Allah as being the only real power in the Universe. He caused all things to exist when there was nothing; thus, He is called al- Khāliq, the Creator. He is the one who gave all things the power to grow, to move and to change, so He is called al- Mālik, the Owner of the Universe [9].

As was mentioned that the principles of the Lordship in Islam are contained in the first Surah as the opening of holy Book (al- Fātihah). The surah obviously mentioned word Rabb in the second verse which linguistically – as we sated - means the owner who has full authority over his property. While ‘Ālamīn is plural for ‘Alam, which encompasses everything in existence except Allah. The word ‘Alam is itself a plural word, having no singular form. al- Farra and Abu ‘Ubayd said: ‘Ālam includes all that has a mind, Jinns, mankind, the angels and the devils, but not the animal”. Also, Zayd bin Aslam and Abu Muhaysin said: “‘Ālam includes all that Allah has created with a soul”. Further, Qatādah said about Rabb al- ‘Ālämin (the Lord of the ‘Ālamīn): “every type of creation is an ‘Alam”. Al- Zajjaj also commented: “‘Alam encompasses everything that Allah created, in this life and in the Hereafter”. While al- Qurtubi clarified al- Zajjāj’s statement. Similarly when Moses (Musa) said to Pharaoh (Fir’awn) in the Sūrat al- Syu’urā’: 24:

“The Lord of the heavens and the earth, and all that is between them, if you seek to be convinced with certainty”.

In the third verse, al- Rahmān (the Most Gracious) and al- Rahīm (the Most Merciful) the Qurʾan mentions both at the second time – with the first at the beginning – means the Rabb contains a warning while both Allah’s names encourage. It also can be interpreted that Allah is the Owner of mercy in both worlds. And the next verse says that Allah is the Owner or the King of the Day of Recompense. It explains that no one except Him will be able to claim ownership of anything whatsoever on that Day, and no one will be allowed to speak without His permission. Everything is under His authority. The fifth verse states clearly about the Oneness and the Lordship of Allah that we (are the Muslim and the believers) worship You alone and none else and rely on You alone and none else. This is the perfect form of obedience and the entire religion is implied by these two ideas. The first part is a declaration of innocence from Shirk (polytheism), while the second negates having any power or strength, displaying the recognition that all affairs are controlled by Allah alone. This combination also
can be found in the CXII Surah (*al- İkhlās* or the Purity) and in the Surah al- Baqarah: 255). The proofs of His Lordship were stated specifically in the 164th of al- Baqarah. These evidences show us that the principles of the Oneness of the Lordship of Allah flow into values of the ownership, the authority and the safeguarding. The first one means full coverage of everything which we call it as a totality. The second one means direct controlling which leads to the great influence. And the third one means full attention which conducts to the balance of continuity.

### 3 OVERVIEW OF SOME MAJOR ISSUES

The fact is that the Indonesia’s spirit of struggle has long been etched in the Constitution 1945, which describe the nation’s goals clearly, include the education purpose to educate the life of the people based on perpetual peace and social justice as the main destination. Meanwhile, the concept of developing country was listed philosophically in the lyrics of the national anthem, Indonesia Raya, for example, Bangunlah jiwanya, bangulah badannya (build its soul, build its body). The same is true with regard to recognize the Oneness of God, the justice, piety and harmony values of people, are contained in the pillars of the Republic of Indonesia. It indicates that Indonesia actually has adopted the Lordship principles and Islamic values. This is a point of view theoretically.

In view of achievement of science and technology advancement, Indonesia has reached the peak by spreading information and internet usage widely. Many educational institutions were established, and research projects have dominated Indonesia’s education world in all fields. But there some crucial corners escaped from the Government’s attention and the touching of educators. These problems are the mistake of point of view of knowledge, the loss of knowledge culture, and the unbalance between understanding and act. However, this development has opened a freedom by out of hand, and people were really lulled by its jewelry until they did not see those problems clearly. Therefore, we need a correct model in solving the problems and - at the same time - formatting the integrity of nation in the frame of virtue.

The problems can be highlighted by some major issues as follows:

#### 3.1 Social Justice

Indonesia expressed succinctly in the fifth principle of its ideology, Pancasila, that social justice for all the Indonesian people. It is an unexceptional commitment that showed Indonesia – since long time ago – has adopted Islamic values which put all people in the similarity of rights and tasks. This principle leads to the convergent several meanings: balance, harmony, stability and equivalency or equality for each citizen to obtain fair life and comfortable. In fact, Indonesian population living in poverty per September 2018 was 25.67 million people, 0.28 million lower compared to that of March 2018, and 0.91 million lower compared to that of September 2017. It was stated clearly by Suhariyanto, Head of the Central Statistics Agency (BPS), on 15th January 2019, in Jakarta [10]. Ironically, this evidence disturbs our minds when we see around of us many beggars and homeless people out of government controlling and supervision.
3.2 Politic Atmosphere

The politic is a fundamental aspect in the affairs of state. It conducts people to the good system or not. The politic of Indonesia has walked on the fluctuated rhythm in the last five years. In other word, politic of Indonesia is unpredictable, depends on the several factors such as economy, education, socio-culture and religion. The economy factor is the main reason which makes the politic confused and bring the people misguided. The money politic for example became a crucial problem in the post-New Order regime (2014), particularly in welcoming the long election round. Therefore, politic education is thus important to resolve the problems and to unite the people’s view on healthy political system, instead of making education issue as a lure for the victory of election. Meantime, dynamic socio-cultural development gives more influence to the color of Indonesia’s politic. In this digital era, old and new issues on the politic are disclosed through social media communication and widespread without filtration unfortunately. In consequence, the political narration becomes uncontrolled and out of rule. This is a rapid erosion of cultural values in dispute of the lust (al-Hawā’ wal al-Nafs) and mind (al- ‘Aql). In the last range, religion issue has built community paradigm that the leader’s background of religiosity is one of the political assessments.

3.3 Economic Growth

Indonesia is the largest economy in South East Asia. Industry and services sides and agriculture have contributed positively to the GDP (Gross Domestic Product) growth. Despite the data account Indonesia’s annual economic growth eased to 5.07 percent in the first quarter of 2019 from 5.18 percent in the previous three-month period and below market consensus of 5.18 percent. GDP Annual Growth Rate in Indonesia averaged 5.28 percent from 2000 until 2019, reaching an all-time high of 7.16 percent in the fourth quarter of 2004 and a record low of 1.56 percent in the fourth quarter of 2001 [11].

Be that as it may, Indonesia’s economy helped reduce poverty to a record low of 9.7 percent in September 2018, as it was mentioned by Rodrigo A. Chaves, World Bank Country Director for Indonesia and Timor-Leste in press release on July 1st 2019 [12]. But the fact is the economic growth does not reach all segments of the population yet. The development has worked at the material construction like infrastructure and private investments, without emphasize on the build of human resources steadily. Teaching the farmers how to product and use artificial fertilizer is more important than providing their needs. It is shown by loss of independence of many productive economic programs in the Village and there is practically no guidance system of healthy business economy. Therefore, prudent economic education is most important to be implanted to people to avoid a perennial disease which perched on the heart of urban and rural communities, poverty.

3.4 Education System

Education sector is one of the sectors which contribute to the human development. HDI (Human Development Index) is used to measure life expectancy, literacy, education, and standard of living for all countries around the world. The human development in education is more related to the education system used of each country. Education system – as known as curriculum - in Indonesia is changeable within several times, from the learning method by
active student (CBSA), curriculum based on the competence (KBK), curriculum at the unit of education level (KTSP) until to the 2013 curriculum. This changing was full of the controlling and domain of the government. The problem looks at the integration of subjects in thematic lesson of 2013 curriculum which does not conform to the competence of pupil and teachers yet. As the result, education objectives did not work optimally.

On the other hand, the problem comes from the private schools which offer higher education fee, and the furthest condition as if some of them are money oriented. It is absolutely caused by the lack of religion understanding (Fahm al-Dīn) and attitude values (al-Qiyām al-Sulūkiyyah) in the nation life.

4 RESULT AND DISCUSSION

4.1 The Nature of Science

Islam is a perfect religion, perfecting religion or pre-existing teachings and becoming a blessing for all nature (rahmatan lil ‘Ālamīn). Islam has placed humankind to a highest level as one perfect creation by ‘Aql (brain). This mind will bring every human who has faith to be a civilized, knowledgeable and devoted person to Him.

As we have seen that the coming of Islam as rahmatan lil ‘Ālamīn has ushered mankind from the darkness to a bright light, namely from the ignorance to the salvation of the afterlife. Surely the Qur’an and the Sunnah of the Prophet are the main grips in achieving the salvation of the Hereafter. As the Prophet said:

From Abu Hurairah r.a., from the Prophet (pbuh) said: “I leave you two cases, you will not be lost as long as you hold fast to both, namely the book of Allah (the holy Qoran) and the Sunnah of His Messenger.”

The holy Qur’an stated clearly about the importance of the role of ‘aql is to elevate the man to the levels of virtue. ‘Aql was created for humankind to think, know himself, his Creator and the nature. In education, activities like study, research and understanding of knowledge can be performed perfectly by using ‘aql properly, is how to lean our mind (read: ‘aql) always to the Lord the Merciful.

4.2 Qur’anic Education Method

The revelation of prophet (pbuh) really has gave us important lessons in understanding the true of knowledge. The first revelation (Qur’an, 96: 1-5) signifies the first step for the mankind to know himself and Universe by elevating his Creator. The second revelation (Qur’an, 74: 1-7) encourages us to do ‘Da’wah (invocations) to our selves, family and people, and at the same time it motivates us to maintain in our righteous pursuits (al-İstiqāmah) or in performing our duty to Allah. While the third one (Qur’an, 5: 3) talks about the perfection of religion (al-İslām) and God’s favour to the prophet (pbuh) that each someone who admitted himself as a Muslim must do totality in Da’wah to get Allah’s blessing and favor. That is all we see the Islamic view on the secret of creation of the first mankind (Adam) on earth (Qur’an, 2: 30), as a Khalifah - the person who judges disputes that occur between people, forbidding them from injustice and sin, as Al- Qurtubi said – that Allah is the source of knowledge. Nobody knows the secret of creation, and not from His angels. The mankind – and also angels – has limit of knowledge, as He stated: “I know that which you do not know” (Qur’an, 2: 30).
On the other side, the Qur’anic method of education comes from other approach when it talks about two most popular indulgences among the Arabs at the time, drinking and gambling (Qur’an, 2: 219). Sayyid Qutb (1966 C. E.) commented: “This statement is a good example of the judicious Qur’anic approach discernible in many Islamic legal and practical rulings and teachings. In addition, we often find that in matters of faith or abstract belief, Islam gives specific and definite pronouncements, but when it comes to matters of tradition or complex social practices, it takes a more pragmatic and measured approach, preparing the ground for smoother adoption and implementation”.

In line with this discussion, Qur’an also emphasizes to the invites in order to educate mankind with wisdom and fair preaching in their Da’wah activities as stated in the Sūrat al-Nahl: 125.

In conclusion, Islam as a cultural movement rejects strongly the old static view of the universe, and it encourages extremely a dynamic-holistic view. In its dynamic view, education must be seen as a fundamental unsure to achieve a great civilization, to be true Muslim, and to be Ummah Wasatan. It should be put into holistic view that the government, educational institutions, educators, students and all people, must do a good cooperation as a team-work in how to build a garden of knowledge and the virtue in educative environments which beneficial for Ummah.

4.3 Rabbani Education In Dealing With the Problems

Religion as interpreted by Western scholars is not same with the understanding of Muslim scholar. Religion in Muslim’s view refers to the word “Dīn”. The one word, Dīn has a grant of a privilege to the various meanings gathered in the unity of direction, al- Islām. It involves the owe condition, submission and surrender, the authority of punishment, evaluation and consideration, and the original character of humankind. Al- Islām has Dīn’s principles as faith, belief, practice, education and guidance which will conduct its followers to the right way. Unfortunately, Majority of Indonesian Muslim pays no full attention to these principles. They neglect the main purpose of life, is ‘Ībādah of Allah (51: 57). ‘Ībādah is often translated into English as “worship”, which is defined as honour and respect mixed with love and fear toward God, a god or a sacred object. ‘Ībādah literally means subservience (i.e. the willingness to serve in a low position) as well as submission (i.e. the surrender of one’s self or rights). Islamically ‘Ībādah is to obey Allah by doing whatever He has commanded and by avoiding whatever He has forbidden. ‘Ībādah involves serving God and surrendering (giving up) one’s will to God’s will. This is why the core of Islām is ‘Ībādah, because the word Islām means the surrender of one’s will to Allah, which is the highest level of obedience that one can reach. In other word, Dīn is a beauty city for Muslim, Islām is a peace inside it, and ‘Ībādah becomes breath for each Muslim’s life.

In relation of the nation’s goals of education, religion (read: Dīn) plays an important role in building a great civilization. Islam enlightens about true and evil, like two sides, positive and negative, light and dark, soft and hard, clean and dirty, etc. God glorifies the man with a sacred superiority, ‘Aql, to do his duty as a leader in the earth. The first thing that Allah showed to His servant (Adam) is teaching of the names. As we knew that our prophet (pbuh) in his first revelation was instructed to read what His angel (Jibrīl) required. This illustration indicates an importance and priority of learn and teach, or we called as education. Moreover Islām encourages each Muslim to learn and learn until the last breath (Hadīs). In short, the process of education must be guided by Islamic values and ethics.
The virtue of moral in all of our movements is very important. We can’t say no. The reality is our education system was broken by “the uncivilized actors” those who snuck in the circle of Islam as known as hypocrite people. They like to purchased badness by kindness, replace guidance to deviation. They have tarnished the truth by making education as land of capitalism. In this condition, ethic becomes more important to be highlighted, because it is related to the education affairs in shaping the characters.

In modern western civilization for example, we can see how it was built by materialistic, far removed from any spiritual or religious influence on the souls of individuals or societies. Religion continued to lose its influence over westerners, little by little, until westerners found themselves in this state of crisis and deep, overwhelming anxiety. Their thinkers and intellectuals now wish that they could make up for what they are lacking in spirituality, but how can they do that when the tree has already borne fruit and sent down deep roots? [13].

On the other hand, the problem of Ummah is more complex. Economic, politic, social, culture, and religion are the hue of life which related each other. To achieve economic and technological advancement as well as social harmony, environmental sustainability, and basic happiness, we need to cultivate a pervasively influential national knowledge culture. Knowledge culture is not one that merely emphasizes on the love of knowledge and learning, and the mastery of the various sciences and skills, but one that also inculcates mature spirituality and ethical qualities actively, enabling our leaders and citizens to optimally realize our individual and collective potentials. The benefits reaped will not only be personal and national, but global as well. In this Information Age, the constant bombardment of facts, ideas, images and opinions from diverse – and often times conflicting – perspectives can be confusing and painful at a personal level, and may even be harmful to society. Hence, a permanently basic, coherent, and architectonic epistemological framework is thus needed for everyone in order to meaningfully select, interpret, and utilize information, ideas, and opinions from these various sources. The basic framework is provided permanently by a dynamic category of knowledge known as fardu al- ‘Ain, which is obligatory to everyone, while all the others that are deemed necessary for societal advancement is fardu al- Kifāyah. The understanding and implementation of a dynamic form of fardu al- ‘Ain and fardu al- Kifāyah knowledge and skills must be properly taught and disseminated. Dynamic fardu al- ‘Ain knowledge should not stop at the basic knowledge of religion that can be mastered by the end of God and the development of character and propriety (Adab). This is the basis for Imam Al-Ghazzali’s Tree of Governance, which questions the static understanding of the concept of fardu al- ‘Ain, and which explains the increase in social problems, lack of integrity, white collar crimes, and extremism among those who are quite trained in basic religious knowledge and skills and who are experts in various fardu al- Kifāyah areas. In this context, the faulty understanding of the concept of fardu al- Kifāyah has compromised the fulfilling of social responsibility, which is expected in Islam, and has defined excellent achievement to the quantitative dimension only instead of the qualitative. The improvement of quality depends very much on a deep understanding of and sincere practices in the knowledge of fardu al-‘Ain [14].

The knowledge culture that is propagated by Islam and all major religions in the country aims to produce educated human beings who understand the limits of truth and usefulness of everything, and act accordingly [15].

Through the true Islamic worldview of knowledge with the cultivation of knowledge culture will guide us towards a balance of all aspects, social, economy, politic, which is absolutely determined by Ma’rifah Allah implied in the principles of al- Rubūbiyyah (the Lordship of Allah). This is that exist in Rabbani education.
Rabbani education is a way for the reconciliation. It is formulated in integrated system that all people must hold on its guideline. It works at all levels, without dichotomy of knowledge. The Rabbani education try to adopt Islamic values and commits to actualize that values in educating people, and always keep the continuity of universe in the harmony conducting. In another word, knowledge (al-`ilm) and implementation of worship (al-`Amal) must walk together under God`s Law (al- Syar`ah al-Islamiyyah). The urgency of integration of knowledge and action was stated clearly in the Qur`an (103: 3, and 18: 107, and 25: 70), where al-`Iman (belief) means knowledge, and righteous deeds means real action. Imam al-Ghazali said on his book:

“O Son! Knowledge without action is sheer folly, but there is no action without knowledge. Know that any type of learning that does not distance you from sins and brings you back to obedience today will never remove you from the fire of hell tomorrow. When you do not act today, nor right your actions of past days, you will say tomorrow, on the the Day of Resurrection: “Send us back to do good deeds”, and you will be told: “Oh, fool! You come now from there”. And he also said: “The sum total of learning is to know the meaning of obedience and service (to God). While, al- Hasan al- Basri (God have mercy on him) said: “To know the true sense (of worship) is to stop thinking about the deed, but not to stop doing it” [16].

In connection with this ethic, Syed Muhammad Naquib al-Attas formulated the concept of Adab or how to put something in its proper place, there are eight important points [17]:

1) To put God in His proper place is to understand well His Attributes, Names, and Act, without having to know His innermost essence, and to practice His religion in the right way, and as exemplified by His Prophet; and to leave behind those that God has forbidden and to constantly improve oneself and ask for His forgiveness;

2) To put Prophet Muhammad (pbuh) in his proper place is to understand his most elevated stature, to follow his example without worshipping him, and to protect the rights of his companions and descendants;

3) To put leaders in their proper place is to think honorably of them and their families, to support their policies and to advise them, and not to bring them down because of their mistakes or errors, which may affect public interest and national stability. However, we are never to obey or aid them in unjust or sinful acts;

4) To put the people in their proper place is to be kind to them, to help them to achieve a decent and happy life by protecting their lives, dignity and security, as well as their religious, economics, and family rights;

5) To put Nature in its proper place is to recognize it as signs of God’s knowledge, mercy, power, and wisdom, and to make use of it wisely and sustainably;

6) To put one’s nation in its proper place is to understand its unique history and achievements, to defend its integrity and sovereignty, and advance its larger interests without oppressing or harming others;

7) To put knowledge in its proper place is to give due priority to fundamental religious knowledge and the humanities (fardu al-`Ain) and to employ that to frame, develop, organize, and evaluate all the socially, economically, and technologically relevant knowledge and skill (fardu al-Kifayah). In fact, the objective and methodology of acquiring knowledge as well as its academic value and benefits is seen from the worldview and framework of religious knowledge that is wide and all encompassing;

8) Putting scholars and specialists in their proper place is to give wide support and opportunities for them to enhance their expertise and to channel their views and experiences to the leadership and society without fear or favor.
5 CONCLUSION

Development of science and technology has opened widely accessibility in information sector and digital system. It significantly has replaced the human roles and influenced our education system. In other side, religion in the modernization was separated from daily life by materialist community. It becomes propaganda in the brainwashing process by hypocrites. It seems like a contradictive condition between maturity of humankind and lack of humanistic values. Human development and values which focused on how to develop people’s perception and understanding of moral values was colonized by the barren systems drive the people toward destruction for a while. Any programs of values education which engages only in analyzing one’s thoughts without providing the means of action is clearly going to be limited in its impact. Therefore, to bridge the gap between the theory and practice, problem and solution, human and nature, we need an integrated, holistic and affective education system, is only pervaded by Rabbani education which has prudent approaches and noble goals in the civilization of humankind. Rabbani education is the solution for Ummah. It is a sturdy system which able to teach the people education values based on the Lord’s principles and go forward in balance to develop Ummah Wasatan, the best nation or the real Islamic community.

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The Controversy of "Nur Muhammad" Concept in Malay Manuscripts: Tajalliy and Faidhun's Perspective Study

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Abstract. The issue of the concept of "Nur Muhammad" in the general perspective still cannot resolve the nature of beings and life. This research is intended to explore the controversy surrounding the concept of "Nur Muhammad", focusing particularly on the manuscript Hikayat Nur Muhammad but also considering other Malay manuscripts to explore how "Nur Muhammad" was understood. In the context of Islamic philosophy, the concept of tajalliy (emanation) holds that everything in the universe, including human beings, originate from the "Nur Muhammad", the Almighty, viewed as the source of all light. Disagreement over the process through which the universe and its contents were created, including human beings, has created conflict between the Ahlu Wachdatil-Wujūd (Syaikh Hamzah Fansuri, Syaikh Syamsuddin As-Samatrani, and their followers) and the Ahlu Wachdatisy-Syuhūd (Syaikh Nuruddin Ar-Raniry and his followers). This research has found that the Ahlu Wachdatil-Wujūd have held that the process through which "Nur Muhammad" spread from ta`ayyun tsāniy (second reality) or a`yān tsābitah (fixed reality) to a`yān khārijiyyah (reality outside Dzāt, Wujūd, and His essence) was not a process of creation, but rather one of radiance or tajalliy. Meanwhile, the Ahlu Wachdatisy-Syuhūd held that "Nur Muhammad" was not a radiance or tajalliy of light, but the bestowing of full power or faiḍhun, such that the light remained strong even as the beings granted power became increasingly distant.

Keywords: hikayat nur muhammad, malay manuscript, kontroversi nur muhammad, tajaliy, faiḍhun, tafwīdh.

1 Introduction

Malay manuscripts are the creative products of the Malay people, written by authors in the Archipelago (such as Syaikh Hamzah Fansuri, Syaikh Syamsuddin As-Samatrani, Syaikh Abdurrauf As-Singkeli, Syaikh Abdush Shamad bin Abdullah al-Jawi al-Falimbari, Syaikh Yusuf Al-Makassary, Syaikh Nawawi al-Bantani Al-Jawi, and Syaikh Muhammad Arsyad al-Banjari, as well as authors outside the Archipelago, such as Syaikh Nuruddin Ar-Raniry, Syaikh Muhammad bin Fadhullah al-Burhanpuri al-Hindi, Syaikh Daud bin Abdullah al-Fattani, and Syaikh Zainal Abidin bin Muhammad al-Fattani [1]. They produced a number of manuscripts dealing with various religious topics, such as fiqh (Islamic jurisprudence), manthiq (logic), and tasawuf (mysticism) ([2], [3], [4]).
Although the form of the manuscript has sometimes been damaged so it is difficult to read [5]. However, it contains very rich contents [6]. These manuscripts represent a veritable treasure passed over generations, encoding the knowledge of their authors so that said knowledge may be read, expanded, and used by subsequent generations of Malays. Malay authors such as those mentioned above have produced works that have been born and grown in Malay society, thereby becoming a part of said society ([7], [8]).

The Malays are a people who share a language and culture and live in the Malay realm, including Brunei Thailand (Pattani), Sailand (Sri Lanka), Burma, Malaysia, South Philippines, Singapore, Sumatra, coastal Sulawesi (Bugis, Makassar, Buton), coastal Kalimantan, coastal Java, and Bali (Sumbawa). The inclusion of these regions in the Malay realm is based on the production of manuscripts written in the Malay language using the Jawi (Arab-Malay) script ([9], [10]) [11].

To date, more than 10,000 Malay manuscripts have been identified. Spread throughout the Malay realm and Europe, many of these manuscripts have been ignored and neglected, as the proper treatment of such manuscripts requires much time, energy, money, and expertise—in other words, fluency in the language used in the manuscript [12].

One manuscript that is interesting for discussion is Hikayat Nur Muhammad, an anonymous manuscript held at the Aceh Special Administrative Region Provincial Museum, Banda Aceh. In tasawuf, "Nur Muhammad" (the essence of Muhammad or the spirit of Muhammad) is a being created by Allah SWT, followed only later by the universe and human beings. As such, the concept of "Nur Muhammad" is closely linked to humans' desire to attain high status and become Insan Kamil (perfect beings).

Every being was created by "Nur Muhammad", and "Nur Muhammad" was created by the light of Allah SWT. In other words, every being (everything in this universe, including humans) receives "Nur Muhammad", but the only beings viewed as perfect are the prophets, and the most perfect of these is the Prophet Muhammad SAW. Importantly, "Nur Muhammad" is not the Prophet Muhammad SAW and the Prophet Muhammad SAW is not "Nur Muhammad". However, "Nur Muhammad" takes the form of the Prophet Muhammad SAW. As such, even after the death of the Prophet, "Nur Muhammad" remains eternal and present in every living being, particularly those who have brought themselves closer to Allah SWT, such as the family and descendants of the Prophet Muhammad SWT, the believers, the pious, the devout, and those who attain the status of Insan Kamil [13]. As such, manuscripts containing the concept of "Nur Muhammad" are interesting for further study, to ensure that the contents of their text can be presented for reading, understanding, embodied, and ultimately used to promote human happiness both on earth and in the afterlife.

The Malay manuscript titled Hikayat Nur Muhammad (the Story of Nur Muhammad) is held at the Aceh Special Administrative Region Provincial Museum, Banda Aceh. Measuring 18 x 10.7 cm, it has been given the code M.S. Inv. 4208, Written on smooth European paper with fine milling strips, it is beautifully written and includes as its watermark the Arms of Groningen, 1755 (consisting of a crowned shield, with wreathes on the left and right, and a table with legs forming a face-down S). This manuscript has yet to be subject to any academic study. As such, three research problems are posed by this manuscript: the manuscript itself, its editing, and its contents—the last of these, in this case, being the concept of "Nur Muhammad". In this article, the contents of several Malay manuscripts dealing with the concept of "Nur Muhammad" will be examined and discussed.

As such, the practical goal of this research is to understand the substance of the manuscript's contents as related to the concept of "Nur Muhammad". This includes revealing
and explaining these contents, such that they can be understood by readers. Meanwhile, the theoretical goal of this research is to offer readers an understanding of the concept "Nur Muhammad" to ensure that its contents can be applied in religious and national life, such that readers can realize a degree of "perfect being", leading to happiness both physical and mental, worldly and heavenly.

2 Method

In order to examine the manuscript "Hikayat Nur Muhammad" concerning the understanding and disclosing the contents of the text "Hikayat Nur Muhammad" in relation to the concept of "Nur Muhammad", it is necessary to use the approach of reception theory as the guidance and reception method for the implementation. Therefore, this article will discuss reception theory and its method in general.

Literary reception theory is a discipline that considers the role of the reader important in giving meanings of literary texts. The relationship between literature and readers contains aesthetic implications [14]. Accordingly, the literary text in this case the text "Nur Muhammad" can be regarded as an aesthetic object after being read or concretized by readers [15]. The position of the reader is very important [16]. This theory reveals that literary works are areas of indetermination or uncertainty that require readers to respond [17]. The reader is required to have the stock of knowledge and experience in this process [18].

The use of reception method should be adjusted to the conditions of the literary work that is being or will be studied. Accordingly, the literary work created some time in the past can be recognized through the manifestation of transformation or through the manifestation of the text's response form [19]. If the form of the transformed text or response text varies, it shows an intensive response to the text. The response of readers can also be traced to various other texts [19]. Therefore, the response of a text to other texts can be traced using three methods. First, experimental method, which is a method of presenting particular texts to particular readers, both individually and in groups, so that they give a response. Such research can be conducted using a list of structured questions [20]. Respondents' answers from the structured questionnaire are then analyzed systematically and quantitatively. In addition, the respondents can also be elicited using non-directed and free analysis. The answers to the question list are then analyzed qualitatively [19], [20]. Second, text criticism method, which is a method that traces the development of reader responses through reviews, criticisms, comments, analysis or research in the form of bachelor’s thesis, master’s thesis, or dissertation ([19], [20]). Third, intertextual method, which is a method that traces response through other texts that respond the text, for example by processing, distorting, resisting, or rewriting the text. This can be performed through copying, adaptation, or translation ([19], [20]). In examining the manuscript "Hikayat Nur Muhammad", those three methods of reception cannot be entirely utilized, but only text criticism method and intertextual method are utilized.
3 Result and Discussion

A. Understanding "Nur Muhammad"

Humans are born in a state of fitrah (purity and cleanliness), in which they have committed no good deeds or bad ones. As they grow and learn, from birth to death, they are hoped to remain in a state of fitrah. As such, there are three major questions related to human life: when were humans first created? For what have humans been created? Where do humans go after their life on earth is finished? The process undergone by humans, from birth to death, is expected to occur under the protection, direction, guidance, and radiance/bestowment of "Nur Muhammad". To delineate the concept of "Nur Muhammad" and reveal it to readers, thereby easing its application in everyday life and promoting happiness in body and mind, on earth and in heaven, it is necessary to provide an understanding of "Nur Muhammad".

In Arabic, the word nūr means "light", something that shines on an object, ensuring that said object is clearly visible. According to the linguist Ibrahim Anis, in his al-Mu'jamul-Wasīt, the word nūr refers to a "light that makes the eyes see". Meanwhile, Muhammad Mahmud Hijazi, an expert in tasawuf, understands nūr as a "light captured by the senses, and with which the eyes can see something. Metaphorically, this has developed into an understanding of "direction and rational thought".

According to Tabataba'i, the author of the al-Mīzan interpretation, the earliest understanding of the word nūr was "something that appears on its own, and also makes sensual objects (implicit, instinctive) apparent". This meaning then developed into a broader understanding, in which every sense is viewed as nūr or as having nūr, and with which all that is sensual becomes apparent. This understanding then developed further, covering the non-sensual, such that the mind itself could be considered nūr as it reveals the abstract.

Ibnu Sina, when asked the meaning of nūr in Q.S. An-Nur [24]:35, answered that nūr contains two meanings: an essential meaning and a metaphorical meaning. The essential meaning is "perfection, clarity", as nūr itself is fundamentally "clear". Meanwhile, two metaphorical meanings can be identified: "something that is good", or "something that leads to goodness".

Al-Isfahani, an expert in tafsir (interpretation), divided understandings of nūr into material (worldly) and spiritual (heavenly) ones. As understood materially, nūr is the light that can be seen/perceived on earth. This can be divided into two further understandings. Abstractly, nūr is understood as the light that can only be perceived by the heart's eye (bashīrah), while concretely or sensually (mahsūs) nūr is understood as the light perceived by the eyes in one's head. Meanwhile, spiritually, nūr can be understood as the light perceived in heaven.

In the Quran, the word nūr is mentioned 43 times, with no less than three meanings. First, the word nūr is used to mean "light itself", as in Q.S. Yunus [10]:5. Second, the word nūr is used to mean "hint or indication", as in Q.S. al-Hadid [57]:9. Third, the word nūr is used to mean "the Quran", as in Q.S. al-Taghabun [64]:8.

As such, the essential meaning of nūr is "hint or indication", as nūr—be it used to indicate light, a hint, or the Quran—serves to provide guidance to people seeking the path to truth. The Prophet Muhammad SAW is also known as nūr, as He is believed to have guided people towards the path of righteousness. This is mentioned in the al-Munawwir dictionary, which explains that nūr refers to the Prophet.
Al-Ghazali, in his Misykatul-Anwār, wrote that the Quran's position relative to the mind's eye is akin to sunlight's position relative to the physical eyes. This light brings perfect sight. As such, the Quran is appropriately termed nūr, similar to how the rays of the sun are known as light.

Al-Ghazali explains that the word nūr or light has four understandings. First, light as something perceptible to the eyes, though nūr cannot see itself. Second, the light of sight, which makes everything perceptible to the eyes; this nūr is grander than the first type. Third, the light of aqli, that which concretely manifests the rational; all hidden by the darkness is made real and perceptible by nūr. Fourth, nūrul-Chaq (Allah SWT), who concretizes the imperceptible, all that is hidden from sight, such as angels.

According to al-Ghazali, the only true nūr is Allah SWT, while all light but that referring to Him is mere metaphor, without any true manifestation. As such, al-Ghazali distinguishes nūr as understood by laypersons and nūr as understood by religious scholars.

As understood by laypersons, nūr refers to something visible or perceptible. Light is something that becomes apparent on its own, or that makes something else visible. Meanwhile, nūr as understood by religious scholars, is a "soul that sees". Here, a soul that sees is equivalent to perceptible light in that it is necessary for visibility and understanding. In fact, a "soul that sees" may be considered more important, owing to its greater abilities for application.

Aside from the word nūr, defined above, it is also necessary to define "Muhammad", which refers to the Prophet Muhammad SAW. Sufis recognize the Prophet Muhammad SAW in their own way. Al-Tustury, for example, recognizes the Prophet Muhammad SAW as the foundation for the sacred earth and creation. The Prophet Muhammad SAW is Azali, as the Prophet is part of Allah SWT, or, more specifically, part of His nūr. Another opinion was voiced by Amin al-Qurdy, who stated that the Prophet Muhammad was Ainul-Wujūd, manifested as the source of everything.

From this discussion, it can be understood that "Nur Muhammad" is radiated/bestowed from the Prophet Muhammad SAW, graceful and virtuous, in body and soul. Ibnu Khatib wrote that "Nur Muhammad" and His light make the moon shine perfectly, as the sun shines with "Nur Muhammad" (https://ahlulbaitrusulullah.blogspot.co.id/2014/01/nur-muhammad-proses-penciptaan-dzat.html, downloaded on 16 February 2018 at 08:10).

The concept of "Nur Muhammad", in a Sufistic context, may be understood as follows. The life (soul) of a human consists of four elements: Wujudul-Lāh, `Ilmul-Lāh, Nurul-Lāh, and Syuhūdul-Lāh. The first, descended from the Dzāt of Allah, is "Nur Muhammad", which serves as the soul of all creation, including human beings (Ar-Raniry in Mā'ul-Chayāt, n.d.:5). As such, in a mystic context, "Nur Muhammad" was the first being created by Allah SWT; only afterwards did He create the universe and humanity. "Nur Muhammad" (محمد روزخ) is often understood as Hakikat Muhammad (the essence of Muhammad), and Ruh Muhammad (the soul of Muhammad; محمد روزخ). The concept of "Nur Muhammad" was first discussed and expanded by a Sufi known as Abu Abdullah Husain bin Mansur al-Hallaj, better known as al-Hallaj.

In Ensiklopedia Islam (The Encyclopedia of Islam), it is stated that "Nur Muhammad" or the "Light of Muhammad", in Sufi teachings is the understanding that Allah SWT first created "Nur Muhammad", and that all other beings were created from this light. "Nur Muhammad" is manifested not only in the Prophet Muhammad SAW, but also in all of the prophets. "Nur Muhammad" first emerged in Adam, and then in the other prophets, but only in the Prophet Muhammad SAW was it perfectly realized. As such, the Prophet Muhammad SAW is known in Sufism as al-Insanul-Kāmil (the Perfect Human). No human has been or will ever be more perfect and more glorious than the Prophet Muhammad SAW. The idea or concept of "Nur Muhammad" was first proposed by an Iraqi Sufi named Abu Muhammad Sahal bin ’Abdullah at-Tustari, best
known as Sahal Abdullah al-Tustari. Further contributions to the "Nur Muhammad" concept were made by al-Hallaj, Muchyiddin Abu Abdullah Muhammad ibn Ali ibn Muhammad ibn Ahmad ibn Abdullah Hatimi at-Ta'i, best known as Ibu Arabi; and Abdul Karim ibn Ibrahim ibn Abdul Karim ibn Khalifah ibn Ahmad ibn Mahmud al-Jilli, best known as Abdul Karim al-Jilli.

According to Sahal Abdullah al-Tusturi, during Creation Allah SWT made Adam of "Nur Muhammad". He also created the light of the prophets also came from "Nur Muhammad", as well as the light of the kingdom of heaven and the malākūt (angels). So too did the light of the world come from this light, the "Nur Muhammad".

Three centuries after Sahal Abdullah al-Tusturi, Ibnu Arabi wrote that "Nur Muhammad" is the seed of humankind. As such, "Nur Muhammad" existed in its essence before Adam, even though on Earth the Prophet Muhammad SAW was descended from Adam. As such, should all of the light of the Prophet SAW be placed in ‘arsy, the ‘arsy would be divided. Should all of this light be placed in seventy chijab (vessels), still it would spill out. Should all beings be gathered, with the light of glory upon them, "Nur Muhammad", they would take flight before falling.

The concept of "Nur Muhammad" is linked to human achievement (Sufism) and perfection (Insan Kamil), such that people who have achieved the highest level of humanity are those with "Nur Muhammad" (the essence of Muhammad or the spirit of Muhammad). As such, al-Jilli argued that the beings created of "Nur Muhammad" are the beings created by the light of Allah. As such, every being and thing contains "Nur Muhammad", but perfection belongs only to the prophets, with the most perfect being the Prophet Muhammad SAW. "Nur Muhammad" is not the Prophet Muhammad SAW, and the Prophet Muhammad SAW is not "Nur Muhammad". However, "Nur Muhammad" took the form (vessel) of the Prophet Muhammad SAW. As such, although the Prophet Muhammad SAW has died, "Nur Muhammad" remains eternal and present in those seeking life with Him, including Sufi scholars, the descendants of the Prophet Muhammad SAW, the pious who are solemn in their prayers, and those who go on the hajj (compare: https://ahlulbaitasulullah.blogspot.co.id/2014/01/nurmuhammadprocespenciptaan-dzat.html, downloaded on 16 February 2018 at 08:10).

B. The Controversy of Sufistic Thought Regarding "Nur Muhammad"

There are two different views held by Muslim philosophers regarding the radiance/bestowment of "Nur Muhammad" from the Dzāt of Allah SWT to His Creation. Known as Ahlul-Wachdah (أهل الوحدة), these consist of two groups: the Ahlu-Wachdatil-Wujūd (أهل وحدة الوجود), with its leading figures being Syaikh Hamzah Fansuri, Syaikh Syamsuddin As-Samatrani, and its followers [21]; and the second being the Ahlu Wachdatisy-Syuhūd (أهل وحدة الشهود) with their leading figures being Syaiikh Nuruddin Ar-Raniri and his followers. A number of subjects related to the spread of "Nur Muhammad" from Dzät Allah to His Creation, including humanity, are discussed below.

The radiance/bestowment of "Nur Muhammad" from Dzätul-Lāh, Shifātul-Lāh, Asmā‘ul-Lāh, and Af‘ul-Lāh may be explained as follows. Dzät Allah SWT is located in a place that is not sensory (لا تَعَيْن) and transcendent (تَنْزِيْه). Allah SWT is azali (without beginning) and abadi (without end), such that His wholeness, His Dzät, cannot be comprehended by the human mind or senses. As such, humans who dedicated their efforts to comprehending Him are believed to be undertaking a pointless endeavor, and thus seen as only wasting their lives [12].

Allah SWT first manifested Himself through "Nur Muhammad", which was radiated/bestowed together with His seven characteristics: Chayāt (life), 'Ilmu (knowledge),
Qudrah (power), Irādah (will), Samā` (attention), Bashar (sight), and Kalām (speech). These seven characteristics were granted to humanity and manifested in the human soul. The human soul also consists of four elements: Wujud Allah (the manifestation of Allah), Ilmu Allah (the knowledge of Allah), Nur Allah (the light of Allah), and Syuhūd Allah (the oneness of Allah). The first light to shine on and radiate through/be bestowed upon the universe was Nur Muhammad. As such, the human soul and body consists of four elements, listed variously as earth, water, air, and fire [22] and fire, water, air, and earth [13]. Earth is the manifestation of Allah SWT as the Chakīm (All-Knowledgeable), water is the manifestation of Allah SWT as Muchyī (the All-Lifegiving), air is the manifestation of Allah SWT as Qawwī (the All-Mighty), and fire is the manifestation of Allah SWT as `Azhīm (the All-Glorious). The seven characteristics of Allah can be understood as ta`ayyun awwal (التَعَيُّنُُ الأوَّلُُ), or the first reality.

Following the Dzāt Allah SWT and His characteristics, "Nur Muhammad" was radiated/bestowed to Asmā’ullāh (the names of Allah). These asmā’ul-Lāh (أسماءُْ الْلُّ) ninety-nine in number and known as Asmā’ul-Chusnā (أسماءُْ الْصَّنِّيْسَ), are recognized as conveying the diverse traits of Allah. The Asmā’ul-Lāh are seen as part of His Dzāt, Wujūd, and essence. As such, this is known as ta’ayyun tsāniy (التَعَيُّنُُ الثّانِـيُ) or a`yān tsābitah (الأعيانُُ الثابتةُ). Allah SWT released Asmā’ul-Lāh (أسماءُْ الْلُّ) from ta’ayyun tsāniy (التَعَيٌّنُُ الثّانِـيُ) or a`yān tsābitah (الأعيانُُ الثابتةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ). This takes the form of af`alul-Lāh (أفعالُ الْلُّ), enabling af`alul-Lāh (أفعالُ الْلُّ) to be understood and perceived by the human being human senses and mind.

The problem and source of conflict is the process through which "Nur Muhammad" from ta’ayyun tsāniy (التَعَيٌّنُُ الثّانِـيُ) or a`yān tsābitah (الأعيانُُ الثابتةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ). According to the Ahlu Wachdatil-Wujūd, "Nur Muhammad" was not spread at the time of Creation, but together with tajalliy (تَجَلِّـيُ), as such, Dzātul-Lāh, Shifātul-Lāh, Asmā’ul-Lāh and Af’alul-Lāh are one and the same, an inseparable unit known as Wachdatul-Wujūd. Meanwhile, according to the Ahlu Wachdatil-Syuhūd, the process through which "Nur Muhammad" was released from ta’ayun tsāniy (التَعَيُّنُُ الثّانِـيُ) or a`yān tsābitah (الأعيانُُ الثابتةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ) occurred together with Creation. As such, the connection between the transcendent Wujūd (ذِئَابُ الْلِّيْلِ, لَهَنَّ الْقُرْءَانِ) and immanent Maujūd (Af`ālul-Lāh) is the connection of Khāliq (Creator) and Makhlūq (Creation). In other words, they are not a single unit, but rather two units in a causal relationship, with Allah SWT and His Creation having a perceptible connection, albeit a close one with tabir (boundaries). The Ahlu Wachdatil-Syuhūd also argue that, if "Nur Muhammad" were radiated from ta’ayun tsāniy (التَعَيُّنُُ الثّانِـيُ) or a`yān tsābitah (الأعيانُُ الثابتةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ) to a`yān khārijiyyah (الأعيانُُ الخارجيّةُ), it would become less powerful as distance increased; this is not a characteristic, they hold, of "Nur Muhammad". As such, the Ahlu Wachdatil-Syuhūd view "Nur Muhammad" not as light being radiated or tajalliy (تَجَلِّـيُ), but light bestowed, with full power or faidhun, tafwīdh (فَيْضَّ,ُ تَفْوِيْض). As such, the light remained strong no matter the distance.

C. Guidance for Worship and Pilgrimage

Solemn (khusu’) worship is one means of connecting one's soul with Allah SWT. As such, by praying solemnly five times daily, one will establish a clear position as the servant of Allah.
SWT through "Nur Muhammad". One's use of solemn prayers, punctually five-times daily, will bring light to one's heart, as mentioned in the following hadith:

This means: Prayer is light (HR. Muslim no. 223). In a hadith from Burairah, the Prophet SAW states: "Share the good news with those walking to the mosque in the dark, for they will receive perfect light on the Last Day." (HR. Abu Daud no. 561 and Tirmidzi no. 223).

Furthermore, Allah SWT provided a great blessing to all those who complete their Friday prayers, as one benefit of Friday prayers is the mitigation of one's sins and mistakes, as well as the strengthening of one's piety, bi idznillah, as mentioned in the following hadith.

This means: "Five-time prayers, the first Friday prayer, and subsequent Friday prayers, these can erase your sins, so long as these sins were not serious" (HR. Muslim no. 233).

Meanwhile, as widely known, the haj pilgrimage is considered a glorious and noble form of worship. This worship is one of the pillars of Islam, compulsory for all Muslims with the necessary ability. The importance of the haj is frequently mentioned in the Quran and Sunnah. It is important, for example, because people who go on the haj pilgrimage will receive a heavenly blessing. The haj pilgrimage is the greatest form of worship, as mentioned in the following hadith.

This means: "The Prophet SAW was asked, "What charitable practice is the greatest?" The Prophet SAW answered, "Being faithful to Allah and His Prophet." Another asked, "What else?" The Prophet SAW answered, "Fighting faithfully on Allah's path." Another asked, "What else then?" The great haj pilgrimage", answered the Prophet SAW" (HR. Bukhari no. 1519). Furthermore, according to Abu Hurairah, the Prophet SAW also said: "and the haj has no more appropriate reward than in heaven" (HR. Bukhari No. 1773 dan Muslim no. 1349).

Allah created "Nur Muhammad", "Hakikat Muhammad", or "Ruh Muhammad", before He created everything. As such, "Nur Muhammad" is considered the foundation, source, or basis for all Creation. It was transcendent, without an ob

This means: Allah is the Light of the heavens and the earth. The example of His light is like a niche within which is a lamp, the lamp is within glass, the glass as if it were a pearly [white] star lit from [the oil of] a blessed olive tree, neither of the east nor of the west, whose oil would almost glow even if untouched by fire. Light upon light. Allah guides to His light whom He wills. And Allah presents examples for the people, and Allah is Knowing of all things. (Q.S. An-Nur [24]:35).

Regarding "Nur Muhammad", the Prophet SAW also said, in the following hadith:
 Truly, Allah makes Himself apparent in His servants, and they do not see Him. Because, as humans, they consist of four elements: earth, air, fire, and water. The Prophet Muhammad SAW is seen from his human aspects, for he ate, drank, and married. This fact or is very important; the Prophet Muhammad SAW is a manifestation, a perfect radiance from Allah, a perfect being (insan kamil), but the Prophet Muhammad SAW is not Allah. In other words, unlike in pantheism, there is no union of humanity and God. Humans are positioned the highest solely because they provide the most perfect service; they are abdun (servants), who surrender themselves to Allah. Abdun must live in recognition of their position as servants of Allah. Abdun are characterized by surrender. As such, their service is provided not based on obligation or compulsion, but rather the joy of service to Allah.

Shortly, the difference between the Kaaba and Baitullah, are described below. Masjid Al-Haram is said to surround the Kaaba in Mecca, and thus this is the direction Muslims face when praying. Literally defined, masjid (مسجد) means "a place of prostration", and the word al-Charam (الحرم) means "holy". Meanwhile, the word Baitullah means "the house of Allah, the palace of Allah". In other words, Baitullah is located at Masjid al-Haram, and the house of Allah or the palace of Allah is in a holy place. As such, Baitullah (the house of Allah or palace of Allah) is found within the hearts of the pious, the devout whose worship is solemn, the devoted who do good deeds. As such, human beings should be a sacred place of rest. They are Baitullah, able to receive the radiance or bestowment of "Nur Muhammad" and spread it to others, thereby bringing them light.

Baitullah is symbolized in Mecca through the Kaaba. However, understood as the house of Allah or the palace of Allah, Baitullah is located somewhere inconceivable to humans, transcendental and unable to be sensed. How, then, can the pious enter Baitullah and meet Allah? Where is Allah's justice, that the pious must travel such distance to visit Him in Mecca? Especially since some say that, during the hajj season, Allah is receiving His guests in Mecca? What is the position of Masjid al-Haram according to the Quran? Wherever humans go, they must turn their faces to Masjid al-Haram, as stated in Q.S. Al-Baqarah [2]:149, and wherever they are they must turn their faces to Masjid al-Haram, as stated in Q.S. Al-Baqarah [2]:150. Is Masjid al-Haram the Great Mosque in Mecca? Must Muslims always face the direction of Mecca in prayer? What of drivers, pilots, and railroad engineers? Wherever one faces, Allah is there, as stated in Q.S. Al-Baqarah [2]:115. As such, Allah is everywhere, not bound by distance or direction. Every one of the faithful is a direction toward which he or she faces, so all must race to that which is good, as stated in Q.S. Al-Baqarah [2]:148.

Where, then, is Masjid al-Haram? Allah is nearby, not far, as stated in Q.S. Al-Baqarah [2]:186; He is with humans wherever they are, as stated in Q.S. Al-Hadid [57]:4; He is closer than the tendons in one's neck, as stated in Q.S. Qaf [50]:16. So what, then, is the essence of Baitullah? The essence of Baitullah lies in the haram or pure soul. Not all humans have Baitullah; it is found within the hearts of the pious who pray solemnly, within the hearts of those who do good deeds, as stated in Q.S. An-Nahl [16]:128. If we seek to become Baitullah, we must become pure or holy places of refuge. This is done by being faithful, by associating others with Allah, as stated by Q.S. Al-Inshiqaq [84]:6. This is the essence of Baitullah.

Or, translated: Have you not seen those who claim themselves to be pure? Rather, Allah purifies whom He wills, and injustice is not done to them, [even] as much as a thread [inside a date seed]. (Q.S. An-Nisa’ [4]:49).
Pure and clean souls that can become Baitullah are symbolized as beautiful birds. Allah created a beautiful bird, consisting of a head (Ali ibn Abi Thalib), two eyes (Hasan and Husain), shoulders (Fatimah Az-Zahra), wings (Abu Bakar and Umar ibn al-Khath-thab), chest (Hamzah ibn Abdul Muthalib), and rear (Abbas and the Prophet's wives Siti ʿAisyah and Siti Khadijah) (Ar-Raniry in Hikayat Nur Muhammad, n.d.:7). The souls and hearts of the Prophet Muhammad SAW's family were pure and clean, and could thus become Baitullah. They could share "Nur Muhammad", and thereby provide guidance to all humans on earth. Humans are the most important factor in one's education process [23] [24].

Conclusion

The word nur has two meanings: the material (concrete, worldly) and spiritual (abstract, heavenly). Understood materially, nur is a bright and clear light, one perceptible to the senses and visible to the eyes, one that brings light to objects and makes them visible. Meanwhile, the word nur can be understood spiritually as direction or guidance, the Quran, the light felt by those who are solemn in their prayers. This nur is located within Baitul-Lāh, and becomes apparent only in the hereafter. As such, the "Nur Muhammad" concept refers to the process through which Sufis seek perfection (i.e. to become insan kamil), the highest level of Maʿrifatul-Lāh or humanity. They seek "Nur Muhammad" (the essence of Muhammad or the spirit of Muhammad), such that they can interact directly with Baitul-Lāh.

Meanwhile, regarding the dispute between the Ahlu Wachdatil-Wujūd or the Ahlu Wachdatil-Syuhūd regarding "Nur Muhammad" and the creation of the universe, including humanity, the writer concludes:

The Ahlu Wachdatil-Wujūd argue that the Prophet Muhammad SAW was created from "Nur Allah", as "Nur Muhammad". According to this group, the release of "Nur Muhammad" from taʾyyun tsāniy (the second reality) or aʾyān tsābitah (the fixed reality) to aʾyān khārijiyyah (the reality outside Allah's Dzāt, Wujūd, and essence) occurred not together with Creation, but through radiance or tajalliy. In other words, Allah SWT radiated His light to the Prophet Muhammad SAW, after which "Nur Muhammad" was radiated further to the devout and pious. As such, Allah and the universe are understood as being inseparable, as being a single unit. This is supported by the concept of Maʿrifatul-Lāh (the highest level of humanity); it is recommended that whoever reaches the level of Maʿrifatul-Lāh not share knowledge with those lacking it, in order to avoid creating unrest and deviance in society.

Meanwhile, the Ahlu Wachdatil-Syuhūd hold that "Nur Muhammad" was not light radiated or tajalliy, but bestowed from its source, Nur Allah. As such, the light remains strong no matter the distance between its source and the beings receiving it. Furthermore, were Creation to involve the radiance of "Nur Allah" through "Nur Muhammad", the greater the distance between the source and the recipient the weaker it would become. This view is supported by the understanding that "Nur Muhammad" is bestowed upon Creation through a causal relationship, rather than being a single unit.

Humans are created by Allah, live to serve and worship Him, and ultimately return to Him. As such, humans are created from the earth and born in a state of fitrah (purity, cleanliness). Over the course of their lives, from birth through old age, humans use the fertile land provided by Allah. They may do good deeds or bad deeds, but these serve only as provision for the afterlife. In other words, humans are created by Allah in a state of fitrah (purity, cleanliness), but lose this purity after being contaminated by life on earth; they must cleanse themselves to ensure
they return to Allah in a state of fitrah (purity, cleanliness). As such, to ensure humans remain in a state of fitrah (purity, cleanliness) and can return to Allah SWT, they require charitable actions and devout worship. Only then can they cleanse their souls (tazkiyyatun-nafsi) and become pious people controlled, guided, directed, and nurtured by the light of "Nur Muhammad". They must do good deeds and avoid associating anyone in the worship of their Lord, as stated in Q.S. Al-Kahfi [14]:110. Furthermore, to ensure they remain illuminated by "Nur Muhammad", they must worship solemnly and go on the hajj. Only then will they become insan kamil capable of reaching Baitul-Lāh. As such, humans are created by Allah SWT to worship Him, and will ultimately return to Him.

References


Internalization of character value of social care for madrasah students ibtidaiyah Muhammadiyah in education disruption era

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Abstract. The purpose of this study are to describe the teacher’s efforts in strengthening the social caring character for students of MI Muhammadiyah. This study uses qualitative methods with the techniques of collecting data by using interviews, observation and documentation. To test the validity of research data using triangulation technique of source and triangulation technique. Data analysis techniques in this study consisting of reduction, data presentation and verification. The result of this study indicate that the strengthening of social care characters is implemented through 1) integration of self-development programs through routine activities, spontaneous activities, exemplary and conditioning, 2) integration in subject, 3) integrating school culture through social activities and social action, building community-class harmony, and empathizing with classmates. The strengthening of social caring character in MI Muhammadiyah as a whole has gone well.

Keywords: Internalization Value, Character, Social Care, Students

1 Introduction

The factors of character formation and life skills are things that must be considered in an education organization. But in its implementation, character education cannot be fully embedded in the souls of students [1]. This is reinforced by the rise of deviant behaviors committed by students as a result of globalization that occurred in Indonesia. Primary schools as primary education institutions have a duty to produce a generation of morality. One of them is in the aspect of education through schools in order to emphasize character education for their students [2,3].

Character education is inculcated not only through formal education but also through informal and non-formal education. It means that character education should not only be a responsibility in the world of education, but a shared responsibility between government, society, families, and schools. The teacher as the main actor and determinant of the success or failure of the learning process if it is associated with character education has a very important role. In addition to having the skills, understanding and competence regarding the character of the teacher must also have a noble character in itself.

Character is a mindset, attitude or action that is inherent in a person with very strong and difficult to remove [4]. Characters mark the application of values into behavior forms [1].
Character is also referred to as psychiatric qualities, morals or character that can distinguish the character and character of one person with another [5]. From the description above it can be concluded that the reinforcement of character is a planned, conscious and responsible way of training and guiding students to apply character values conceptually and contextually in accordance with educational goals. Social care is an act or attitude to provide assistance to other people and communities in need [6]. Social care is a tangible form of human consciousness as social beings who cannot live alone [7]. From the description above it can be concluded that social care is an act done consciously to others who need it.

The implementation of social care character education is done by teachers through strengthening verbal and nonverbal values. Verbal reinforcement through providing motivation, advice, stories, reprimands, punishment, and praise [8]. Strengthening non-verbally through habituating behavior and exemplary. The implementation of social care character education includes: 1) integration of personal development programs such as greeting habits, routine infaq every Monday and Thursday, social services every Ramadan, 2) integration in subjects by linking social care characters in the subjects of Pkn, IPS and Indonesian, 3) the integration of school culture by facilitating social activities such as when Eid al-Adha distributes sacrificial meat [9].

MI Muhammadiyah in Sukoharjo seeks to implement the strengthening of social care characters in every learning activity for students [2]. The era of disruption is a phenomenon when the community shifts its activities which were originally real activities into activities in cyberspace. This also has an impact in the world of education, where children become more comfortable in cyberspace so the social care of children is greatly decreased. For this reason, there is a need for teacher efforts to strengthen the character of social care [3]. Strengthening social care character is intended to form a spirit of generosity and a high sense of social care so that it can be applied and embedded in daily life both within the school environment and outside the school environment [4]. The teacher as a mentor must set an example for his students, caring and respecting each other in the classroom environment. To strengthen the social care character, the school carries out various efforts through activities every day. The purpose of this study is to describe the efforts of teachers in internalizing the character of social care for students at MI Muhammadiyah Sukoharjo [2,10,11].

This research was conducted for 4 months starting from March to June 2019. The schools that were the object of research were the nadasah ibtidaiyah in Sukoharjo Regency, represented by Gon Goniim, MIM PK Wir in ogunan, and PK Kartasura MIM. Data collection methods used in this study were interviews, observation and documentation. Interviews were conducted with school principals, teachers and students. In this interview the speakers were: 1) school principals in three schools that were sampled, to obtain information on background, vision and mission, teacher competencies and models for strengthening social care characters in MI Muhammadiyah in Sukoharjo, 2) Teachers from grade 1 to grade 6 in each school are 20 people to find out the involvement of teachers in planning and implementation in strengthening social care character in MI Muhammadiyah Sukoharjo, 3) students in grades 1 through grade 6 total 60 MI Muhammadiyah students in Sukoharjo to get information about the competencies provided and the attitude of teachers in treating their students.

The observation referred to here is observing the implementation of the internalization of the values of social care characters, changes in the character of students and things that support the implementation of the internalization of social care characters in MI Muhammadiyah Sukoharjo. Documentation as a complement to interviews and observations in qualitative research. The documentation referred to here is about the surrounding documents regarding the strengthening of social care character and the interview process takes place. To test the validity of the data, researchers used triangulation techniques to test the data by checking the
data to the same sources with different techniques. In addition, researchers also triangulate the source to test the data by checking the data that have been obtained through several sources.

2 Methods

The research conducted is a qualitative research with a phenomenological design. Qualitative research focuses on social phenomena and on voting on the feelings and perceptions of participants under study. Through the design of phenomenology, researchers conducted research with a focus on seeing the efforts of teachers in internalizing the value of social care characters in MI Muhammadiyah in Sukoharjo Regency.

This research was conducted for 4 months starting from March to June 2019. The schools that were the object of research were the madrasah ibtidaiyah in Sukoharjo Regency, represented by Gon Gonim, MIM PK Wir in ogunan, and PK Kartasura MIM. Data collection methods used in this study were interviews, observation, and documentation. Interviews were conducted with school principals, teachers and students. In this interview the speakers were: 1) school principals in three schools that were sampled, to obtain information on background, vision and mission, teacher competencies and models for strengthening social care characters in MI Muhammadiyah in Sukoharjo, 2) Teachers from grade 1 to grade 6 in each school are 20 people to find out the involvement of teachers in planning and implementation in strengthening social care character in MI Muhammadiyah Sukoharjo, 3) students in grades 1 through grade 6 total 60 MI Muhammadiyah students in Sukoharjo to get information about the competencies provided and the attitude of teachers in treating their students.

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3 Results and Discussion

This research was conducted at MI Muhammadiyah in the Sukoharjo region, represented by MIM Gonilam, MIM PK Wirigunam, and PK MIM Kartasura. Judging from the facilities and infrastructure owned by MI Muhammadiyah in the Sukoharjo region as a whole the conditions are adequate and quite good. This research was conducted in three schools that have different characteristics. MIM PK Wirigunam represents MIM where most of the students live near the center of the crowd such as markets, terminals, highways, etc. This is the cause of the lack of students social care level because parents protect their children tightly. MI Muhammadiyah Gonilam represents MI which includes schools in middle condition both in infrastructure and achievements. This school has a vision of "Being the best partner for the community in forming students who are righteous and excel". The MIM PK Kartasura represents schools that are already quite conducive in various ways. These characteristics can be seen in the Table 1.
Table 1. Characteristics of Respondent Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Category</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIM Gonilan</td>
<td>Less</td>
<td>The location of the school near the center of the crowd, education and social status of parents is low, the level of social care is still lacking</td>
</tr>
<tr>
<td>MIM PK Wirogunan</td>
<td>Intermediate</td>
<td>The condition and facilities of school infrastructure are quite supportive, social status and secondary parental education is relatively conducive in various aspects</td>
</tr>
<tr>
<td>MIM PK Kartasura</td>
<td>Well</td>
<td>Relatively conducive in various aspects</td>
</tr>
</tbody>
</table>

In the learning process, the teachers at MIM implement learning activities while having fun, planting and strengthening character and active learning. This was demonstrated by the implementation of good habits such as learning good manners in behavior and speech, as well as monitoring the personality of students conducted every day.

Internalization of the value of social care characters can be done in several forms. The form of internalizing social care characters can be seen from the integration of social care character education through self-development programs, integration in subjects, integration in school culture [12,13]. Students are accustomed to applying character values into their daily lives, schools are required to conduct activities related to the intended character [14,15]. Coaching is not only taught in class but also continued in habituation in the school environment [16]. The same thing was done by MIM in Sukoharjo, were to internalize the value of this social care character has done various things such as creating a self-development program, integration in subjects, and integration in school culture.

To internalize the value of social care characters in MI Muhammadiyah Sukoharjo, several efforts are needed by the school in the form of:

1. **Personal Development Program**

   Some of the school activities in the self-development program consist of:

   a. **Routine Activities**

      This activity is carried out continuously in school. This activity includes the custom of greeting and greeting when meeting with friends and teachers, welcoming the morning, obligatory prayers and sunnah in the congregation, Friday morning infectious, and social services every Ramadan. In addition, there is also other habituation as carried out by MIM PK Wirogunan namely reading the pledge every morning before learning begins. Pledges at the school began with the Creed, read the Al-Fatihah, the Prayer of Ba'iat and the Prayer of Learning, the Promise of Muhammadiyah Students, sang the song of the sun, sung MI's march, and ended with singing the national song. One of the contents of the Muhammadiyah Student Promise is "Willing to sacrifice and help others". This is quite effective to remind students to always have a caring attitude towards others.

      Getting used to good daily activities is one way to strengthen the caring character of students [3]. In order to be able to internalize the character of social care in students, these activities must be familiarized and carried out continuously so that students will get used to it [14].

   b. **Spontaneous Activities**

      This activity was carried out at that time as a form of correction for bad actions which included giving a reprimand to a busy friend himself, giving understanding to students who were indifferent, and giving praise to students who were willing to help others. This activity is usually carried out when the teacher or other education
staff learns that there is an act which is not good from the students which must be corrected at that time [15].

This activity was carried out at that time as a form of correction for bad actions which included giving a reprimand to a busy friend himself, giving understanding to students who were indifferent, and giving praise to students who were willing to help others. This activity is usually carried out when the teacher or other education staff learns that there is an act which is not good from the students which must be corrected at that time [4].

Exemplary is a good action as a teacher to be a good example for their students because this model will contribute positively to the development process of student psychology, especially in the habituation and formation of student behavior by giving good examples such as helping others, visiting sick friends, helping friends who are struggling, and polite words [17,18]. There were four things in the effort to develop character education in relation to personal development, one of which was the example, attitudes and behavior of students imitating the behavior and attitudes of teachers and education personnel [2].

In this MI conditioning with non-physical things is in the form of direct experience and stories, advice, habituation of mutual cooperation and direct examples in obeying discipline in school. To support the implementation of character education, the school must be conditioned to support the activity. Schools must reflect the life of cultural values and national character [8,11].

This is reinforced by observations that show that routine activities carried out at MI Muhammadiyah Sukoharjo include 3S habituation (smiling greetings) when meeting, giving respect, speaking politely and performing dhuha and dhuhar prayers in congregation at the mosque. In addition, the teacher also greets and greets students at the school gate, provides a box for routine infaq every Friday, opens the lesson with greetings, provides motivation and attention to students. Spontaneous activities carried out at MI Muhammadiyah Sukoharjo include when there are students who are sick, other students help deliver to UKS, the teacher reprimands and advises students who are busy when the learning process takes place, the teacher gives direction and advice when there are students who fight, besides the teacher also reprimands students who do not respect their friends when presenting in front of the class. Exemplary conducted at MI Muhammadiyah Sukoharjo includes the participation of teachers in routine infaq activities every Friday, the teacher also provides examples to always help students who are experiencing difficulties and need help. Conditioning that is carried out at MI Muhammadiyah Sukoharjo includes conditioning in the classroom that allows students to work together and help each other, besides that the teacher also accustoms students to greet each other when they meet.

2. Integration in Subjects

Integration in each subject is taken from each subject by reviewing the lesson plan and syllabus used in the learning process. At MI Muhammadiyah Sukoharjo, the teacher has included the values of social care characters in the written and conditional RPP, and the teacher has also integrated the values of social care characters in the subject. Internalization of the character of social care is done with stories, motivation, and advice so that students care more about each other. Not only linking the value of socially caring characters in general subjects such as Pkn and IPS but also linking with Al-Islam subjects such as Fiqh, Al-Qur'an and Hadith. In the Pkn subject, the teacher internalizes the
character of social care through examples of sharing attitudes in daily life. In social studies subjects, the teacher internalizes social care attitudes by contributing to victims of natural disasters, visiting orphanages and nursing homes, visiting sick friends, helping teachers erase the blackboard, and other social care attitudes. In Fiqh learning by teaching students to respect each other when a friend is presenting their findings in front of the class. This is reinforced by the results of observations that show that in MI Muhammadiyah Sukoharjo there are already several teachers who include the value of social care characters in the lesson plan and some are still conditional.

The development of cultural education values and national character are integrated in each subject matter of each subject [2]. These values are included in the syllabus and lesson plans. In order to achieve a character that has been fading so far the strengthening of character values needs to be included in the RPP. Each subject has its own values which will be instilled in students. This is because the priority focus of each subject must have different characteristics [6].

Internalization of the value of social care characters in learning is shown by the teacher teaching students to share with each other when there are friends who do not carry stationery, teach children to respect friends who are expressing opinions in front of the class, teach to share and help friends when there are friends who are having difficulties, advising students not to ridicule other friends.

3. Integration in School Culture

The school has carried out various social activities covering a variety of things. Based on the results of interviews with school principals and teachers, it is obtained that the school has integrated social care characters into the school culture. This is reinforced by the results of observations in schools that show that schools have integrated social care traits such as, social service to underprivileged residents around the school during Ramadan, collecting money and goods for victims of natural disasters, visiting friends or teachers who are sick, infaq routine weekly every Friday, lending friends a stationary when in class, no fuss in the classroom during the learning process, respecting friends who express their opinions and presentations in front of the class, not busy themselves, respecting teachers when explaining material, sharing food and drinks during recession, lending friends who do not carry pocket money, helping friends who are troubled when receiving lesson material and helping school cleaners by not littering the yard and throwing trash in its place.

School culture can be said as thoughts, words, attitudes, actions and hearts of each school community which is reflected in the spirit, behavior and symbols as well as the unique slogan of their identity [8]. Character values in school culture include activities carried out by school principals, teachers and students. School programs can run smoothly because of harmonious relations, cooperation and mutual benefits between the school and the community. Thus schools can be said to be successful in strengthening the social care character of their students [18]. Character education and attitudes in schools are an important foundation in the socio-cultural development of a nation [19], [20].

4 Conclusion

Based on the results of research conducted at MI Muhammadiyah Sukoharjo through interviews, observations and documentation, then from this study it can be concluded that the
efforts made by teachers in internalizing the values of social care characters include: 1) Personal development programs in the form of routine activities, spontaneous activities, exemplary, and conditioning such as exchanging greetings and greetings, giving Friday morning activities, giving reprimands, motivation and advice, giving examples for students. 2) Integration in subjects, including internalization into general subjects (Pkn and IPS), as well as Al-Islam subjects (Al-Qur'an, Hadith and Fiqh). 3) Integration in school culture by carrying out social activities within the school and community environment such as social services in the month of Ramadan, collecting assistance to victims of natural disasters, and weekly infaq. Overall the internalization of the values of social care characters in MI Muhammadiyah Sukoharjo has been going well.

References

The Effect of Small Step Reading Method and Stepping Stone Method on The Ability of Beginning Reading of Elementary School Students

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Abstract. Some factors influence the difficulty of students in beginning reading. One of them is the selection of the method. The purposes of this study are: (1) to determine the ability difference of beginning reading by spelling method and SSR (Small Step Reading) method (2) to determine the ability difference of beginning reading by spelling method and Stepping Stone method, and (3) to determine the more effective method between SSR method and Stepping Stone Method. This quantitative study was a quasi experiment with a nonequivalent control group design. Subjects of this study were 51 first grade students of Islamic Elementary School Gonilan (MI Muhammadiyah Gonilan), Central Java, Indonesia. Data collection did with some tests including normality with Saphiro Wilk test, homogeneity with F-test, as well as a hypothesis with t-test. The findings of this study showed; (1) there was an ability difference of beginning reading by spelling method and SSR (Small Step Reading) method (2) there was an ability difference of beginning reading by spelling method and Stepping Stone method, and (3) SSR method was more effective than Stepping Stone Method based on t-count (1.952) > t-table (1.676).

Keywords: Small Step Reading Method, Stepping Stone Method, Beginning Reading, Elementary School Student

1 Introduction

The ability of beginning reading is the reading potential of children in an early-stage such as reading symbols and images. The purposes of beginning reading in the lower class are to recognize the letters and arrange the letters so the children can read. At the beginning reading stage, children are learning the writing system, how to achieve reading fluency, as well as integrate sound and writing system. Accuracy and success in the beginning reading stage would give an influential impact on the next level of reading skill [1].

The inability of elementary school students in beginning reading is a serious problem. The beginning reading inability of students would lose their motivation in learning. Besides, the undressed inability of beginning reading would rise low performance in class, desperate feeling, student misbehaviour, and drop out of school [1]. The students with the problem of beginning reading should get treatment as early as possible.

Dimensions of students with difficulty in beginning reading such as; not fluent in reading, too many mistakes in reading, unable to distinguish among similar letters, bad visual memory, and unable to understand the sound symbols. Based on the other studies also found the
difficulties in beginning reading are: inability to analyze letters, inability to recognize letters or words generally, a misconception that the omitted letters or words are unneeded, and inability to understand the relationship between letters and sounds in word [2].

Several studies of beginning reading have conducted. Stepping Stone is a new method of beginning reading for lower grade students [3]. SSR method is proven to improve students’ reading ability [4]. The implementation of MMP (Membaca Menulis Permulaan) method for elementary school students is quite successful [5]. Four methods used by teachers in teaching beginning reading are the Sound Method, Alphabet Method, Syllables Method and Kata Lembaga Method [6]. There are seven effective beginning reading programs for kindergarten to third-grader students, namely: Kindergarten Peer-Assisted Learning Strategy (K-PALS), Peer Tutor, Stepping Stone to Literacy, Sound Partners, Fast for Word Reading 1 (FFW1), Reading Recovery, Corrective Reading, and Wilson’s Reading System [7]. The last one, the implementation of Stepping Stone method can increase the students’ interest in literacy [8].

Despite these past studies, not many of them focused on comparison among these methods, especially the most effective ones. That fact left a gap for more studies to do in Indonesia. Based on the problem statement above, the purposes of this study are; (1) to determine the ability difference of beginning reading by spelling method and SSR method (2) to determine the ability difference of beginning reading by spelling method and Stepping Stone method, and (3) to determine the more effective method between SSR method and Stepping Stone method.

The authors proposed these following hypotheses:

Hypothesis 1

H₀: There is no difference in beginning reading ability by spelling method and SSR method.
H₁: There is a difference in beginning reading ability by spelling method and SSR method.

Hypothesis 2

H₀: There is no difference in beginning reading ability by spelling method and Stepping Stone method.
H₁: There is a difference of beginning reading ability by spelling method and Stepping Stone method.

Hypothesis 3

H₀: SSR method is no more effective in beginning reading than The Stepping Stone method.
H₁: SSR method is more effective in beginning reading than The Stepping Stone method.

2 Method

2.1 Type and Design

The method used in this study was a quasi-experimental with a quantitative approach. The study design was the Nonequivalent Control Group Design. In this study, there were two groups with different treatment. The authors gave the first group the SSR method (X₁), and gave the second group The Stepping Stone method (X₂). The first group was called the experiment class 1, and the second group was called the experiment class 2. The study design is presented in Table 1.
Table 1. Study Design

<table>
<thead>
<tr>
<th>Initial Condition</th>
<th>Group</th>
<th>Taking</th>
<th>Treatment</th>
<th>Final Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>Experiment class 1</td>
<td>I</td>
<td>SSR Method</td>
<td>Post Test</td>
</tr>
<tr>
<td>Pretest</td>
<td>Experiment class 2</td>
<td>I</td>
<td>Stepping Stone Method</td>
<td>Post Test</td>
</tr>
</tbody>
</table>

The study steps were:
- Determined the experiment class 1 and 2.
- Validated the pretest and postest items
- Provided a pretest
- Provided treatment for each classes
- Provided a posttest
- Analyzed the data with statistical tests

2.2 Place and Time of Study

This study was conducted at MI Muhammadiyah Gonilan located in Tuwak, Gonilan, Kartasura, Sukoharjo, Central Java, Indonesia. At this elementary school, especially in first grade, were still experiencing difficulties in beginning reading. This study conducted during June 2019.

2.3 Subject

The subjects in this study were all first grader students of MI Muhammadiyah Gonilan in the 2019/2020 (n=51). All students spread into two classes, 26 students who were experiment class 1 and 25 students who were experiment class 2.

2.4 Data Collection Techniques and Instruments

Data collection technique is the most strategic step in the study because the main purpose of study is to get data [9]. The authors employed several tests for collecting the data. The tests consist of item validity test, item reliability test, level of difficulty test, pretest, normality test, homogeneity test, hypothesis test, and postest.

Item Validity

To analyzed the item validity, the authors used Correlation Product Moment [10].

\[ r_{xy} = \frac{n\Sigma x_1y_1 - (\Sigma x_1)(\Sigma y_1)}{\sqrt{\left[n\Sigma x_1^2 - (\Sigma x_1)^2\right]\left[n\Sigma y_1^2 - (\Sigma y_1)^2\right]}} \]

Note:
- \( r_{xy} \) = correlation between variable x and y
- \( x = x_i - \bar{x} \)
- \( y = y_i - \bar{y} \)

The item is valid if the value of \( r\text{-count} \geq r\text{-table} \) with \( \alpha = 0.05 \). Otherwise, if the value of \( r\text{-count} < r\text{-table} \), then the item is invalid. \( df = n-2 \), in finding \( r\text{-table} \).
**Item Reliability**

Reliability testing was done internally by analyzing the consistency of items on the instrument with the Cronbach Alpha technique [11]:

\[ r_i = \frac{k}{(k-1)} \left(1 - \frac{\sum S_i^2}{S_T^2}\right) \]

Note:
- \( r_i \) = instrument reliability coefficient
- \( k \) = number of statement items
- \( \sum S_i^2 \) = total item variance
- \( S_T^2 \) = total variance

The item is reliable if the value of \( r \)-count \( \geq r \)-table with \( \alpha = 0.05 \). Otherwise, if the value of \( r \)-count < \( r \)-table then the item is not reliable.

**Level of Difficulty**

To find out the level of difficulty for each item, the authors used:

\[ IK = \frac{x}{SMI} \]

Note:
- \( IK \) = Level of difficulty
- \( x \) = Average Score
- \( SMI \) = Ideal Maximum Score for each item

**2.5 Data Analysis Technique**

The analysis performed by statistical descriptive.

*Analysis Prerequisite Test*

a) Normality Test

Test normality did use Saphiro Wilk test. Data is normal when the calculated p values are between \( \alpha (0.10) \) and \( \alpha (0.5) \) above the \( \alpha \) value (0.05).

\[ T_3 = \frac{1}{n} \left[ \sum_{i=1}^{k} a_i(x_{n-i+1} - X_i)^2 \right] \]

b) Homogeneity Test

In this study, the homogeneity test used the F-test. To found out the homogeneity results, a calculation was performed to found the F-count value used the formula:

\[ F = \frac{\text{Biggest Variance}}{\text{Smallest Variance}} \]

If F-count \(< F\)-table then the data is homogeneous, whereas if F-count \(> F\)-table then the data is not homogeneous.
Hypothesis Test

An independent t-test was used to find out the differences in the mean of two independent population or data groups.

To answer the hypotheses 1 and 2, the authors did dependent t-test with formula as follows:

\[ t = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} - 2r\left(\frac{s_1}{\sqrt{n_1}}\right)^2\left(\frac{s_2}{\sqrt{n_2}}\right)^2}} \]

Note:
- \(x_1\) = sample mean value (pretest)
- \(x_2\) = sample mean value (posttest)
- \(s_1^2\) = data variance (pretest)
- \(s_2^2\) = data variance (posttest)
- \(s_1\) = standard deviation (pretest)
- \(s_2\) = standard deviation (posttest)
- \(n_1\) = number of students (pretest)
- \(n_2\) = number of students (posttest)
- \(r\) = correlation between the two samples (pretest and posttest)

While to answer the hypotheses 3, the authors did independent t-test with formula as follows:

\[ t = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \]

Note:
- \(x_1\) = sample mean value (experiment class 1)
- \(x_2\) = sample mean value (experiment class 2)
- \(s_1^2\) = data variance (experiment class 1)
- \(s_2^2\) = data variance (experiment class 2)
- \(n_1\) = number of students (experiment class 1)
- \(n_2\) = number of students (experiment class 2)

3 Result

3.1 Instrument Trial Data Analysis

Item Validity Test

The result of item validity test as follows:
The beginning reading test was conducted using oral questions consisting of 10 items. After tested the validity of the items using the Product Moment Correlation from Karl Pearson [10], the results of all items are stated by following with the criteria $r$-count $\geq r$-table, then the item is valid. Based on Table 2, the value of $r$-count for the whole item is higher than the value of $r$-table (0.281). It is meant that the instrument test is valid or usable.

### Item Reliability Test

The reliability test used the Cronbach Alpha technique [11] to 10 items. All items in the experiment class 1 and 2 were obtained 14.616 a total item variance. Meanwhile, for total variance was obtained 101.6539. That means the alpha value was 0.9513. The instrument reliability coefficient

The $r$-table value for $n = 51$ with df = n-2 using $\alpha = 5\%$ is 0.281. It can be concluded that the instrument was reliable because the $r$-count (0.9513) $> r$-table (0.281).

### Level of Difficulty

The level of difficulty of each item are presented in Table 3:

<table>
<thead>
<tr>
<th>Item No</th>
<th>Level of Difficulty</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.912</td>
<td>Easy</td>
</tr>
<tr>
<td>2</td>
<td>0.882</td>
<td>Easy</td>
</tr>
<tr>
<td>3</td>
<td>0.767</td>
<td>Easy</td>
</tr>
<tr>
<td>4</td>
<td>0.692</td>
<td>Easy</td>
</tr>
<tr>
<td>5</td>
<td>0.624</td>
<td>Medium</td>
</tr>
<tr>
<td>6</td>
<td>0.578</td>
<td>Medium</td>
</tr>
<tr>
<td>7</td>
<td>0.592</td>
<td>Medium</td>
</tr>
<tr>
<td>8</td>
<td>0.501</td>
<td>Medium</td>
</tr>
<tr>
<td>9</td>
<td>0.503</td>
<td>Medium</td>
</tr>
<tr>
<td>10</td>
<td>0.363</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Based on the level of difficulty classification, the item numbers 1, 2, 3, and 4 were easy while the item numbers 5, 6, 7, 8, 9 and 10 were medium.
3.2 Pretest Data Analysis

To determine whether the two groups originated from the same initial ability, a pretest was conducted. Pretest did before applied the SSR method and Stepping Stone method.

Normality Test

Normality test was performed to determine whether the experiment class 1 and 2 data were normally distributed or not. Test normality did use Saphiro Wilk test. Data is said to be normal when the calculated p values are between $\alpha$ (0.10) and $\alpha$ (0.5) above the $\alpha$ value (0.05). The results of the Saphiro Wilk test are shown in Table 3 as follows:

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Experiment Class 1</th>
<th>Experiment Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Sample</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>$\alpha$ (0.10)</td>
<td>0.933</td>
<td>0.931</td>
</tr>
<tr>
<td>$\alpha$ (0.5)</td>
<td>0.965</td>
<td>0.964</td>
</tr>
<tr>
<td>P</td>
<td>0.9539</td>
<td>0.9613</td>
</tr>
<tr>
<td>proportion gained</td>
<td>0.1314</td>
<td>0.1949</td>
</tr>
</tbody>
</table>

Table 4 shows that the value of the proportion gained from the Saphiro Wilk trial of experiment class 1 and experiment class 2 respectively is 0.1314 and 0.1949. The second value of the p is above the value of $\alpha = 0.05$. It can be concluded that the sample of experiment class 1 and experiment class 2 were normally distributed.

Variance Homogeneity Test

Homogeneity test aimed to determine whether both samples have homogeneous variance or not. The authors used the F-test. The data is homogeneous if F-count<F-table, and not homogeneous if F-count>F-table. To find the F-count, using the formula:

\[
F\text{-count} = \frac{\text{Biggest Variance}}{\text{Smallest Variance}}
\]

\[
= \frac{19.949}{10.218} = 1.927
\]

Based on the data calculation, the F-count<F-table (1.027<1.96). The sample is homogeneous at a 95% confidence level.

3.3 Posttest Data Analysis

Data Normality Test

The results of the posttest data normality of the experiment class 1 and experiment class 2 are shown in Table 5:
Based on these data, it can be concluded that the both classes were normally distributed.

**Variance Homogeneity Test**

\[
F_{\text{count}} = \frac{\text{Biggest Variance}}{\text{Smallest Variance}} = \frac{11.902}{9.112} = 1.306
\]

Based on the data calculation, the \( F_{\text{count}} < F_{\text{table}} \) (1.306 < 1.96), it can be concluded that the sample was homogeneous at a 95% confidence level.

**Hypothesis Test**

After the prerequisite tests analysis, the hypothesis test was performed using the t-test.

**Hypothesis 1**

This is the result of t-count by spelling method and SSR method.

\[
t = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} - 2r\left(\frac{s_1}{\sqrt{n_1}}\right)\left(\frac{s_2}{\sqrt{n_2}}\right)}}
\]

\[
= \frac{61.12 - 83.81}{\sqrt{\frac{83.04}{26} + \frac{83.04}{26} - 2.00007\left(\frac{9.35}{\sqrt{26}}\right)\left(\frac{9.11}{\sqrt{26}}\right)}}
\]

\[
= -76.351
\]

The t-table value with \( df = 26 + 26 - 2 = 50 \) and an error level set of 5% \( t_{\text{table}} = 1.675 \). So, \( t_{\text{count}} -76.351 < t_{\text{table}} 1.675 \). \( H_1 \) is accepted and \( H_0 \) is rejected that mean there is an ability difference of beginning reading by spelling method and SSR method.

**Hypothesis 2**

This is the result of t-count by spelling method and stepping stone method.

### Table 5. Posttest Data Normality Test

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Experiment Class 1</th>
<th>Experiment Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Samples</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>( \alpha (0.10) )</td>
<td>0.933</td>
<td>0.931</td>
</tr>
<tr>
<td>( \alpha (0.5) )</td>
<td>0.965</td>
<td>0.964</td>
</tr>
<tr>
<td>P</td>
<td>0.9641</td>
<td>0.9446</td>
</tr>
<tr>
<td>proportion gained</td>
<td>0.2005</td>
<td>0.1894</td>
</tr>
</tbody>
</table>

Normal
\[
t = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} - 2r \left(\frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}}\right)}}
\]

\[
= \frac{58.00 - 78.00}{\sqrt{\frac{204.42 + 141.67}{25} - 2.0867 \left(10.22 + 11.90\right)}}
\]

\[
= -16.820
\]

t-table value with \(d_k = 25 + 25 = 48\) and an error level set of 5% \(t\)-table = 1.672. So, \(t\)-count = -16.820 < \(t\)-table 1.672. \(H_1\) is accepted and \(H_0\) is rejected that means there is an ability difference of beginning reading by spelling method and Stepping Stone method.

Hypothesis 3

This is the result of the \(t\)-test.

\[
t = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_1}}}
\]

\[
t = \frac{83.81 - 78.00}{\sqrt{\frac{83.04 + 141.67}{26} + \frac{141.67}{25}}}
\]

\[
t = 1.952
\]

t-table value with \(d_k = 51 + 25 = 1.672\). So, \(t\)-count 1.952 > \(t\)-table 1.676. \(H_1\) is accepted and \(H_0\) is rejected that mean SSR method is more effective on beginning reading than The Stepping Stone method.

4 Discussion

Based on the result, there was a difference in the result of students' beginning reading using the spelling method and the SSR method. The SSR method provides positive changes to the students' beginning reading skills. There are five levels in teaching children to read with the SSR method. The five levels have been adjusted to the child's initial ability. Another influential factor is the appearance of media in the SSR method. In the SSR method, there are pictures and fragments of words that have been coloured to attract and make it easier for children to read. With the pictures and colours in the fragments of words can help children learn to read.

According to one of the factors that can influence students' initial reading ability is a psychological factor [13]. The psychological factor here includes children's motivation and interest in reading activities. With the pictures and coloured fragments of the SSR method, it can attract students in learning to read and motivate students to enjoy learning to read. When students have no burden and feel happy in learning to read the situation will have a positive effect on the results of the ability to read. That is why the SSR method has a positive influence
on students' initial reading ability compared to using the spelling method, which is less attractive to students.

The Stepping Stone method also has a significant impact on improving students' beginning reading skill. First, it is because The Stepping Stone method is a new method. Second, in reading lesson using The Stepping Stone method, students are not allowed to read by spelling. According to the result of Sasongko's research [14], teaching children to read by spelling would slow children to master beginning reading skills. Children who are taught to read by spelling method experience some difficulties understanding how to pronounce certain words in a reading text.

From these data, it can be seen that by using the SSR method is more effective than by using The Stepping Stone method. The factor that influences the SSR method is more effective is there are images that attract students to read. Besides, there are fragments of words with special colour to help students learn to read without spelling. With the pictures and fragments of words, the students can understand the material easier. In the opinion of Fahmi [15], six to seven years old children do not have a fixed emotion. Children still often feel afraid of doing a certain activity. Therefore it is very important in choosing the right reading method for the students' conditions to create a pleasant learning experience.

According to research [16], the SSR method can improve the ability to read double vowels for children with difficulty reading in grade four of elementary school. According to the result of this study, the application of the SSR method in beginning reading can improve students' initial reading skills in grade I elementary school. By using the SSR method, students' reading difficulties can be overcome, students' ability to master reading skills is increased. It can be concluded that in addition to being applied to upper classes, the SSR method in reading lessons can also be applied to lower class students.

The Stepping Stone method is not suitable for students in first-grade of elementary school. One very influential factor is a rule that students are not allowed to learn the next step if they cannot read at the previous level. Students must be able to master one by one at each step of the reading material. These rules slow down students in learning the beginning reading material. This rules causes the result of the ability to read with The Stepping Stone method is no more effective than the SSR method.

The conclusion, The Stepping Stone method is still too difficult to use in first-grade students in elementary school. Besides, The Stepping Stone Method takes too long for students to learn at each reading stage. The Stepping Stone method would be appropriate for children who learn to read privately or outside the teaching and learning process at school. For example reading lessons or reading and learning activities with parents at home. In this study, the external variables are not tightly controlled. It can influence the study such as learning styles and learning environment.

5 Conclusion

Right planning and selection of learning method can affect the students' achievement. SSR method usable as one of interesting learning method for students. SSR method not only usable for the beginning reading lesson but also various learning materials. It is essential for train Elementary School Teacher Education students the SSR method.
References


Instructional Leadership In Elementary School SD Muhammadiyah Boyolali

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Abstract. The purpose of this research was to describe the instructional leadership employed by principals in improving the students’ learning outcomes. This research was a qualitative research. The data collection techniques were interview, observation, and documentation. The data analysis technique was interactive method. The result of the study indicates that the principals were the most instrumental element in improving the quality of education. To improve the quality of education, the school principal conducted an instructional leadership, namely through the formulation of the school's vision and mission, the management of meaningful learning, and the maintenance of a positive school climate. These three dimensions were then broken down to eleven descriptors.

Keywords: leadership, instructional, elementary school

1 Introduction

Education is a fundamental part of a national development process that determines a country's economic growth. Education is also an investment in human resource development; the importance of the sustainable improvement and development human resources is one of the policies to improve the quality of education. One of the salient issues in organizing education in Indonesia is finding the ways to improve the quality of education in the midst of the rapid changing times. Based on Programme for International Study Assessment (PISA) in 2015, Indonesia ranked among the lowest ranked countries in the education quality achievement. Of the 72 countries that were assessed, Indonesia's mathematical ability ranked 65th; that of science ranked 63rd; and that of reading ranked 66th. This was indicated by the ranking earned in the ability to read, mathematics, and science of the 15 year old students.

Among the components that are crucial in the process of learning in schools is the teacher. On the grounds of the importance of the roles and responsibilities of teachers, Law No. 14/2005 concerning Teachers and Lecturers declares teachers as the learning agents that must become the facilitators, motivators, promoters, learning manipulators, and learning inspirations for the students. In addition, they also have the main tasks of educating, teaching, guiding, directing, training, assessing, and evaluating the students in the early childhood education through the formal education, basic education, and secondary education. Thus teachers have an important and strategic position and role to shape the nation's personality through the development of the learner’s potential and the desired values. One of their tasks in schools is to provide services to the students so that they become the students who are in harmony with the goals of the school.
In fact, the reality has not yet matched the expectation. Based on the research undergone by the Research and Development Agency of the National Education Department in 2006, the low quality of our education was caused by numerous factors; one of them that contributed greatly was teacher factor. Research conducted by UNESCO through the 2016 General Education Monitoring (GEM) Report positioned the education in Indonesia in the 10th place out of 14 developing countries. Furthermore, in the assessment of the teacher’s quality, Indonesia ranked 14th out of the 14 developing countries which means it was in the lowest position.

This is the challenge for Indonesians to improve the quality of teachers in schools. This also means that the four teacher competencies, including professional, pedagogical, personal, and social competencies, must be improved. The two absolute competencies for the personal development that need to be improved are professional competency and pedagogical competency. Professional competency is needed to improve the ability of the teachers in understanding the learning content; while pedagogical competence is needed to improve their ability in teaching, making plans, assessing, designing the learning methods, managing the classroom, etc. In order for them to improve their competencies, apart from the teachers themselves, the principals also play a very important role.

Priansa (2014: 49) argues that a principal is defined as the functional personnel of teacher who is given the task of leading the school where the teaching and learning process is held, or the place where the interaction occurs between the teacher giving the lesson and the students taking the lesson. One of the principal’s tasks is instructional leadership. Instructional leadership, according to Eggen & Kauchak (2004), is an action taken (by a principal) to develop a productive and satisfying work environment for the teachers that is ultimately able to create the improve conditions for the student’s learning. Meanwhile, according to Bush and Glover (2013), it is a leadership that emphasizes the components that are closely related to learning, including curriculum, teaching and learning process, assessment, teacher development, excellent service in learning, and the development of learning communities in schools.

The main aim of instructional leadership is to provide excellent service to all students so that they are able to develop their potential, talents, interests and needs. In addition, it also functions to facilitate learning so that the students’ learning achievement increases, learning satisfaction is higher, learning motivation is higher, curiosity is realized, creativity is fulfilled, innovation is realized, entrepreneurial spirit is formed, and awareness for lifelong learning increases as science, technology, and arts develop rapidly and grow well.

Based on the description, how is the role of the principal as a learning leader in improving the student’s learning outcomes in elementary school SD Muhammadiyah Boyolali? This study aimed to describe the instructional leadership of the principal to improve the student’s learning outcomes.

2 Method

The study belongs to qualitative research of which results are descriptive data in the form of written or oral words from people and the observable behavior. The research was conducted at elementary school SD Muhammadiyah Boyolali, Central Java, from January to July 2019.
The data collection techniques employed in the study were interviews, observation, and documentation. The data analysis technique used was non-statistic method, namely the qualitative data analysis interactive method, meaning that the obtained data on the instructional leadership performed by the school’s principal was reported based on the real situations which were then analyzed descriptively to get a picture of the facts. The steps of the data analysis were: (1) data reduction, (2) data display, and (3) conclusion drawing.

3 Result and Discussion

School’s principals have a chief role in improving the quality of education in schools. They are required to be able to lead as well as organize and manage the implementation of teaching and learning programs held in the school. It is also a must for them to be able to become the supervisor of the team consisting of the teachers, staff, and students in realizing an effective and efficient teaching and learning process so that the learning productivity is achieved which can ultimately improve the quality of the education.

A principal also has a great responsibility in managing the school management that is directly related to the learning process. This is in accordance with Mulyasa (2013: 24)’s claim that the principal is the most instrumental component in improving the quality of education. In line with this, Ermita (2010) states that the principal is among the components that play a role in the management of educational institutions. The maximum achievement of the educational goals depends on the success in organizing the education and learning at every level of the education unit.

To be able to improve the quality of education, a principal must have a vision, mission, and education management strategy as a whole and be oriented to the quality of education. Principals are expected to create a harmonious working atmosphere and to create a work climate and school culture that can motivate the teachers to increase their work productivity and effectiveness in order to achieve the education goals. To be able to improve the student’s learning outcomes, the learning process must become the focus of the principal's attention. The principal's instructional leadership at elementary school SD Muhammadiyah Boyolali as an effort to improve the student’s learning outcomes was reviewed based on the learning leadership model conveyed by Hallinger and Murphy.

A. Defining the School’s Mission

In this dimension, there are two descriptors, namely framing the school’s goals and communicating the school goals. The vision, mission, and objectives of elementary school SD Muhammadiyah Boyolali were formulated and established by the Foundation. The school’s principal and all school’s community are the executors. Therefore, the principal must be able to formulate a joint program with the school’s community to achieve the school's goals. Once the program is prepared, it is then communicated with all school members and stakeholders. All programs arranged by the school’s principal must be oriented towards the improvement of the student’s learning outcomes so that the quality of education in schools is improved and the school’s goals are achieved.
These findings are in line with the research on the ability of principals related to administrative competence carried out by Adegbemile entitled Principal's Competency Needs for Effective Schools Administration in Nigeria at the secondary school level in South Geo Barat, Nigeria. The results of the study show that instructional leadership skills needed by principals for the effective school administration include those of: (1) collaborating with the teachers to determine the school's goals; (2) providing the facilities; (3) supervising of the lesson plans; (4) undergoing the teaching and learning activities; and (5) evaluating plans and implementing the curriculum.

Another study carried out by Prytula, Noonan, and Hellsten entitled “Toward Instructional Leadership: Principals’ Perceptions of Large Scale Assessment in Schools” examined the principals’ perceptions of the reform of the measurements of the principals’ performance and how these measurements affected their role as principals. The results show that the reform of the measurements of the principal performance had a positive effect on the instructional leadership which including the framing the school’s goals, improving the implementation of the instruction, and changing the measurements of the student’s learning.

The findings of the research explain that framing the school’s goals is important to be done to set the learning direction and objectives. To determine school's goals, it is prominent to take into account both situation and the conditions that lead to the success of their realization. Target as a benchmark is fundamental to achieve a successful realization of school’s goals. Among the ways is to use SMART (Specific, Measurable, Achievable, Realistic, and Time bound) method. It means that the targeted school goals must be specific/focused, measurable, attainable, adjusted to the situation and condition of the school, and must have a deadline for the achievement. Therefore, the school's goals are more feasible to achieve. The chief among them is the maximum learning outcomes that ultimately affect the quality of the education.

B. Managing the Instructional Program

Three descriptors namely supervising and evaluating the learning, coordinating the curriculum, and monitoring the student’s learning progress belong to this dimension. The second dimension of this is the stages of the main process of learning activities. The quality of education is very dependent on the teaching and learning process. Therefore, the principal as a learning leader needs to supervise and evaluate it. The principal of elementary school SD Muhammadiyah Boyolali conducted annual supervision of the learning at the beginning of the school year. This is an attempt made to help and develop the teacher’s professionalism, by the orientation of individual, groups, and class visit techniques. This is also carried out with the aim of improving the process of the learning activities, so all activities of the organization results in the efficient and effective learning. The effective and efficient learning can improve the student’s learning outcomes and the quality of education.

This is in accordance with Kotirde & Yunos' (2014) research entitled “The Processes of Supervision in Secondary Schools Educational System in Nigeria” describing the secondary school’s supervisions in the country consisting of two stages namely the supervision of the principals and that of the teachers. Each stage focuses on supervising the output. The output of the firstly mentioned is on achieving the frequency and effectiveness of the rules, values, character, and gender competition in the school, while that of the later is on the exploration of the teacher's role, student’s participation, motivation, and learning evaluation.
Sidhu and Fook (2010) in their study entitled “Formative Supervision of Teaching and Learning: Issues and Concerns for the School Head” explain as supervisors, principals have to improve the quality of the teachers. This study highlights knowledge, understanding, and practice of elementary school principals as formative supervisors. The study also concluded that the principals had a limited understanding of the implementation of supervisions.

Another research conducted by Suryantini entitled “Improving the Supervision Competency of Principals through Group Supervision in Elementary Schools” concluded that: (1) the implementation of the managerial supervision was carried out through a cycle procedure consisting of three stages: preliminary meeting, observation, and follow-up meeting and (2) the supervision was effective to improve the principal’s supervision competency. This is indicated by the results of the assessment that increased in each cycle of the actions.

Factors related to the implementation of learning supervision are: the process of program preparation, the approach used in the implementation of the supervision, and the follow-up activities. The stage of the supervision that has been implemented at vocational school SMK Pelita Bangsa Sumberlawang consisted of planning and implementation stages. To be exact, the follow-up stage has not yet been carried out by the teacher nor the school’s principal. On this ground, the supervision became a formality for fulfilling the obligations.

The second descriptor of Hallinger and Murphy's leadership model is coordinating the curriculum. Curriculum is a guide used by teachers as a reference to develop the learning process. All learning activities, i.e. preparing the lesson plans, selecting the learning materials, determining the approaches and strategies/methods, selecting and determining the learning media, and determining the evaluation techniques, should all be oriented to it.

Curriculum must be arranged based on the demands of the changing era and the progress of the society. In other words, curriculum experience changes from time to time. Curriculum change is a necessity; if it does not experience adjustments and changes while the social life, technology, and other dimensions of life do, then it is a certainty that the curriculum is unable to meet the demands of change. As a result, everything taught in schools cannot keep up with the changes of the world of work.

The elaboration is in line with Adegbemile's study entitled “Principal's Competency Needs for Effective Schools Administration in Nigeria”. As the title suggests, the focus of the study was the expected principals' administrative competencies to build the effective schools at secondary school level in South Geo West, Nigeria. It concludes the instructional leadership skill required by principals for effective school administration include that of the principals to: (1) collaborate with the teacher to determine the school's goals; (2) provide the facilities; (3) oversee the lesson plans; (4) monitor the teaching and learning activities; and (5) evaluate the plans and implementation of the curriculum.

The results of the study at elementary school SD Muhammadiyah Boyolali show that the curriculum applied were static and could not keep up with the changing era. As a result, there is a tendency for the graduates to be unable to keep the good work at the highly qualified schools of the higher level of education.
The third descriptor is monitoring the student’s learning progress. Monitoring is an activity performed by the principal in order to scrutinize the teacher’s performance. In this case, the principal walked around the terrace of each classroom to ensure that the teachers carry out the teaching and learning activities as scheduled. Moreover, it is not uncommon for the principal to substitute for the teachers who had not yet present. The monitoring was carried out on the daily basis, so that the learning can be done effectively and efficiently.

The monitoring was also done by submitting the daily journals by the homeroom teacher once a week. Then, the class’ daily journal was recapitulated as a report to the principal for the further actions. The submission was to determine the discipline of the teachers in carrying out the teaching, as well as the reports on the progress of the student’s learning. By doing so, the principal knew what actions needed to be taken should anything regarding the learning problems occurred. Furthermore, the principal monitored the learning to ensure that the competencies in accordance with the process standards and the passing competences standard (SKL) were achieved.

C. Promoting a Positive School-Learning Climate

This dimension consists of six descriptors namely controlling the allocation of learning time, encouraging the professional development, focusing on achieving the vision, offering incentives for the teachers, setting the academic standards, and providing incentives for the students. Based on the study, the six aforementioned descriptors were able to promote a positive school-learning climate. The safe, comfortable, and pleasant (conducive) climate made the students more focused in the learning.

These findings are supported by the study conducted by Johnson, Uline, and Perez (2011), “Expert Noticing and Principals of High-Performing Urban Schools”. This study aimed to examine the role of principal’s instructional leadership in supporting the progress of schools located in the urban areas in the United States. The results show that the principals gave a high attention to the matters related to the student’s involvement in the learning and the creation of the climate or atmosphere in the classroom. The principals were very concerned about how the teachers maintained the positive atmosphere for the learning.

In conclusion, in order to be able to implement an effective learning process, a positive school climate is fundamental. Setting the time for the students to do the learning, increasing the competence or professionalism of the teachers, and setting the academic standards of the teaching staff according to the laws and regulations can be a good starting point. Other things that can be done are focusing on achieving the vision of the school and giving appreciation in the form of incentives for teachers and students who excel. Should all the descriptors are able to run smoothly; the effective learning will be created. The fruit of an effective learning is the increasing student’s learning outcomes.

4 Conclusion

To improve the quality of education, the principal implemented instructional leadership. The implementation was based on the model proposed by Hallinger and Murphy. Of the three dimensions used as the indicators of the leadership, only the dimension of framing the school’s mission was not carried out by the principal on the grounds that the school’s vision, mission, and goals were determined by the Foundation. The principal and staff were the
executors who compile the school’s programs oriented towards the goal’s achievement. Moreover, learning management was carried out by supervising and evaluating the learning, coordinating the curriculum based on the demands of change and progress of the community, and monitoring the student’s learning progress.

As it is mentioned earlier, principals must build a positive school climate. In this case, it was done by controlling the allocation of the learning time, encouraging the development of the teaching profession, focusing on achieving the school’s vision, offering incentives for the excellent teachers, setting the academic standards in accordance with the laws and regulations concerning teachers, and providing incentives for the students with high achievement.

Acknowledgement

We would like to thank various parties who have supported this research study. Our gratitude goes to the Directorate of Research and Community Service, the Directorate General of Research and Development of the Ministry of Research, Technology, and Higher Education for funding this multi-year research through the Postgraduate Research Grant. We are also sincerely grateful to the Director of the Graduate School and the Chair of the UMS Research Institute and its staff, who have provided the facilities and encouragement so we can conduct this study. We owe a debt of gratitude to the head of the Department of Education, the head and teachers of elementary school SD Muhammadiyah Boyolali, Central Java who helped us during the study so it went in accordance with the plan.

References


[16] Law No. 14/2005 concerning Teachers and Lecturers
Analysis of Upper Primary Students’ Critical Reading Skills in Surakarta Based on School Accreditation

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Abstract. This study aims to describe the critical reading skills of upper primary students in elementary schools of Surakarta City. The researchers also analyzed the differences in critical reading skills of upper primary students from A-accredited and B-accredited elementary schools. This type of research is descriptive qualitative research. Informants in the study come from 4 A-accredited elementary schools and 4 B-accredited elementary schools consisting of 2 fourth grade students, 2 fifth grade students and 2 sixth grade students per school (6 students per school). Critical reading ability was measured by using a written test instrument followed by in-depth interviews to explore six aspects of critical reading skills, namely: accuracy, clarity, precision, depth, relevance and logic. Competency analysis of students refers to Bahasa Indonesia Basic Competencies for primary students of Indonesian Ministry of Education and Culture Number 37 of 2018. The result of the study shows that the students in A-accredited schools have better critical reading skills in the aspects of accuracy, clarity and relevance. Students in sixth grade master the aspects of critical reading more than the students in fourth grade and fifth grade.

Keywords: critical reading skills, upper primary students, school accreditation, students performance

1 Introduction

Critical reading skill is one of the important skills students have in this 21st century. In increasingly sophisticated technological developments, it allows students to access many readings from various media. In fact, not all the reading from various media is factual. There are some readings that are not in accordance with the facts, but intentionally made for certain purposes. In reading activity, students must be able to analyze the truth of the information contained in the reading. Therefore, it is very important that critical reading is taught to students early on, so that students are able to analyze whether the information is true or false¹.

In fact, the teacher has not maximally taught critical reading skills. Many teachers think that children’s critical reading skills will develop automatically as they grow older. However, this perception has been challenged by various studies. The result of several studies shows that critical thinking skills taught early on to primary school students can work as it is taught to adults. There is also research that emphasizes that the development of students' critical thinking must begin in primary school. The earlier students are taught critical reading, the more students' abilities are developed compared to students who are not taught earlier.

Teachers need to provide supplies to students in the form of critical reading skills. "When we teach critical reading skills to students we will develop them to be critical thinkers ..." These reading skills will support critical thinking skills, including skills to interpret, to assess opinions, and to determine the truth behind the news or text. Critical reading and information literacy will fortify readers not to be deceived by invalid text content. According to Hardcastle in Sarikaya, critical reading is a reading activity that involves critical thinking which consists of several steps. The steps of critical reading are described as follows: (1) examining the text title before reading; (2) determining the time, the purposes and the author of the text; (3) asking questions about the text; (4) identifying one's own feelings and thoughts about the text; (5) determining the text that has been read; (6) identifying ideas conveyed in the text; (7) evaluating ideas presented in the text; and (8) comparing text with other texts. Critical reading skills include the activity of looking for sources of information, recognizing the purpose of the author, distinguishing between opinions and facts, and making conclusion.

Critical reading ability are influenced by several factors, but basically it is divided into 2 types, namely internal and external. External factors include the environment, the facilities, and the frequency of critical reading teaching in primary schools. Various factors of school quality affect the development and the success of students in the future. School quality indicators have been determined based on school accreditation standards. Accreditation is an assessment process based on certain indicators according to the facts. Assessors conduct an

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observation and judgment according to reality, without any manipulation. The quality of learning in A-accredited and B-accredited schools has differences. Therefore, it will have an impact on learning output.

This is the background of the researchers to investigate the differences in critical reading skills in A-accredited and B-accredited primary schools. Researchers assessed that so far there had never been any research on critical reading skills based on school accreditation. The purpose of this study is to describe and to analyze the critical reading skills of students in A-accredited and B-accredited primary schools. This research is important to do because it will add to the scientific repertoire, especially in critical reading learning in primary schools.

2 Research Methods

This research is descriptive qualitative research with analytical methods. This study was conducted in eight primary schools in Surakarta, Indonesia, which consist of four A-accredited primary schools and four B-accredited primary schools. The study started on March 2019 and conducted for 5 months. The purpose of this study is to describe the differences in critical reading skills of upper primary students from A-accredited and B-accredited primary schools. Four A-accredited and four B-Accredited primary schools were randomly selected. The data sources in the study are Indonesia language learning in 24 classes from eight primary schools, documents from students’ learning, informants and respondents consisting of teachers and students of upper primary: 2 fourth grade students, 2 fifth grade students and 2 sixth grade students (6 students per school). Random sampling technique was implemented in choosing the students. The data were collected using observation, document analysis, and test instrument technique. Students’ critical reading ability was measured using a written test instrument followed by in-depth interviews to explore six aspects of critical reading skills, namely: accuracy, clarity, precision, depth, relevance and logic. The data were validated using data triangulation and method triangulation techniques. The data obtained were analyzed using Miles and Huberman’s interactive analysis techniques, namely: data collection, data condensation, data display, and conclusions.

3 Research Methods

The ability to read critically between students in A-accredited schools and B-accredited schools can be seen in the following diagram.

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Based on the diagram there is a difference between A-accredited and B-accredited schools on the aspect of accuracy. The students in A-accredited schools are at the comprehending stage, while students in B-accredited schools are at the emergent stage. In the aspect of clarity, the students in A-accredited primary schools are at higher stage which is at comprehending stage, while the students in B-accredited primary schools are at the emergent stage. In the aspect of logic, students in A-accredited primary schools and B-accredited primary schools are equal, which are at the emergent stage. In the aspect of relevance, students in A-accredited schools are at the emergent stage. In the aspect of depth A-accredited and B-accredited primary school students are at comprehending stage. In the aspect of precision, students in A-accredited and B-accredited schools are at comprehending stage.

The results of the study above indicate that students who are in A-accredited schools have a higher ability compared to B-accredited schools as it is proven by the number of critical reading aspects that they master. This is in line with the theory of factors that affect the quality of education, including curriculum, human resources, facilities, school management, funding for education and leadership. The school accreditation is included in school management, thus accreditation is a factor that determines differences in learning outcomes. Quality schools carry out quality, efficient, relevant and high productivity of learning processes. Optimal learning is also influenced by the availability of the facilities and infrastructure that the school has. School facilities have important roles, both symbolic and functional, in supporting the educational process. Symbolically, school building represents the values given by each community to education. Functionally, building acts as a stage for learning, both supporting and limiting teaching and learning activities. Well-designed, well-lit, well-ventilated and well-equipped rooms improve the activity of student learning, regardless the subject matter. Quality space also has a very pleasant impact on moods, attitudes, and, increases student’s attention over the subjects. Well-designed and carefully articulated classrooms

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positively influence the ability of teachers as well, which ultimately contributes to student’s academic achievement \(^{19}\).

Another factor that distinguishes the results of critical reading skills in schools with different accreditation is the quality of the teacher. There are results of research to determine the effect of school resources on students’ achievement. They found a total of nine studies that analyze the influence of teacher abilities on students’ achievement. The findings show that there is a positive relationship between the two attributes \(^{20}\). Other findings indicate that teacher education courses have a positive effect on students’ achievement \(^{21}\). The results of other studies also compare professional education and academic subjects to determine the relationship between the two variables and teaching effectiveness \(^{22}\). The study provides that there is a positive relationship between professional education and subjects to the effectiveness of learning.

Knowledge and professional skills of teachers can be developed through professional development and service programs to achieve optimal student learning outcomes \(^{23}\). Teacher’s opportunities to participate in professional development in a specific field of subjects related to the curriculum have an impact on teaching and students’ achievement\(^{24}\). Therefore, education courses the teachers have are keen in improving the level of education. The skills of the teachers make learning process happen for students. In general, effective teachers can adjust their teaching style to suit the needs and styles of different students because they have broad approaches and strategies, such as direct teaching, modeling interactive teaching strategies, cooperative learning techniques, experience-based, and skill-based approach. So, quality learning depends on the competencies and attitudes of each teacher.

For a more detailed explanation of the differences between fourth, fifth and sixth grade students in A-accredited and B-accredited schools can be seen in the following diagram.


The diagram shows that upper primary students at A-accredited and B-accredited schools have similar levels on the aspects of depth, and precision. This is because the curriculum in primary schools in the learning of Bahasa Indonesia subject in the fourth grade has begun to apply basic competencies related to the aspects of relevance, depth, and precision. Basic competencies (BC) taught in fourth grade, namely BC 3.1 Comprehending the main ideas and supporting ideas obtained from oral, written, or visual texts; BC 3.3 Exploring information from a character through interviews using a questionnaire; BC 3.5 Describing personal opinions about the contents of literary books (stories, stories, etc.); and BC 3.8 Comparing things that are already known to those just known from nonfiction texts. Fifth grade students are more strengthened with competencies related to accuracy, depth and precision. The basic competencies of it are BC 3.1 Determining the main points in oral and written texts; BC 3.2 Classifying information obtained from books into the aspects: what, where, when, who, why, and how; BC 3.3 Summarizing the explanatory text (explanation) from print or electronic media; BC 3.4 Analyzing the information contained on an advertisements from print or electronic media. The sixth grade students are strengthened to understand explanatory texts, history books, and nonfiction texts, linking events that are read with personal experience, and concluding the contents of the text. Basic competencies in the sixth grade are in the form of BC 3.1 Summing up information based on the report text of observations that are heard and read; BC 3.2 Exploring the contents of scientific explanatory texts that are heard and read; BC 3.4 Digging important information from history books using aspects: what, where, when, who, why, and how; BC 3.8 Exploring information contained in nonfiction texts; and 3.10 Linking the events experienced by characters in fiction with personal experience. However, the similarities in the four aspects of students in the fourth, fifth and sixth grade are still in the comprehending stage.

Fourth and Fifth grade students at A-accredited and B-accredited schools are still weak in the logic aspect, which is at the emergent stage. This is because the teacher has a low frequency in facilitating students to associate the text with other contexts, in the curriculum of the fifth grade there are also no basic competencies to compare and look for similarities between the two texts. Meanwhile, the fourth and sixth grade have basic competencies to compare texts, such as fictional texts. The relevance aspect is developed supported by the concepts taught in fourth grade, i.e: BC 3.5 and 3.8. Describing personal opinions about the contents of literary books (stories, fables, etc.) and comparing things that are already known to those that are just known from non-fiction texts. In this BC students develop themselves to link themselves to concepts or content, so that when reading, they will be accustomed to linking concepts or content to their
context or themselves. The development of the logic aspect is not found in BC of fifth grade, so that the strengthening and development of the logic aspects do not develop. In sixth grade, the strengthening of the logic aspect reappear in BC 3.10, namely linking events experienced by characters in fiction with personal experience.

This finding indicates that there is a lack of perfection in the curriculum. The curriculum currently used is not continuum development which is shown in Basic Competencies of fourth grade, fifth grade, and sixth grade. If the constant curriculum development process does not pay attention to the importance of material that is continuous in each level, it will make the learning process ineffective. For this reason, it is necessary to refer to the outline of a learning continuum that functions as a learning target. The mastery of material qualifications that occur in Indonesia is now considered to be unstructured because the developing curriculum has not paid attention to the importance of sustainable learning. Determination of basic competencies also pay attention to the depth of aspects of the material so that the content of the material presented in the teacher handbook and student handbook becomes the main learning resource that guides students to achieve their competencies. Conformity between the measurement process and the presentation of the material in the learning process is a factor that needs to be considered considering these conditions affect the achievements obtained by students. The form of equalization carried out can pay attention to the material in the curriculum with the learning objectives. Basically, students are the human being that will continue to develop and change. Therefore the learning continuum needs to be developed to adjust the abilities of students according to their respective developments. As a teacher, it is necessary to map basic competencies and materials so that they are adaptable to the abilities of students so that they will develop continuously.

Sixth grade students have better abilities in the stage of clarity, understanding text supported by facts, data, or examples. The advantages of sixth grade students are because in the fourth and fifth grade, they have learned basic competencies related to the development of clarity aspects, namely in fourth grade: BC 3.1 and 3.2 Comprehending the main ideas and supporting ideas, as well as the interrelationships of ideas obtained from the oral, written, or visual text, while in fifth grade, 3.5. Exploring important information from historical narrative texts presented orally and in writing is done by using aspects of what, where, when, who, why, and how. As the experience of students increases in practicing critical reading skills, the ability of these students in critical reading will increase. Critical thinking must be taught to students early on. The critical thinking and critical reading skills of students does not automatically develop by themselves when they grow up, but they must be trained with critical thinking experience both at school and outside of school. This perception is supported by various studies in the field.

However, based on the results of the research, the sixth grade students are just at comprehending level. This is because they have not been exposed to the concept of "observing

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facts, data, or examples” in texts other than narrative and descriptive texts. The results of the study are due to the type of text learned by students in elementary schools with more types of fiction and non-fiction (narrative) text and descriptive narrative texts in history books. When they are in fifth grade and sixth grade, the students began to be taught explanatory texts, reports, and other more complex texts. However, students are only exposed to printed text from students’ textbook and lacked of experience in reading different type of text and resources.

4 Conclusion

Based on the results of the study, it can be concluded that the critical reading ability of students in A-accredited and B-accredited schools is different. Students who are in A-accredited schools have higher critical reading skills than students who are in B-accredited schools. The aspects that prove the fact are the aspects of accuracy, clarity, and relevance. Meanwhile, in the aspects of logic, depth and precision of students, A-accredited and B-accredited schools have similarities on the results. When they are viewed from the grade level, students in the sixth grade experience decreases in the aspects of accuracy and relevance. This is because some basic competencies related to reading in fifth grade curriculum are not continuing from BC in fourth grade. Therefore, students' skills, for example skill related to relevance aspect does not develop. In the sixth grade, basic competencies related to clarity and logic aspects of critical reading are growing even though they are still at the comprehending stage. A continuous monitoring and identification on students' language skills should become a reference on intervention program’s adjustment, teaching models and media. Teachers need to make basic competency mapping and arrange the material suited to the students' critical reading skills that can increase along with their progress to the next grade.

References


Learning Natural Frequency And Resonance Using Wasted Water Bottle

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Abstract. The water bottle can be used as learning media to teach physics. Finding its natural frequency and develop a procedure to show resonance phenomena are needed to use it in teaching and learning in the class. In this research, three bottles had been used. Using sound analysis free and tone generator installed on a mobile phone, we can detect the natural frequency of these three bottles and show the resonance phenomenon. "Fresh tea" bottle has a natural frequency in 186.3±0.6 Hz. While Syrup bottle has a natural frequency in 133.8±0.6 Hz and "Pristine" bottle has a natural frequency in 203.4±1.2 Hz. The step to perform a resonance phenomenon as follows: a). Open tone generator and click sweep generator, b). Change sweep to tone by click sweep button on the bottom left, c). Change the frequency by clicking the frequency in Hz and input the frequency, d). Play by clicking the bottom middle button, e). Move mobile phone speaker to the top of bottle mouth, f). Check the difference of sound volume at the top of the bottle and in other position. The relation between resonance frequency (y) and the square of one per length of the empty collum in the bottle (x) follow equation $y = 2298x - 310.2$. $R^2$ is equal to 0.952, which shows that the equation produced in the graphic is strongly fit to the data. The relation between resonance frequency (y) and the square of one per length of the empty collum (x) in bottle $y = 4317x + 47.33$. $R^2$ is equal to 0.996, which shows that the relation the equation produced in the graphic is strongly fit to the data. The data is fit to the theory.

Keywords: natural frequency, resonance, water bottle

1 Introduction

Sound is an abstract learning material [1]. Visualizing and witnesses it can increase student understanding and experience about sound. But in most schools, the delivering method is almost the same. A teacher often only uses lecturing and not give the student an opportunity to witnesses the phenomena. The reason is various. Some of the teachers do not know how to bring that concept to reality. Others, they do not have time to prepare the learning material in the laboratory to experiment, or they do not have the tools. It needs a procedure and method that simple and can be done with quick preparation to experiment with the introduction of resonance concept for the student.

Resonance phenomena are the vibration of others object or system because of the vibration of other objects/systems. Some of the teachers use two tuning forks which has the same frequency. When one of them make a sound by hitting it, other will vibrate too. This phenomenon is because both have the same natural frequency. The phenomena happen too, when we have two pendulums with the same length. When one pendulum oscillates, another one will oscillate too. The natural frequency of a system or an object is precise. Two identical
baseball stick may not have the same natural frequency. Two glasses windows or two drinking glasses with identical in shape may also have a different natural frequency too. Knowing the natural frequency of this glass object will make us understand how to break this glass using sound. Sounding tuning fork in the top of air column will produce resonance too [2]. But, commonly, the sound source used in the air column resonance experiment is the tuning fork having disadvantage of unoptimal resonance results due to the sound produced which is getting weaker [3]. Resonance occurs when two objects have the same natural frequency.

The water bottle can be found anywhere, easy to find, and very cheap, some of them can be found as trash for free. Blowing in the top of this water bottle at open can make a sound. The frequency of the sound depends on the depth of the column. When air is blown across a water bottle, the turbulent airflow across the open bottle interacts with the confined air and sets up an oscillation in the neck at a resonant frequency. The Helmholtz resonator applies to a large bottle with a small narrow neck[4]. Known as Helmholtz resonance, this phenomenon occurs when air is blown across containers with a wide range of cavity and neck shape [5]. Sound is produced only for specific values of the blowing velocity [6]. This frequency called resonance frequency in the open-end tube. Monteiro et al did experiment using the bottle to find the relationship between volume and natural frequency with blow the bottle which filled with water in various capacity [7]. But not all bottles resonate according to the Helmholtz equation [8]. This research is only to find a new way of teaching natural frequency and resonance using a water bottle. A good Helmholz resonator can be used to measure of water filled in it [9] and also can visualize the harmonic series of its pipe at ideal situation [1].

The bottle is a system of an open-end tube which follows equation 1.

\[
f_n = \left(\frac{2n-1}{4}\right) \frac{v}{l}
\]

With \(f_n\) is resonance frequency, \(v\) is the speed of sound in air, \(l\) is the length of the column in open-end tube, and harmonics \(n = 1, 2, 3, 4, \ldots\)

From equation 1

\[f_n \approx \frac{v}{l} \approx \frac{1}{l}\]

If the length of the column longer then the resonance frequency will be lower. Lenght of the column can be seen in figure 1.

![Figure 1. Lenght of the bottle column.](image)

If volume of space in the column is equal to \(V = A.l\) then

\[f_n \approx \frac{1}{l} \approx \frac{1}{V}\]

From equation 3 we can see that resonance frequency is linearly related to \(1/l\) and \(1/V\). This relation will be proved in experiment using water bottle. Further experiment found by D. Megli [10], Balacandran [5], Ruiz [4] and A Eliot [8] that

\[f_n = \frac{v}{2\pi} \sqrt{\frac{A}{Vl}}\]
Where $A$ is the cross-sectional area of the neck. From this experiment the relation between resonance frequencies with volume and length are linear as follows

$$f_n \approx \frac{1}{\sqrt{l}} \approx \frac{1}{\sqrt{V}}$$  \hspace{1cm} (5)

Sound analyzer free is an application that can be used to determine the frequency and free. Using this application, combined with water bottle blowing, can perform variation in natural frequency phenomenon for the student. The tone generator is an application in android to produce sound with a specific frequency. Using this application sound with specific frequency match with the natural frequency of water bottle can be performed so resonance phenomenon can occur. This research aims to:

1. Determine the natural frequency of water bottle with sound analyzer free
2. Determine the procedure to perform resonance in water bottle using tone generator
3. Determine the relation between column length, empty space volume in the bottle to bottle resonance frequency on bottle which have a neck

2 Methodology

The object of this research is three bottles. These bottles are not identical. The shape is also different. Water bottle blows to produce sound, and the frequency is determined using sound analysis free installed on a mobile phone. These bottles have specification shows in table 1. The picture of the water bottle is in Figure 2.

<table>
<thead>
<tr>
<th>Type of bottle</th>
<th>“Fresh tea” bottle</th>
<th>&quot;Agung&quot; Syrup bottle</th>
<th>&quot;Marjan&quot; Syrup Bottle</th>
<th>“pristine” bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Plastic</td>
<td>glass</td>
<td>glass</td>
<td>Plastic</td>
</tr>
<tr>
<td>Column length</td>
<td>23.9 cm</td>
<td>27.4 cm</td>
<td>27 cm</td>
<td>21.3 cm</td>
</tr>
<tr>
<td>Neck length</td>
<td>2.0 cm</td>
<td>9.5 cm</td>
<td>11.5 cm</td>
<td>2.5 cm</td>
</tr>
<tr>
<td>Body length</td>
<td>21.9 cm</td>
<td>17.9 cm</td>
<td>15.5 cm</td>
<td>18.8 cm</td>
</tr>
<tr>
<td>Body Diameter</td>
<td>6.3 cm (not equally)</td>
<td>6.4 cm</td>
<td>5.5 cm</td>
<td>6.0 cm</td>
</tr>
<tr>
<td>Mouth diameter</td>
<td>2.0 cm</td>
<td>1.8 cm</td>
<td>2 cm</td>
<td>2.5 cm</td>
</tr>
<tr>
<td>Producing sound difficulties</td>
<td>medium</td>
<td>easy</td>
<td>easy</td>
<td>hard</td>
</tr>
</tbody>
</table>

In this research, mobile phone “Vivo V15Pro” is used. Software tone generator and sound analysis free are installed. The experiment is done in the night to avoid another sound that will include in the sound study.

A. Determine the natural frequency of bottles

Every bottle is blown to produce sound. This sound will represent the natural frequency of the system in the bottle. These sounds are analyzed using sound analysis free application in android to see the highest peak of the sound graphics. This highest peak of the frequency is the natural frequency of the system in the bottle.

B. Determine the procedure to perform resonance in water bottle using tone generator

After the natural frequency found, tone generator installed and will be used to produce sound. Sound with a specific frequency is created. The frequency of the sound in tone generator sets to the natural frequency of the bottle. Close the speaker of the mobile phone to bottle and see
what happened. If the resonance occurs, write down the practical procedure for teacher or student to perform this experiment.

![Figure 2. Bottle as object in this research](image)

C. Determine the relation between column length, empty space volume in the bottle to bottle resonance frequency on bottle which have a neck

Using the easiest bottle to perform sound with blowing, the variance of length and volume of space in the bottle is varied. Graphics between frequency versus 1/length and 1/volume created. The relation between resonance frequency and length or volume analyzed using ms excel.

3 Result and discussion

A. Determine the natural frequency of bottles

Sound analysis free is an smartphone application to analyze the frequency of the sound in real-time. Before using this, calibration is done using frequency from audacity in the laptop to produce 440 Hz tone and use the application to detect the sound frequency. The result is the frequency detected in exact 440 Hz (Fig. 3). The sound application free from Google Playstore can be used to determine sound frequency real-time with high precision.

![Figure 3. Frequency detected by sound analysis application in 440 Hz (the same as resources frequency)](image)

The results of sound frequencies of three bottle that blow to produce sound are in table 2. It can be shown that "fresh tea" bottle has a natural frequency in 186.3±0.6 Hz. While "Agung"
Syrup bottle has a natural frequency in 133.8±0.6 Hz, "Marjan" Syrup bottle has a natural frequency in 156.1±0.3 Hz, and "Pristine" bottle has a natural frequency in 203.4±1.2 Hz.

<table>
<thead>
<tr>
<th>No</th>
<th>&quot;Fresh tea&quot; bottle (Hz)</th>
<th>&quot;Agung&quot; Syrup bottle (Hz)</th>
<th>&quot;Marjan&quot; Syrup Bottle (Hz)</th>
<th>&quot;Pristine&quot; bottle (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>185.8</td>
<td>134.3</td>
<td>156.4</td>
<td>203.4</td>
</tr>
<tr>
<td>2</td>
<td>186.1</td>
<td>133.1</td>
<td>156.1</td>
<td>203.5</td>
</tr>
<tr>
<td>3</td>
<td>187</td>
<td>133.3</td>
<td>155.6</td>
<td>204.7</td>
</tr>
<tr>
<td>4</td>
<td>186.9</td>
<td>133.6</td>
<td>156.4</td>
<td>203.9</td>
</tr>
<tr>
<td>5</td>
<td>185.7</td>
<td>134.6</td>
<td>155.9</td>
<td>201.5</td>
</tr>
<tr>
<td>Mean</td>
<td>186.3</td>
<td>133.8</td>
<td>156.1</td>
<td>203.4</td>
</tr>
</tbody>
</table>

Sd 0.6 0.6 0.3 1.2

From the graphics of the sound of the bottle in sound analysis, it can be seen that the natural frequencies have the highest peak (figure 4). Another peak is the second harmonics, third harmonics, and so on. It is very easy to use this application. Push the button in the bottom left near 0 points to collect data and stop the analysis when sound from the resource (water bottle) occur. This simplicity is needed for teacher or student to do this experiment. Student or teacher can perform this activity in the class easily.


B. Determine the procedure to perform resonance in water bottle using tone generator

Tone generator produces sound with exact frequency (figure 5). This application can be downloaded for free in Google Playstore. The step to produce sound as follows:

1. Change sweep to tone by click sweep button on bottom left.
2. Change the frequency by clicking the frequency in Hz and input the frequency
3. Play by clicking the bottom middle button

The sound will appear in exact input frequency. Set the frequency in the natural frequency of the bottle and play it. Moving mobile phone speaker to the mouth of the bottle make sound louder than before. This phenomenon is resonance. It is a unique way to perform resonance concept using this way, and the student and teacher can do this.
C. Determine the relation between column length, empty space volume in the bottle to bottle resonance frequency on bottle which have a neck

In the experiment of determining the natural frequency of the bottle, the easiest way to produce sound and the best natural frequency is in "Marjan" syrup bottle. This bottle has 470 ml in volume. The length of the column measured from the top of the bottle/mount of the bottle. Water poured into the bottle to fill the bottle and make the column length variation. The bottle blows so we can find its natural frequency which is the resonance frequency of the system. The result of this experiment is in figure 6 and figure 6.

**Figure 5.** Produce 186.3 Hz frequency using tone generator

**Figure 6.** Relation between $\frac{1}{\sqrt{l}}$ and resonance frequencies

From graphics in figure 6, we can see that resonance frequency is linearly related to the square of one per length column. This variation is the prove of equation 3. There is a slight difference
in the data in low light. This slight difference does not happen after second data which is taken in the same diameter. The first data and the second data is in the transition zone. In the bottle, there is a transition between the body with the high diameter and the neck which has a shorter diameter. This situation is affecting the resonance frequency. The diameter of the column affects the resonance frequency. The graphic in figure 6 gives equation $y = 2298x - 310$. $R^2$ is equal to 0.952, which shows that the equation produced in the graphic is strongly fit to the data.

Figure 7 also prove that natural frequency linearly related to the square of one per volume of the bottle. This is the proof of equation 3. The graphic in figure 7 gives equation $y = 4317x + 47$. $R^2$ is equal to 0.996, which shows that the relation the equation produced in the graphic is strongly fit to the data. Equation 4 and 5 are proved.

D. Discussion

The step to find the natural frequency of the any water bottle is as follows:

1. Blow the bottle until have high volume sound
2. Detect natural frequency by looking the highest peak
3. Determine the natural frequencies of the bottle

This step can be used also when the bottle is not empty. The more depth will lower the natural frequencies if there is a water inside the bottle. This will lead us to open-end tube resonance concept. In this step also noted that the higher diameter of the mouth bottles the more difficult to produce sound at its natural frequencies. The material and length of the neck also influence the natural frequency. More exploration about it can be done in another research.

The step to perform resonance phenomenon as follows:

1. Open tone generator and click sweep generator
2. Change sweep to tone by click sweep button on bottom left.
3. Change the frequency by clicking the frequency in Hz and input the frequency
4. Play by clicking bottom middle button
5. Move mobile phone speaker to the top of bottle mouth
6. Check the difference of sound volume at the top of the bottle and in other position

The sound volume increase when mobile phone speaker place at the top of the mounted bottle. The bottle will begin to vibrate. Contacting the bottle with a finger will make feeling about this sensation of vibration. This happened when the resonance phenomenon appeared.

From figure 6 and 7, it can be seen that equation three is proved. But because there is a transition zone in the bottle between high-low diameter, there are slight differences in the data at lower length. The effect of diameter in resonance frequencies also appear. This results also follow the result of the experiment did by Boelkes and Ingrid [11]. The same experiment also found by Luftiah et al. [12] and Amrani [13]. The diameter of the pipe does affect the resonance frequency. The equation appears in the graphics shows strongly fit to the data. But in another experiment, R Nave[14] found that the relation of air volume with resonance frequency is not in linear. The relationships of it are linear in the graphics of $f \; vs \; \frac{1}{v^2}$ or $f \; vs \; \frac{1}{V^3}$. Equation 4 and 5 are proved..

4 Conclusion

1. “Fresh tea” bottle has natural frequency in 186.3±0.6 Hz. While Syrup bottle has natural frequency in 133.8±0.6 Hz and “Pristine” bottle has natural frequency in 203.4±1.2 Hz.

The step to find the natural frequency of the any water bottle is as follows:
2. The step to perform resonance phenomenon as follows:
   a) Open tone generator and click sweep generator
   b) Change sweep to tone by click sweep button on bottom left.
   c) Change the frequency by clicking the frequency in Hz and input the frequency
   d) Play by clicking bottom middle button
   e) Move mobile phone speaker to the top of bottle mouth
   f) Check the difference of sound volume at the top of the bottle and in other position

3. The relation between resonance frequency ($y$) and square of one per length of the empty column in bottle ($x$) follow equation $y = 2298x - 310$. $R^2$ is equal to 0.952 which shows that the equation produced in the graph is strongly fit to the data. The relation between resonance frequency ($y$) and square of one per length of the empty column ($x$) in bottle $y = 4317x + 47$. $R^2$ is equal to 0.996 which shows that the relation the equation produced in the graph is strongly fit to the data. The data is fit to the theory.

References

Analysis of Tree Stratum Vegetation in Sand Dune Core Zone in Parangtritis Village Kretak Sub-District Bantul Regency Yogyakarta As Learning Sources on Biodiversity for Grade X Senior High School

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Abstract. The research aims to know the species of tree stratum in the Sand Dune Core Zones of Parangtritis and their significant roles according to the Importance Value Index (IV). Besides, it is to examine the influence of abiotic environment (soil temperature, air temperature, light intensity, humidity, and soil pH) on the tree diversity in the sand dunes as well as the potential of the research results to be the learning materials for biology subject, particularly biodiversity, for Senior High School.

The samples were taken using the Point Centered Quarter (PCQ) method in the Sand Dunes Core Zones that is spread through 141 Ha. The area was divided into three, 14 Ha for each. The vegetation parameter covers density, dominance, frequency, Importance Value Index, and Diversity Index. The influence of the abiotic environment was revealed using linear regression analysis. The results were then analyzed for the potentials to be used as the learning materials in biology subjects for grade x Senior High School.

The study found six species of tree vegetation. The tree having the highest Importance Value Index is *Acasia auriciliformis* (124.17%), while the lowest is *Psidium guajava* (3.26%). The measured abiotic environments do not influence the index of vegetation diversity in the sand dunes. The results are potential to use as learning materials for grade X senior high school. The aspects include object availability and the issues in question; suitability with the learning objectives; aims and purposes; information clarity; exploration guidelines; and the outcome

Keywords: Tree Stratum Vegetation, Sand Dunes Core Zone, Learning Source

1 Introduction

The dune is formed by wind and it moves all the time as the results of wind activities. Dunes can be identified by their basic form. In Parangtritis, we can find three of their species: parabolic, barchan, and linear. Barchan is only found in Indonesia. Indeed, it only exists in Southeast Asia. It is a unique and rare ecosystem [1].

Sand dunes are controlled by environmental factors, such as soil temperature, air temperature, light intensity, humidity, and soil ph. Trees play important roles in the area, in that it determines the patterns of a particular ecosystem.
According to Soerianegara and Indrawan [2] analyzing vegetation is one of the ways to study the structure and composition of the plant in a particular area by describing them. The research on tree stratum in Sand Dunes Core Zone helps students to learn that nature with all the phenomena provides them with abundant information about biodiversity. [3] stated that one way to make students learn is to bring them to the field, allowing them to increase their knowledge and insight, particularly in biology subject for grade X senior high school.

2 Methods

The study belongs to explorative research. It was carried out in the Sand Dunes Core Zones of Parangtritis village, with the western boundary of Pelangi Beach, East of Parangtritis Beach, and North of Southern Ring Road.

The study was conducted during the dry season, from June to July. It employed several types of equipment, such as the Map of the Sand Dunes Core Zones, Roller-type meter counter, pole, GPS, camera, stationery, thermometer, hygrometer, Lux-meter, and Soil-tester. Meanwhile, the materials of the study included the tree stratum in the Sand Dune Core Zones of Parangtritis village, Kretek Sub-district, Bantul Regency, Yogyakarta.

![Figure 1. Sand Dunes Core Zones area in Parangtritis village, Kretek sub-district, Bantul Regency, Yogyakarta](image)

2.1 Procedures

1. The preliminary observation was conducted to know the area of the Sand Dunes Core Zones
2. Of all the areas, only 10% was taken as the study area.
3. The selected areas were divided into three. Study Area I was near the seashore, Area II in the middle, and Area III in the northern part of the sand dunes. Each of them is 50,000 m².
4. Each study area was divided into five stands with the size 50m x 200m.
5. The main transect line was drawn along 200m with the sub-transect line in every 20m. Therefore, there will be 10 sampling spots. Each spot is in the form of four quadrants.
6. Each quadrant was measured from the intersection of the main transect line and the sub-transect line of the closest tree that was found. It continued with the next closest tree found.

![Figure 2](image)

**Figure 2.** The intersection of the main transect line and the sub-transect line with the closest tree.

7. The tree trunk diameter was measured at breast height of an adult (if the tree is small, the basal measurement is based on the soil surface).

8. The observation results were added to the table that includes all the name of the measured plants.

9. Each stand was measured based on the vegetation parameter that includes density, dominance, frequency, Importance Value Index (IV), and Diversity Index (ID).

10. Further, the abiotic environment conditions found in each stand were examined the effect of diversity index.

11. The result of this research will be reviewed as a learning resource for biodiversity at grade X senior high school refer to Djohar [4].

### 3 Results

A. The Importance Value Index (IV) or the tree stratum of all the studied area.

The research conducted in the laboratory of plant taxonomy of UGM found six species of tree stratum in all the studied area. They are *Casuarina litorea* (beach she-oak), *Glirisedia sepium* (Glirisedia), *Acacia auriculiformis* (Acacia), *Borassus flabellifer* (palmyra palm), *Psidium guajava* (yellow guava) dan *Acacuba accidentalis* (Cashew fruit). The IV scores of all the areas (I, II, and III) are presented in Figure 3.
Figure 3 presents the IV score of the six species of vegetation in the Sand Dunes Core Zones. The highest was *Acacia auriculiformis* (124.17%), followed by *Casuarina litorea* L. (107.89%), *Gliricidia sepium* (38.19%), *Acacuba accidentalis* L. (14.15%). Meanwhile, the low scores were achieved by *Borassus flabellifer* (12.34%), followed by *Psidium guajava* (3.26%).

B. Diversity Index (ID) of the vegetation of the tree stratum

The measurement of the Diversity Index to the tree stratum in the Sand Dunes was shown in Figure 4.

C. Regression Analysis

Table 1 shows the influence of the measured abiotic environment on the diversity index of the tree stratum in Parangtritis village.

<table>
<thead>
<tr>
<th>Measured Environment Condition</th>
<th>R</th>
<th>R Square</th>
<th>Sig</th>
<th>Equation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Temperature</td>
<td>0.179</td>
<td>0.032</td>
<td>0.524</td>
<td>Y=-0.006, 0.010X</td>
<td>No influence</td>
</tr>
</tbody>
</table>

Table 1. Analysis results of the Influence of the Measured Abiotic Environment Condition on Diversity Index
The measured abiotic environments did not give a significant influence on vegetation diversity. It is evident in the significance rate, which was above 0.05.

### 4 Discussion

A. Importance Value Index (IV)

Importance Value Index (IV) is the index to describe the significance of particular vegetation in the ecosystem. If the IV is high, it influences the stability of the relevant ecosystem[2]. Of all the six studied tree strata, the highest score was reached by *Acacia auriculiformis* (124.17%), while the lowest was *Psidium guajava* (yellow guava) (3.26%).

The IV score of *Acacia auriculiformis* in all the studied area shows that the species dominates the area, particularly in utilizing the resources and in adapting to the surrounding environment [5]. If the IV score of particular vegetation is high, it will influence the stability of the ecosystem [2]. The results show the score of measured abiotic environment. The soil pH ranged from 6.78-6.84, soil temperature 32.0℃, air temperature 31.67℃, air humidity 64.9% and light intensity 684.53 lux.

The scores prove that the soil is ideal for the growth of *Acacia auliculiformis* in the Sand Dunes Core Zones in Parangtritis village. It is in line with the result [6], that the suitable soil pH is 6.64. Similarly, [7] stated that the plant grows at the soil temperature of 26.16℃, air temperature 27.06℃, air humidity 84.06%, and light intensity 2832.99 Lux.

*Psidium guajava* reached the lowest IV, which was 48.94. A species with low score means it is less adaptive to use the nutrients or to the climate, such as light, temperature, rainfall, and wind[5]. The scores find that the soil temperature ranged from 31℃-34.6℃, air temperature 31℃-32.2℃, light intensity 569.2-664.6 lux, air humidity 63.650-65.6%, and soil pH 6.78-6.84. These scores prove that the condition is not suitable for the habitat for *Psidium guajava*. According to [8], the suitable score for the maximum growth is 22℃-28℃ for the air temperature and 70%-90% for the humidity. Stated that the light intensity for vegetation should be 3283.7 lux.

B. Diversity Index of Tree Vegetation in the Sand Dunes Core Zones

The Mean score for the Diversity index of the tree vegetation in the area I was 0.18, area II 0.42, and area III 0.34. In general, the score was in a low category. In relation to Shannon-Wiener[2], if H’ value < 1, diversity of particular transect is low. The Diversity Index shows that the vegetation species are few and uneven. [9] suggested that a community is said to be in the low category if the structure consists only of a few dominating species.
C. The Influence of Species Diversity of Tree Stratum Vegetation on the measured abiotic environment conditions

The measured abiotic environment (soil temperature, air temperature, air humidity, light intensity, and soil pH) did not influence the vegetation diversity in the Sand Dunes Core Zones. It is evident in the significance score, which was above 0.05.

D. The Research Results as Biology Learning Source

The findings are potential to be used as learning materials for grade X students of senior high school, particularly the basic competence in Indonesian National curriculum for Senior High School Level no. 3.2. (KD 3.2.) It is about describing gene diversity, species, and ecosystems through observation. The analysis follows the criteria proposed by Djohar[4]they are: 1) Those are the potentials of the object availability and the issues; the possible topic or the research object in this project include the vegetation species of tree stratum, which focuses on the rarity of good examples of contextual teaching-learning process for biodiversity materials at tenth grade senior high school level. 2) The relevance of the research result with the national learning objective of Biology subject at Senior High School level as seen in National Curriculum 2013 especially KD 3.2., which stipulates the specimens of vegetation tree stratum, which plays an important role ranging from the most to the least importance at sand dunes in Parangtritis. The students are able to explain the concept of diversity. 3) the aim and purpose of the materials. The object of the research is the biodiversity whereas the material should meet the learning objectives of grade tenth students of Senior High School. 4) information clarity, a product and concept are obtained from the research. The research found out 6 species of vegetation tree stratum in sand dunes Parangtritis. The vegetation tree stratum having the most important value index is \textit{Acacia auriculiformis} while the least important value index is \textit{Psidium guajava}. 5) clarity of the exploration guidelines. It is understood that this research is based on the clear working procedure or clear exploration guideline. The working procedure starts from determining the location of research, finding the research object, research procedure, research tools and materials, data analysis, and drawing conclusions. 6) the clarity of the learning outcomes. That is the achievement of learning outcomes, which are expected to improve the students achievement in three domains i.e. cognitive, affective and psychomotor domains. The use of environment as learning resource is expected meaningful and interesting for the students. This is because the students are able to interact directly with the real environment. This thing is in accordance with [10] statement, which say that the use of environment in teaching-learning process can attract the students’ interest. Furthermore, [11] say that the teaching-learning process, which involve the students in real environment as learning resource makes it possible for the students to study the material easily. Based on the result of the analysis of the learning resource, it can be concluded that sand dune core zone in Parangtritis is a potential learning resource for the learning material of biodiversity for the tenth grade students of Senior High School.

5. Conclusion

From the discussion, it can be concluded that there are six species of tree stratum in the Sand Dunes Core Zones in Parangtritis. Those are \textit{Casuarina litorea} (beach she-oak),
Glirisedia sepium (glirisedia), Acacia auriculiformis (acacia), Borassus flabellifer (palmyra palm), Psidium guajava (yellow guava) and Acacuba accidentalis L (cashew fruit). The species with the highest Importance Value Index is Acacia auriculiformis (124.17%), while the lowest one is Psidium guajava (3.26%). The result is they are potential to be used as the learning materials of biology for grade X students of senior high school, particularly for the material of biodiversity.

References

Experimental Analysis of Adobe Flash CS6 Based Instructional Media Development In Accounting Subject

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Abstract. The purpose of this study is to compare the achievement of students' activeness and learning outcomes in the teaching-learning process using Adobe Flash CS6 interactive media-based multimedia compared to conventional learning in Accounting with the material on journal adjustment for Vocational Middle School students. The research method used was the quasi-experiment method with the pretest-posttest control group design. The population of this research is first year vocational middle school students. Data sampling was conducted using the purposive sampling technique for the experiment class and the controller class. The data collecting technique used was observation, test, and documentation. The analysis technique used to test the result of this research was the independent sample t-test. The result of this research showed that there is a difference in the activeness of the students' learning in the learning process using the Adobe Flash CS6 interactive media-based multimedia compared to conventional learning. The result of the t-test with the significance level of 5% showed a significant difference of 12.889 ≥ 1.994 between the experiment class and the controller class. The average rate of students' activeness from the result of the observation instrument was 51.42 for the experiment class and a lower result for the controlled class with 40.30. Furthermore, it is also proven that there is a difference in the learning outcome of learning using the Adobe Flash CS6 interactive media-based multimedia compared to conventional learning. From the result of the t-test, there was a significant difference of 14.254 ≥ 1.994. The average rate of students' learning outcome of the experiment class was 89.72, whereas the controlled room was 71.25. The gain score of the experiment class was within the high category while the controlled class was within the moderate category.

Keywords: instructional media, Adobe Flash CS6, students’ learning activeness, students’ learning outcome.

1 Introduction

Teachers as educators are required to be able to deliver the materials optimally and liven up the teaching-learning process. The teaching-learning process is a two-way process that cannot be separated between the teacher and the students. In this process, the educator delivers material that has been appropriated to the goal of the study with the means of educating the students. The best teacher is those who provide education that is understandable, easy, interesting, implements proper class management, and builds a strong relationship with their students [1].
The curriculum in Indonesia has undergone many changes. Until this day, the curriculum has always prioritized the role of students within the teaching-learning process to increase their information or knowledge. The purpose of an educator is more of a facilitator, where students can obtain experience with the guidance of the teacher [2]. Essentially, the active role of students in the modern world of education is a significant necessity [3].

The learning process is expected to raise and increase the active role and participation of students in developing their learning capacity, potential, and talent. When they are engaged in learning, students carry out many activities [4]. The activeness of a student in the learning process can stimulate and develop their talents, critical thinking, and problem-solving in everyday situations [5]. They use their brains in learning ideas, solving problems, and implementing what they have learned [6]. Active learning is learning quickly, fun, full of enthusiasm, and engaging personality to learn something well, must listen, see, and answer the questions and discuss with peers[7].

In the learning and teaching process, aside from the students' activeness, the learning outcome and students' learning mastery are also extremely important to be taken into account, because they are one of the goals that need to be achieved. The learning outcome shows the skills, will, knowledge, and grades that can be measured that students must make after completing a task [8].

The learning process is a communication process that takes place within a system. Hence the instructional media occupies a reasonably necessary position as one of the components of the learning system in reaching the intended learning goals [9] [10]. The result of a study conducted by Ogott and Odera [11] found that with the existence of various instructional media, from 38 teachers 65.8% said that it is extremely helpful, 13.3% said it is helpful, 10.5% said it gave ease in understanding the learning material, and the rest stated that it is not helpful.

However, in reality, instructional media has not been optimally used by a majority of teachers in the learning process. The result of the researcher's observation at a Vocational Middle School in the Boyolali District, Central Java, shows that a majority of teachers that dominantly use lecturing method in the learning process. Teachers use conventional methods such as lecturing because of the lack of knowledge of using or developing innovative and creative instructional media that can help the learning process and the learning outcome of the students. This conventional method makes the learning process less exciting and monotonous without much variation. Hence students tend to be bored and become passive during the learning process because the communication seems to be one way. This thus causes the students' learning outcome to decrease. In line with the research conducted by Aksit et al [12] that stated that many factors hinder students to actively learn, such as the lack of instructional media which makes students passive, incompetent educators, lack of time and time pressure during the learning process, teacher's lack of skills. The most dominant obstacle, in this case, leans more towards the instructional media used.

The use of instructional media is an alternative in solving various problems faced by students during the learning process [13]. The technology of interactive multimedia empowers the education process by increasing the interaction between teachers and students [14]. Students satisfaction in learning is an essential part of developing their skills and knowledge to improve the students' learning outcome.

From the discussion that has been elucidated related to the influence of instructional media towards the learning process and the students' learning outcome. The goal of this study is to prove the advantages of instructional media in increasing students' activeness and their learning outcomes by experimenting using the development of instructional media with the Adobe Flash CS6 software in the learning process of Accounting on Vocational Middle school students. The
Adobe Flash CS6 software is used because of its various features that ease the process of creating an instructional media. Adobe Flash CS6 can load texts, pictures, sound, animation, videos, and films according to the needs of the creator and is equipped with interactive buttons [15]. Classes that use Adobe Flash CS6 based instructional media development will be compared to classes that use conventional teaching methods. The result of the study is expected to provide knowledge on the influence of instructional media in classes, especially in learning Accounting. Therefore, it will contribute ideas related to how the learning process should be conducted.

2 Method

This research uses Quasi-experiment. Quasi-experiment research is used to find the influence of a specific treatment in the condition where the researcher cannot fully control and manipulate freely and intensively [16]. This research uses the pretest-posttest Control Group Design [17]. There are two variables in this research, which are independent variables (the instructional media) and dependent variables (students' activeness and learning outcome). The population in this research is three classes of first-year students of SMK (Vocational middle school) Negeri 1 Boyolali, Central Java Province, Indonesia. The data sampling technique used was purposive sampling. The determination of the experiment group and the controlled group was through consideration and observation. Thus, class XAK1 was selected as the controlled class and class XAK3 as the experiment class. The data collection technique used in this research was observation sheets, tests, and documentation. The students' activeness was assessed using the observation sheets, whereas the learning outcome was evaluated through the test. Instrument trial test was conducted using the instrument validity test and instrument reliability test. The analysis technique used pre-analysis requirement test, which is the data normality test and homogeneity test. The hypothesis test used the independent sample t-test with the significance level of 5% and the gain score of the students' learning outcome variable. Data processing was conducted using the assistance of the SPSS program.

3 Result and Discussion

Interactive multimedia in this research is through creating an instructional media using the Adobe Flash Professional CS6. Flash is usually used to create animation, commercials, and various components of websites [15]. Adobe Flash Professional CS6 has a .swf extension and can be played in the Flash Player. The advantages of an instructional media using the Adobe Flash Professional CS6 are: flash files are small in size, all types of picture files and audio files can be inserted, animations can be controlled as desired, able to create executable files (*.exe) hence can be played in any PC without having to install anything [18]. The font of the presentation will not change in any PC. The creation of an Adobe Flash Professional CS6 based instructional media was created with an attractive appearance and menus according to the needs of the learning process (see picture 1).
In the Adobe Flash CS6 instructional media, there are exciting features that can help the learning process. These features consist of:

a. **INSTRUCTIONS** contains steps on how to use the instructional media.
b. **COMPETENCY** contains essential competencies, indicators of achievements, and learning goals.
c. **MATERIAL** contains an explanation of the materials on adjustment journals.
d. **PRACTICE** contains questions for practicing for evaluation preparation.
e. **EVALUATION** contains pre-test and post-test questions to measure the students’ learning outcome.

**PROFILE** contains the data of the creator of the instructional media.

This research compares two classes, one which uses Adobe Flash based interactive media and another which uses the conventional teaching method. The accounting material studied is the adjustment journal. To find the difference, two classes were used which were the experiment class which used the Adobe Flash CS6 based instructional media that has been developed by the researcher, and the controlled class which used a lecture or conventional learning. The following is the result and analysis of the research of the experiment and controlled classes:

### 3.1. Analysis of the difference of students’ activeness in learning in using Adobe Flash Interactive media-based instructional media and conventional learning

Students’ activeness in the learning process can stimulate and develop their talent, they can also practice thinking critically, and problem-solving in the learning process.

In this research, data of students’ activeness was obtained using the observation sheet with the following assessment indicators:

a. Active participation in carrying out their learning tasks
b. Engaged in problem-solving

c. Ask questions to peers/teachers when they do not understand something

d. Try to find various information to solve a problem

e. Conduct group discussion

f. Assess their ability and the result they obtained

g. Train themselves in problem-solving

Opportunities to use/ implement what they learned from completing their tasks/ problems [19].

The result of students’ activeness in the experiment and controlled classes based on the observation sheet can be seen in table 1.

<table>
<thead>
<tr>
<th>Variation Source</th>
<th>Experiment class</th>
<th>Controlled class</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Mean</td>
<td>51.42</td>
<td>40.31</td>
</tr>
<tr>
<td>Median</td>
<td>52.50</td>
<td>41.00</td>
</tr>
<tr>
<td>Mode</td>
<td>53</td>
<td>41</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>3.237</td>
<td>4.034</td>
</tr>
<tr>
<td>Minimum</td>
<td>39</td>
<td>34</td>
</tr>
<tr>
<td>Maximum</td>
<td>56</td>
<td>53</td>
</tr>
</tbody>
</table>

From table 1, it can be seen that there is a difference in the result of the average score of students’ learning activeness in the experiment class and controlled class. The average score for the experiment class is higher than the controlled class. Based on the Independent Sample t-Test, the tcount obtained was 12.889, and the ttable was 1.994 (tcount > ttable). The significance level also showed 0.000, which means that there is a significant difference between the score of learning activeness of the learning process using the Adobe Flash CS6 interactive media based instructional media and conventional learning.

By using the Adobe Flash CS6 interactive media based instructional media in learning accounting, the result of the observation showed that students were more enthusiastic in following the learning process that a dynamic learning atmosphere was created. Furthermore, students were seen to be more engaged in solving problems and participated more in completing their tasks. The instructional media gave the students more activities that involved their kinesthetic aspects. The visual display of the instructional media also made the students more motivated to observe and eager to ask questions due to their curiosity. On the other hand, in the conventional learning class which was dominated by the teacher’s lecturing and students listening, the atmosphere of the class was mostly passive; the students felt bored and tended not to pay attention. These findings are similar to those found in Putri’s [20] research that stated that flash media could increase students’ activeness. Students are more active visually, orally, in listening, writing, drawing, metric activities, and mentally.
3.2. The difference of students’ learning outcome in using Adobe Flash CS6 interactive media based instructional media compared to conventional learning

Learning is an activity that involves both physical and mental. Thus the change that occurs must be reflected through students' physical and mental development. Students' learning achievement can be measured based on the magnitude of the range of change before and after students participate in a learning activity. According to Hamalik [21], the learning outcome is that when someone has learned there will be a change in their behaviour, for example, from not knowing to knowing, and from not understanding to understanding. From this research, in measuring the learning outcome, the researcher used a pre-test and post-test with questions related to the adjustment journal material. The learning outcome of the learning process using the Adobe Flash CS6 interactive media based instructional media can be seen in Table 2.

<table>
<thead>
<tr>
<th>Variation Source</th>
<th>Experiment Class</th>
<th>Controlled class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
</tr>
<tr>
<td>N</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Mean</td>
<td>52.64</td>
<td>89.72</td>
</tr>
<tr>
<td>Median</td>
<td>52.50</td>
<td>90.00</td>
</tr>
<tr>
<td>Mode</td>
<td>50</td>
<td>95</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>4.998</td>
<td>6.088</td>
</tr>
<tr>
<td>Minimum</td>
<td>40</td>
<td>75</td>
</tr>
<tr>
<td>Maximum</td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>

From Table 2, it can be seen that there is a significant difference in the average deviation from the pre-test and post-test of the learning outcome at the beginning and the end of the experiment and controlled class. This is proven by the average of the pre-test in the experiment class using the Adobe Flash CS6 interactive media based instructional media was 52.64 and became 89.72 in the post-test whereas the average of the pre-test of the controlled class using conventional learning method was 52.08 and became 71.25 in the post-test. Based on the independent sample t-Test the t count obtained was 14.254, and the t table was 1.994 (t count > t table). The significance level showed 0.000 which means that Ho is rejected, thus inferring that there is a significant difference in the learning outcome between students who used the Adobe Flash CS6 interactive media based instructional media and conventional learning. Aside from that, the calculation of the gain score found that the experiment class had a higher score compared to the controlled class with 0.78 > 0.39. The gain score of the experiment class was within the high category while the controlled class was in the moderate category.

The research showed that by using the Adobe Flash CS6 interactive media based instructional media, the experiment class is better than the controlled class, which used conventional learning method. This is proven by the difference and the increase in the average of the learning outcome of the experiment class, which was higher than that of the controller class. The existence of the Adobe Flash CS6 interactive media based instructional media influences the difference in the learning outcome due to several factors. One of which is the delivery of the materials using a different concept. The learning process using the Adobe Flash CS6 interactive media based
instructional media can interestingly display the materials. Hence, students can understand the materials better.

On the other hand, in the controller class, the conventional learning tends to be unable to make students understand the materials presented. This is due to the fact that conventional learning seems boring, and the concept of the delivery of the material is not attractive; thus, students tend not to pay attention to their teacher's explanation. This consequently results in the difference in the result of the learning outcome between the experiment class, which uses the Adobe Flash CS6 interactive media based instructional media and the controller class, which uses conventional learning method.

The finding of this research is in line with the study conducted by Priyadana and Suhamanto [22] which stated that there is an increase in the learning outcome after the implementation of Adobe Flash CS6 interactive media based instructional media. Where the improvement of the class that used Adobe Flash CS6 interactive media based instructional media increased by 25% whereas the controlled class, which used the conventional method only increased by 8%. Although there was an increase in both classes in their post-test, the improvement in the learning outcome of the experiment class was more significant than the controlled class. The effectiveness of the implementation of the Adobe Flash CS6 interactive media based instructional media can increase creativity and broaden knowledge.

4 Conclusion

Based on the result of this research, it can be concluded that there is a difference in the students' activeness in learning in the learning process using the Adobe Flash CS6 interactive media based instructional media for the materials on adjustment journal in the subject of accounting in vocational school students compared to conventional learning. The increase in students' activeness lies in the average score of the experiment class, which was 51.42, while the controlled class was only 40.31. Aside from this, it was also proven that there is a difference in the learning outcome of students is learning using the Adobe Flash CS6 interactive media based instructional media and conventional learning. The increase in students' learning outcome lies in the average score of the experiment class at 89.72, while the controlled class was 71.25. The gain score of the experiment class was categorized as high, whereas the controlled class fell into the moderate category. The result of this research is expected to be able to increase teachers' motivation to be more innovative in using Adobe Flash CS6 interactive media based instructional media in their teaching-learning process so that they can increase the students' activeness and maximize their learning outcome.

References


The Contextual Accounting Learning Management Based On Lesson Study At Senior High School

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Abstract. The research aims to analyze and describe the contextual accounting learning management that is done by the accounting teachers of Senior High School at Surakarta city. This research used research and development approach. The research subject was Senior High School accounting to teachers at Surakarta city. Data gathering method used: interview, observation and documentation. Data analysis technique used interactive analysis involving data gathering, data reduction, display, and verification. Data validity used triangulation method and sources. The research results showed that contextual accounting learning management that is done by Senior High School accounting teachers at Surakarta city is begun by making learning leading planning that is focus on syllabus, all teachers have not developed learning conducting planning independently. Most of them in education performing accounting still tend to use ceramah method, giving task and item exercise. Teachers still having problems in contextual accounting learning, Teachers have not fully understood and master contextual accounting learning. Teachers have not usual to link learning material with their real-life problems. Interaction management begin entering the class until the closing activity is dominated by the teachers (teacher center). Learning material management is conducted by an academic calendar that is established by the headmaster. Learning evaluation is done through Oral, written and giving task/assignment.

Keywords: accounting; contextual; learning; lesson study; management.

1 Introduction

Stepping from the information, and communication technology development that is demanded the accounting learning at the level of education set, especially Senior High School (SMA) that is in line with the progressing of science, knowledge and technology (IPTEK). Senior High School students, after completing their study tend to continue to the university. Therefore, accounting lessons curriculum should be arranged and prepared in a good way so that Senior High School students’ graduation have can to develop their science and knowledge at the university or to help the society. The main target of the accounting lesson is preparing accounting Senior High School graduation invariant basic competencies, in order to master and able to apply the accounting basic concepts, principal and procedure in a good way, whether for continuing to the university or plunge to the society life, so it gives the advantages for the students’ real life [3]

For so long our education still has an opinion that the science and knowledge only able to be got by memorizing and counting, teachers to be the primary sources for science and knowledge then delivering a speech as the primary choice method of learning and most of the
students had not to study preparation when they came to school. The reality, many students have who have problems in learning lesson at school. Several cases of that problems or difficulties such as: material that is taught no link with the real life day by day, the way to present the lesson tend to monotonous, boring and not variation so students can’t relate/link between what have they learned with how to use the advantages in real life.

The fact at the field also showed that learning that is done by the teachers so far remain the same in accounting learning presentation, such as: (1) It is begun with theory/definition teaching, (2) continued with giving items examples and (3) then items exercises. Actually, in the learning process teachers can use the environment as a learning base, because it can help teachers and students for achieving the learning target [15]. The same thing chose to active by LSM/NGO (Non-Government Organization) Sari in conducting learning process [14]. In the learning process with environment, base can also make the students be independent. It is same with the problem based learning. The research results showed that the class condition to be active, creative and able to increase the students’ independence attitude [25]. Soebakri’s opinion [9] mainly “Teachers should leave routinely/routine ways in learning, but make more creativity professional development programs.” Besides that, the wrong understanding of management function will influence learning management. Kirkham states that “Teachers feel have taught in a good way, even though they can’t show the reasons of that assumption”[8]. The wrong assumption makes many teachers acted unprofessionally in learning, whether in planning, conducting and evaluation.

Therefore in accounting learning management, accounting materials that have particular/unique characteristic need learning management properly, so it is the duty of teachers for creating effective and efficient learning management. Based on that mentioned above, so the problems studied in this research is how the accounting learning management that is done by the accounting teachers of Senior High School at Surakarta City Central Java.

2 Method

This research totally used research and development approach. This research and development is a process for developing the existing product and can be the responsibility [20]. The research location is in Senior High School at Surakarta city. The research subject is Senior High School accounting teachers at Surakarta city. Data gathering method uses interview, observation and documentation. Data analysis technique uses interactive analysis that is including data gathering, data reduction, data display and verification [11]. Data validity uses triangulation method and sources.

3 Result and Discussion

A. The Planning of Accounting Learning Conducting in Senior High School at Surakarta City

The planning arrangement of learning conducting (RPP) should be in line with syllabus and curriculum that is established. Teachers’ activity in learning material arrangement refers to basic and standard competence that is written on syllabus. The syllabus development in the form of that planning of accounting learning conducting that is taught by teachers in the classroom. A teacher should has planning in
conducting teaching learning process, if teacher does not arrange RPP, so the teaching learning activity in the classroom will never succeed in a good way and create the clear cut in the classroom.

As on the interview, observation results showed that generally, the accounting teachers in Senior High School at Surakarta city had not developed the planning of learning conducting (RPP) accounting independently. All of the teachers have made syllabus and RPP, but accounting teachers have not able to build a syllabus. Actually, teachers can make syllabus that can be suited with the school condition, students and environment. Therefore accounting’ teachers can develop syllabus actively, independently and creatively. It is in line with BNSP [22], that syllabus developer: (1) can be done by the teachers independently or from MGMP and education department, (2) if teachers can recognize the students’ characteristic, the condition of school environment, the syllabus can be arranged by themselves independently.

In contextual learning, RPP (Rencana Pelaksanaan Pembelajaran/the planning of learning conducting) refers to personal than reporting to the headmaster/supervisor instead to personal plan than as to the headmaster/supervisor like what has been done for this time being. RPP tend to be more functioning to remind the teachers themselves in preparing the tools or media and controlling the stages (scenario) of learning. Before doing the contextual learning activity, the teachers preparing learning planning. This planning as the part of teaching preparation. The plan in the learning model form that describes the conducting plan from the beginning until the end of learning for one basic competence. One basic skill can be written in one or more RPP. The teachers use that learning model as the guidance of teaching strategy for achieving the learning goal.

In conducting contextual learning divided into three stages mainly: introduction, core/body of content and closing. The introduction stage, almost all of the teachers almost have conducted it in a good way. The core stage including: (1) Teachers propose the contextual problem that is linked with the material which will be studied, (2) Students try to find the answer for the contextual problem that is asked by the teacher, (3) Teachers to facilitate students to do investigation and find the problem solving by themselves, (4) Teachers give an opportunity to students to build up their own skill and knowledge, (5) Teachers develop the students’ skill to ask, (6) Teachers present the innovative learning model.

Based on the observation of accounting teachers in Senior High School at Surakarta city have not accustomed to propose the contextual problem so that the students lack routine to find and apply their ideas in contextual learning. The questions that is conveyed by the accounting teachers has not fully can be thought real at the students’ thinking. Teachers have been habitual to use speech method, giving all of the knowledge to the students previously, then giving the items that have linked with the basic competence that is explained. Therefore the students to be dependence to no as effort to look for the solution of the problem. Teachers have not given opportunity to the students to find the skill and knowledge for their own. This is in line with Lynch and Dorothy’s opinion (in [13]), that learning is not only transferred the science but also the process of knowledge consumption. Studying is a process, not merely to memorize the ready concept, but should be experienced by themselves. The students should construct themselves step by step, giving the meaning of that concept through the application to the other field, even to face the students’ real life.
B. Accounting Learning Strategi in Senior High School at Surakarta City

Accounting learning conducting in Senior High School at Surakarta city has not done optimally. It is because the teachers have not fully understood and master contextual learning. Accounting learning with contextual strategy is excellent to be applied in the accounting learning process because will make the science and knowledge more recorded in the students’ memory, but in the conducting teachers face the problems. The problems that will be faced by the teachers in conducting contextual accounting learning are: (a) Teachers still facing difficulty in formulating learning scenario or learning planning step by step of students’ activity. (b) The lack of understanding of how to link between learning material with the students’ real situation or the knowledge that is owned by the students. (c) The material and the insufficient students’ competence. As a result, the process of learning to be blocked, because the students have not ready, (d) to use computer and LCD, the learning process still far from enough. Teachers recognized the importance of media usage in accounting learning, those are; (1) to ease the students to receive the material to be taught, (2) Senior High School students much more need the real media, (3) can be faster to understand the concept. Dealing with the problems can be overcome by activating the lesson teachers’ cooperation (MGMP) that exist in the city. The existing activity in MGMP can be used for finishing the problems that are faced by the teachers in conveying learning material to the students.

C. The Lesson Management in Accounting Learning in Senior High School at Surakarta City

The teachers’ activity to arrange the learning material refers to the primary and standard competence that is written in syllabus. The syllabus development in the form of planning of learning conducting IPS especially in accounting lesson, the accounting learning that is written in the planning of learning conducting (RPP) that will be taught by the teacher in the classroom. A teacher should have planning in conducting the teaching learning process, if teacher does not arrange RPP so the teaching learning activity in the classroom will never be succeed in a good way and will arise up the clear cut in the classroom. The RPP arrangement should be suitable with the syllabus and the established curriculum.

The lesson material management should be in line with is planned by the teacher to achieve the goal so that students can reach up to the completing criteria minimum (KKM) that is determined by the school. The teachers should be able to master the accounting material, because accounting much computations to enter transactions to be booked for financial reporting that is finally the students can think creatively, skillful and know in the world job, especially in the accounting field. Senior High School curriculum at Surakarta city still using two curriculums, those are; Kurikulum Tingkat Satuan Pendidikan (KTSP) and curriculum 2013. This is relevant with Kirkham’ research that is said curriculum approach can increase the effective learning and good experiences to understand accounting that is in line with curriculum and as a good approach for the students to learn to account [8]. It can be meant that curriculum approach for increasing learning experiences in accounting and the students’ study achievement.

The completing material for the students is begun from simple until the complex, such as: doing journal items, ledger, help book, worksheet then to be one as the reporting financial. The accounting material very needs the high accuracy and analysis Material in the recording that is begun from transactional analysis proofs to the providing journal in that material. The accounting material often and much study, transactional intrepretis events that will be recorded as in line with the recognition principles and measurement from each element concept of financial reporting in one accounting period. The conducting in bookkeeping on
accounting learning is going on and then be practiced in bookkeeping to determine the profits and loss level of the company.

Teachers in teaching should use the guide books, such as (a) Printing material, (b) learning material audio, (c) learning material visual, (d) learning material interactive in order teachers can know that in teaching have suitable with the certain criteries and the guidance books that are in line with the established curriculum [24]. The learning material management in Senior High School at Surakarta city has not completed good, so that is needed the increasing of teachers’ creativity in order students like accounting learning and satisfied towards the learning material in the classroom. The main target of teaching learning is the lesson material. The successful of teaching learning can be measured by how far the students can master the learning material that has been conducted by the teachers. The learning material itself is the knowledge that a source from the lesson that has been conveyed at school. While the lesson itself is the human being experiences in the past that is arranged systematically and logical, then be explained in many lesson books and finally, the contents of the books should be mastered by the students, [25]. Therefore, the teachers’ duty should make the students understand and master accounting lesson that is in line with the content of the established books, especially the accounting lesson. The teachers should be able to transfer the science and knowledge to the students, so that Senior High School students at Surakarta city understand and master the material or accounting lesson that is suitable with the accounting teachers wished. Accounting learning is as learning material that can not be changed anymore because accounting as asset learning in IPS field. Not only accounting learning that should be increased but also the learning teaching too. This is relevant and suitable with the Vincent’ research stated that to use accounting learning not only at outstanding schools but also in other schools as well, because the accounting learning is as the general learning [24]. The suitable and clear accounting learning will increase the students’ science and knowledge.

D. Accounting Learning Evaluation in Senior High School at Surakarta City

Evaluation in accounting learning Senior High School at Surakarta city including, evaluation affective, psychomotor and cognitive the students should own all of them as a continualist of attitude, skill and academic. The assessment evaluation aspects, such as: spiritual to The Inner Most of High Allah SWT. Psychomotoric or skill evaluation, teachers can observe and give an assignment that makes faster thinking way to complete the given duty by the teachers, this evaluation process can be formed in portfolio duty and be conducted while the accounting learning is going on in the classroom. Whereas cognitive assessment in written form, spoken and giving duty that is conducted in daily, mid and final test. The results from the evaluation can be form in the last semester test as the report, and the students know the score of accounting, so that the teachers can understand the students’ competence. Before the teachers evaluating of study results, they have to study the curriculum seriously and carefully. This curriculum study is meant to observe and see the study results types that is written in basic competence formulation and indicator. By recognizing that study results types, teachers will choose to determine the evaluation techniques and instruments accurately. For examples: Competence and indicator formulation that contains the cognitive study results in levelling understanding. So the evaluation technique that can be used is objective test multiple choice model or essay. If the study results are psychomotor, so the suitable evaluation technique is attitude test and the instrument use scoring scale from [12]. The accurate scoring for education give the results that are in line with the hope because the assessment is the collecting and cultivating information process to determine the achieving students study results [13]

The assessment in education is critical, because to know the students’ competence in accounting learning. Besides, the scoring affectively, psychomotoric and cognitive, the
scoring that is done by the lecturers to students can be formed in formative test that is directed to improve the teaching learning process that has been done in the final semester discussion of the main topic, whereas summative test that is directed to determine the progressing score or the students study results. The evaluation is to know the final result in teaching learning process that is involved the knowledge, skill, attitude, and values that can be formed in thinking and acting habitually. It will make the students get high spirit and motivation in learning to account to achieve the best results in understanding accounting.

Evaluation in learning accounting so variant so that it do not make boring, like the evaluation in the duty and group form, that things make the students to have more spirit and motivation for studying and understanding accounting. The unity learning Evaluation, as the achieving scoring of the students’ basic competence that is conducted based on indicators. The scoring is used by using test and non test both in spoken or written. The attitude’ observation, attitude measurement, the assessment of assignment/duty, project and or product, portfolio usage and self assessment [10]. From the stages aspect evaluation that is conducted both in the planning stage and performing. Whereas from the target aspect, evaluation is focused on process and learning product.

The goal of evaluation is to know the students’ absorption in accounting learning towards material that is given by the teachers in the items form to know the students’ competence. The assessment by giving the certain items will give the effective and efficient measurement that can able to give the best results as in line with KKM and increase the accounting learning quality. The accounting learning evaluation also a variant, such as. Evaluation is conducted in group and individual, group evaluation is based on the group’ score. Whereas individual evaluation is based on individual’ score/results both in spoken, written or the duty given.

Curriculum has grown up as the importance factor in preparing the accounting students for the future job. In a conceptual frame, it is proved that to offer several potential advantages for evaluation curriculum design and future research can give tighter examination from the framework of many developmental stages. Viewed from the quality has shown the potential that is used to determine relevance curriculum on the topic level every week and maybe as the approach that is used by the researcher to discover several useful scoring criteria the students like scoring criteria in Laing’ accounting [6]. Interaction from computer application can develop the students’ evaluation about the scoring of accounting attitude; the accounting scoring also uses a computer is very effective that has been applicated in the curriculum level. It is meant that the scoring from Laing to show up on curriculum level at the students’ attitude evaluation, similar with Senior High School at Surakarta city based on the existing of KTSP curriculum or 2013 curriculum. The evaluation that is done by the accounting teachers has suitable with the established criteria. The scoring in Senior High School at Surakarta city excellent from the group job results, portfolio or individual duty have achieved the established minimum scores. The scoring results are in the daily, intermediate and final test results. The results that are obtained by the students on accounting learning much satisfaction, because in Senior High School at Surakarta city have been used the useful teaching-learning model to increase the science and knowledge, the students’ understanding to achieve the wished and hoped results. The evaluation that is done by the accounting teachers has been in line with the established scoring criteria.
4 Conclusion

The accounting learning management that is conducted by Senior High School accounting teachers at Surakarta city is begun with the planning of learning attendly that refers to the syllabus, teachers have not maximally developed the plan of education leading independently. Most of attendly of accounting learning still tend to use speech method, in giving duty/task and items’ exercises. The teachers still having problems in contextual accounting learning, teachers have not fully to understand and to master contextual accounts learning. Teachers have not been accustomed to link the learning material with the problems of the students’ real life. Interaction management begins to enter the classroom until the closing activity more be dominated by the teachers center. The learning material management is conducted based on the academic calendar that is established by the headmaster. The learning Evaluation is conducted in spoken, written and duty/task’ giving.

References

The Reinforcement of Collaborative Constructive-Based Teacher Professionalism in Writing Scientific Work

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Abstract. The objectives of research were: 1) to map teachers’ ability of writing scientific work, 2) to explain the form of teachers’ need in developing sustainable profession in scientific work writing field, and 3) to describe the collaborative constructive-based sustainable teacher profession development model to improve the scientific work writing. The research design employed was research and development one. Techniques of collecting data used were observation, in-depth interview, documentation, FGD, and questionnaire. Data analysis was conducted using qualitative and quantitative analyses. The result of research showed that firstly, teachers of SMA/MA/SMK (Senior High School) Muhammadiyah in Sukoharjo having educator certificate have not understood completely the appropriate concept of scientific work writing leading to the inadequate publication of scientific work. Teachers’ experiences with writing scientific work were largely acquired when they attended Teacher Profession Training and Education. Secondly, there were many constraints in developing sustainable teacher profession. Therefore, teachers require the policy’s stakeholders to simplify anything related to the incriminating administrative activity of learning, fund support, initiative of primary and secondary education chamber, access to internet network, and support from education practitioners from high education. Thirdly, a comprehensive and integrated collaborative constructivist-based sustainable teacher profession development model could improve teachers’ productivity in writing scientific work. The development started with the teachers’ need for writing scientific work and conducted constrictively and collaboratively, while external team gave reinforcement and facilitation.

Keywords: professionalism model, professionalism development, and scientific work.

1 Introduction

Teachers are professional educators with the following main duties: educating, guiding, directing, training, assessing, and evaluating students in early age child education for formal education channel, primary education, and secondary education (Law Number 14 of 2005). In education process, teachers serve not only the transfer of knowledge function but also the value inculcation and character building functions sustainably and continuously. Teachers play a very strategic part in preparing high-quality human resources with noble character. Teachers are the front guard in defining education and learning’s success and quality. Therefore, many attempts should be taken to improve their professionalism continuously.
The development of teacher professionalism builds on institution, teacher group, and teacher’s needs. Danim in [1], teacher development is intended to stimulate, to maintain, and to improve the quality of staff in solving organizational problems. Teacher professionalism development is conducted through on the job training and in service training. It can be accomplished in some ways: (1) self development including functional education and training such as course, training, upgrading, and other education and training forms, (2) attending teacher workshop or work discussion group activities or in house training for teacher professionalism development activity, as keynote speaker or participants of seminar, colloquium, panel discussion or other scientific meetings, and (3) attending other collective activities corresponding to teachers’ duty and obligation related to their professionalism development.

In the meantime, Castetter [2] has long suggested fives teacher development models: Individual Guided Staff Development, Observation/Assessment, Involvement in a development/Improvement Process, Training, and Inquiry. Out of five teacher development models, training model is the one most commonly used in private education institutions. In such education institutions, the popular method to develop teachers’ professional ability is to conduct in-service training in the attempt of refreshing and upgrading, conducted either individually informally or collectively.

Meanwhile, Primary and Secondary Education Directorate General of National Education Department [3] mentions some alternatives to Teacher Professionalism Development Program as follows. (1) Teacher Education Qualification Improvement Program. (2) Equalization and Certification Program. (3) Competency-Based Integrated Training Program. (4) Education Supervision Program. (5) Subject Teacher Discussion Empowerment Program. (6) Teacher Symposium. (7) Other traditional training program. (8) Journal or scientific work reading and writing. (9) Participation in Scientific Meeting. (10) Conducting some researches (particularly Class Action Research). (11) Apprenticeship. (12) Attending Actual News from Learning Media. (13) Participation and Activeness in Professionalism Organization, and (14) Raising Cooperation along with Coworkers. Those alternative programs can be chosen as one of sustainable teacher profession development programs.

One of main issues in a sustainable teacher profession development, particularly to those with Civil Servant, is the presence of scientific work writing obligation. Meanwhile the scientific work writing ability is important to teachers (Anah Suhaenah, Kompas, April 22, 2014), because the activities during writing scientific work will be the teachers means of reflecting their experience. Data in Central Province, for example, shows that nearly 60% of Civil Servants that have achieved IVA grade can not go up to one higher grade because there is an imperative to write scientific work. Data shows that 50.88% of Secondary School teachers have occupied IVA grade but only 0.5% of them can go up to the IVB and higher grade (Yunanto, 2007). The dominant factor leading to teachers’ less success in improving professionalism is teachers’ poor abilities of conducting class action research and writing scientific work [4].

The writing scientific work that is published scientifically should be an important agenda and aware of by the teachers. Scientific publication should get much attention as it is the prerequisite not only for academic purpose but for the Nation’s future as well. Through publishing scientific work, either scientific work in the form of research finding, review, analysis, or other scientific studies, people will know and utilize it for broader and meaningful interests. It means that the socialization and training for teachers concerning the importance of a scientific work should be conducted continuously.
Writing scientific work, in addition to being an attempt of developing teacher profession, also serves as an attempt of improving teachers’ welfare through credit point administration system corresponding to the type of scientific work type they write. Some types of scientific work the teachers can write as a means of developing their profession are: research result report, scientific review article, popular scientific writing, scientific article, textbook, and etc. All those types of scientific work can be teachers’ means of developing their profession and of improving their welfare all at once. It is in line with the provision included into Minister of Administrative and Bureaucratic Reform Number 16 of 2009 dated 10 November 2009 about Teachers’ Functional Position and Credit Point stating that one of profession development activities is scientific publication.

Considering the description above, a sustainable teacher professionalism development model should be invented, particularly in scientific work writing. One of development models that can be conducted is the collaborative constructive-based one. The model is developed constructively, meaning that it builds on the problem found by the teachers themselves, while research team only reinforces and facilitates them. The attempt of finding solution or solving problem and writing scientific work collaborative is a foundation to develop writing ability more easily and meaningfully as it is based on the problems the teachers found themselves. This development model is expected to grow self-confidence and teachers’ motivation to write scientific work.

In the meantime, the development of sustainable teacher profession in Muhammadiyah Secondary Schools in Sukoharjo, Central Java, tends to be stagnant and the teacher profession development programs have not apparently organized clearly. For that reason, a collaborative constructivist-based sustainable teacher professionalism model development is required to improve teachers’ ability of writing scientific article.

Finally, the objectives of collaborative constructivist-based sustainable teacher professionalism development research to improve the scientific work writing ability are as follows: (1) to describe teachers’ ability of writing scientific work, (2) to describe the form of teachers’ need in developing sustainable professionalism in scientific work writing, and (3) to describe the collaborative constructivist-based teacher professionalism development model to improve the scientific work writing ability.

2 Method

This research and development took place in Sukoharjo Regency, Central Java Province. Data sources employed were: (1) informant consisting of teachers, headmasters, and head of chamber, (2) place/event, the learning process in school and classroom, and (3) document based on snowball sampling and purposive sampling. In the recent case, the author conducted an exploration until finding the sample actually wanted and then the author entered into the research location that has been known accurately before.

This study was a research and development, the one started with preliminary study, and then followed up with development activity through field study process, model designing, model trial, and model validation [5].
3 Result and Discussion

3.1 Teachers’ Ability of Writing Scientific Work

The result of research showed that teachers’ ability of writing scientific work in Muhammadiyah secondary school in Sukoharjo Regency still needs improvement. It can be seen from information given by some informants explained as follows. Considering the information from teachers of SMK Muhammadiyah 1 and 2 Sukoharjo (1st and 2nd Muhammadiyah Vocational High Schools of Sukoharjo), crosschecked later with informant consisting of teachers from SMA Muhammadiyah 1, 3, and SMK Muhammadiyah Watukelir, it can be concluded that there are still some constraints found in understanding scientific work concept. Teachers’ experiences with writing scientific work are largely acquired when they attended Teacher Profession Education and Training. Until today, teachers still find difficulty particularly in writing and describing substantive things.

By employee status, the 119 teachers having gotten educator certificate are divided into 20 with civil servant (PNS) status, 72 Foundation’s Permanent Teachers (GTY), and 27 non-permanent teachers (GTT). By education status, they are divided into 109 with bachelor (S1) degree and 10 with master (S2) degree. By sex, they are divided into 81 females and 38 males. Teachers with educator certification’s understanding on scientific work concept can be shown in the histogram below.

![Figure 1. Certified Teachers’ Understanding on Scientific Work](image)

Figure 1 explains the teachers’ understanding on the work. Only 15% of teachers really understand the scientific work writing. Such condition is in line with Sumardjoko’s [4] study finding that teachers still found some constraints in writing scientific work. The constraints included: (1) low reading interest, (2) teachers’ inadequate information on the recent development activity, and (3) misperception, due to inadequate information on scientific work. Then, 85% of teachers understand poorly or do not understand the scientific work writing. This data, of course, can be used to be the basis of the importance of organizing teacher training program in scientific work writing.

Scientific work is essentially a scholar’s product of thinking that wants to develop science, technology, and art. This scientific activity can be accomplished through literature, experience, research, and others’ previous knowledge. Scientific work, according to Pateda [6], is the product of scientific thinking in a certain discipline organized systematically, scientifically, logically, correctly, responsibly, and using right and correct language. So, scientific work is written not only to be accountable for the use of research resource (money, material, and tool)
but also to be accountable for the scientific work writing technically and substantively. It is because the product of a scientific work is read and studied by others in infinite period of time as a means of developing science, technology, and art.

The result of scientific writing is organized logically and correctly. Therefore, to achieve the logical and correct scientism, a scientific work writer should have strong theoretical foundation to prevent the scientism featured from deviating from certain discipline and to make it accountable for. Scientific accountability is related not only to the content of scientific work but also to its writing procedure.

3.2 The Need for Sustainable Teacher Professionalism Development

The development of professionalism conducted by teachers in Muhammadiyah schools environment of Sukoharjo is corresponding to Guideline of Sustainable Teacher Professionalism Development. The development activity is conducted in school independently and categorized into three: (1) conducted by teachers independently, (2) in cooperation with fellow teachers in a class, and (3) through profession organization network.

The evidence of teachers’ self development activity is shown by the result of interview with some informants. BS, as a Pancasila and Civic Education teacher of Vocational High School (interview on June 5, 2015), stated that “So far I have read many books, and attended workshop and outbound. If all of these can be done, these will be sufficient to improve competency in writing scientific work”. This information is confirmed by a history teacher (SS), stating that “in addition to reading book, I also often browse in internet, because historical event will be found more easily in the internet. I have attended seminar and workshop as well, and all of these can support my competency as a History teacher”.

The information gotten from the resource above is not different from what HS has done, as a certified teachers assuming Entrepreneurship course in SMK Muhammadiyah 1 Sukoharjo. HS developed his competency by attending seminar, workshop, and attending Subject Teacher Discussion (MGMP) activity actively. Even, there is also a teacher, ES as a Pancasila and Civic Education teacher (interview on June 8, 2015), stating that “to develop competency, in addition to attending actively MGMP activity, he also takes aside some of his income to buy laptop so that he can access internet any time, because it will helpful to searching for latest information on civic issues”. ES’ information was crosschecked with the information from another certified teacher in SMK Muhammadiyah 2 Sukoharjo, W, assuming physical education subject. Considering the result of interview on June 6, 2015, W said that “If the school got invitation for seminar or workshop, I always attended it. Reading book, doing physical exercise, and watching video show in Youtube are some activities I often do to improve my competency. Considering the information aforementioned, the educator-certified teachers have done some activities to develop their competency so far. They have taken many attempts to improve their professionalism sustainably as shown in the histogram below.
Although many attempts have been taken to develop professionalism, some problems still arise related to the sustainable teacher professionalism development. Generally, the problems arising are: limited time, limited fund, limited school infrastructure, age factor, low motivation, leader’s policy, and access to internet network. Therefore, in developing their professionalism, particularly in the term of writing scientific work, teachers need (1) policy stakeholders’ measures to simplify anything related to administrative activities of learning, (2) support from Primary and Secondary Education Chamber and other sponsor to give the teachers the opportunity of conducting such corresponding activities, (3) the change of policy from the Primary and Secondary Education Chamber’s leader to conduct the grade increase more selectively concerning pedagogic, professional, personality, and social domains, (4) supporting access to internet network, (5) support from high education institution to the organization of workshop/seminar/and other activities, (6) supporting scholarship for advanced study.

The findings above shows that what the teachers have done in developing their professionalism independently are justifiable. It is in line with Gambell Trevor [7] stating that personal initiative to reform education based on professionalism is very important. As a professional, teachers are recommended to wrestle with the larger education objective and direction. In a more professional culture, teachers assume bigger responsibility for producing their own scientist.

3.3 Collaborative Constructive-Based Sustainable Teacher Professionalism Development Model

This research shows that in Muhammadiyah Primary and Secondary Education Chamber setting, teachers’ ability of writing Scientific Work still needs improvement. A facilitating strategy is required in writing scientific work to teachers of SMA/MA/SMK Muhammadiyah Sukoharjo, by synergizing Muhammadiyah Primary and Secondary Education Chamber of Sukoharjo, Schools/Teachers, and High Education (Teacher Training and Education Faculty of Surakarta Muhammadiyah University). The main components supporting the organization of sustainable teacher professionalism development model in writing scientific article are as follows: (1) participation of all stakeholders, (2) Muhammadiyah Primary and Secondary Education Chamber constituting the main component determining model implementation, (3) school providing infrastructure to teachers, (4) teachers constituting the key components of model implementation, and (5) High Education as facilitator and developer.

A sustainable teacher professionalism development model is based on collaborative-constructivism. In its implementation, it can improve the teachers’ ability of writing scientific work. The model is developed constructively, meaning that the development conducted is based
on the problems the teachers find themselves, while the research team reinforces and facilitates them. Collaborative basis means that teachers collaborate with their group (same school/same subject) to produce scientific work. The attempt of solving problem and writing scientific work collaboratively underlies the development of writing ability more easily and meaningfully as it is based on the problems found by the teachers themselves. This development model in fact can grow self-confidence and can motivate teachers to write scientific work.

This collaborative constructivism-based sustainable teacher professionalism development model to improve scientific work writing ability is as same as the training model or the learning model explained by Joyce and Weill [8]. The learning model intended consists of four categories: the social family models, the information-processing family models, the personal family models, and behavioral models [8].

The collaborative constructivism-based sustainable teacher professionalism development model for teacher in scientific work writing belongs to the social family model. It is the one focusing on the essence of human beings and learning method. This model emphasizes on community’s basic characteristics, learning social behavior, and social interaction in the learning. Cooperative becomes a characteristic enhancing the quality of life, bringing about happiness and understanding on spirit, and reducing social conflict. The development of social behavior, academic skills, and knowledge products is interrelated [8]. This cooperation results in collective energy called synergy.

The information-processing family models, according to Joyce, Weil and Calhoun [8], emphasizes on improving the human character in directing the world by eliciting data, collecting data, identifying problem, finding solution to the students, developing concepts, and language to improve their ability. The information processing model is useful to themselves and community, to improve intellectual ability, and to achieve personal and social values to education.

The personal family departs from an understanding that human reality basically lies on individual consciousness. This personal model emphasizes on individual’s self-development prioritizing the process of helping individual create and organizing reality, by inviting students to develop productive relation to the environment [8].

Behavioral model is based on social learning theory, behavior modification, behavior therapy, and cybernetics theories. Human beings are self correcting the communication system by reengineering behavior in responding to information successfully [8].

The effectiveness of model is evaluated for its target compatibility and achievement as specified, by comparing the professionalism before and after the model implementation. From the result of model implementation, it can be summarized as follows: (1) the model, in fact, effectively improves teachers’ ability of identifying problem and formulating the theme of research constructively and collaboratively; (2) the model effectively improves the teacher group’s ability of writing scientific article (constructively and collaboratively) published in national journal; and (3) the model effectively improves the sustainable teacher professionalism.

The advantages of this collaborative constructive-based development model are as follows. (1) Involving many parties in its implementation: stakeholders, Muhammadiyah Primary and Secondary Education Chamber, Schools, teachers and LPTK team. (2) Applicable using both bottom up and up to down strategies. It means that this model started with teachers’ initiative, responded to and supported by Muhammadiyah Primary and Secondary Education Chamber. (3) Giving teachers the opportunity of exploring the scientific work writing as broadly as possible. It is because the model is developed constructively, based on the problems found by
teachers themselves. (4) Giving the teachers the opportunity of identifying problem and of cooperating as broadly as possible, by which teachers will collaborated with group (same school/same subject), to produce scientific work. (5) Combining constructive and collaborative measure. (6) Involving high education practitioners as facilitator. (7) Not harming the teachers’ primary job in teaching-learning process at school. It is because the school is the component of model organization so that the teachers’ activity in writing scientific article will be adjusted with teaching-learning activity. (8) Having some stages conducted effectively to generate the teachers’ spirit to write scientific work.

Despite some advantages aforementioned, the effectiveness of this collaborative constructive-based development model is highly dependent on the followings. (1) Teachers as the subject of model implementation; therefore teachers’ motivation and willingness highly determine the effectiveness of model. (2) Teachers have conducted research and documented their report, so that they only need to follow up it by writing scientific work. (3) The publication of scientific work in ISSN or ISBN journal and National or International Proceeding needs cooperation with Muhammadiyah Primary and Secondary Education Chamber, in this case represented by teacher work group/MGMP and LPTK.

4 Conclusion

Firstly, in relation to scientific work writing ability, the educator-certified teachers have not understood completely yet the concept of scientific work. Teachers’ experiences with writing scientific work were largely acquired when they attended Teacher Profession Training and Education. Secondly, there were many constraints in developing sustainable teacher profession. Therefore, teachers require the policy’s stakeholders to simplify anything related to the incriminating administrative activity of learning, fund support, initiative of primary and secondary education chamber, access to internet network, and support from education practitioners from high education. Thirdly, a comprehensive and integrated collaborative constructivist-based sustainable teacher profession development model could improve teachers’ productivity in writing scientific work. The development started with the teachers’ need for writing scientific work and conducted constrictively and collaboratively, while external team gave reinforcement and facilitation.

References

Mind Mapping: Learning strategy for novice learners of anatomy for physical education undergraduate program

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Abstract. There is an important demand for faculty in undergraduate program to deliver lecture through student-centered learning environment. The purpose of this study is to determine the effects of a mind–mapping learning strategy on novice learner’s basic knowledge of anatomy. The subject of this study were new entrants of physical education undergraduate program of Universitas Muhammadiyah Surakarta. A paper-based mind-map learning strategy was introduced to the students in the experimental group to improve their basic knowledge of anatomy. This study applied the experimental method using control group design. Through one-way ANOVA analysis, it was found that paper-based mind-map learning strategy had no significant contribution enhancing basic understanding of anatomy in the experimental group. In addition, the results of simple paired t-test analysis indicated that mind-map performed as similar to standard note taking technique as an effective method to facilitate students learning new subject.

Keywords: mind map, student-centered learning, critical thinking, creativity

1 Introduction

Physical education (PE) undergraduate program often recruit highschool graduate from major other than science. Thus bringing their first year in college difficult to get maximum result in science-related subjects as they have no background in science and medical subject which become part of the curriculum in PE undergraduate program. Among science related subjects, Anatomy become first subject to be taught in firs year. The idea of Anatomy for physical education is that PE professionals must effectively and efficiently integrate knowledge of human body structure to design physical activity suitable for students. Human body structure are taught in anatomy subject. Therefore make the subject important for PE students in college.

Lack of basic science knwoledge for PE students make it hard to design a teaching method that compatible to novice learners. It is known that making student embrace the positive classroom experience is a hard task for lecturer. Costumized learning approach is necessary to fulfill the college student’s demands for worthy and satisfying classroom experience in today’s educational settings [1]. On this disruptive era, where everything is changed, students need to customize their style of learning. They need to move away from traditional learning where teacher is the center of knowledge in class. Students required the thinking skills that can benefit them finish their task and answer the challenge coming in the globalization era. They are meant to be a problem solver for one problem to another. Research
indicated that acquiring critical thinking and creativity could help them improve their problem solving abilities [2]. Mind mapping, an active learning method seen to be benefit for students in nursing and medical department to learn science [3][4][5][6][7], it facilitate a student-centered active learning and promotes the mind’s natural ability to think and recall conceptual information in a more effective way [8]. Mind map also accommodate critical thinking and creativity needed to improve problem solving abilities as suggested by Muglia et al [2].

Science education including learning Anatomy needs students to be an active participants. Applying the active learning approach, science education facilitate students in searching, implementation, investigation, experimentation or observation [9]. Faculty members is suppose to swift their teaching methods away from teacher-centered educational approaches and actualize an active student-centered learning situation. Moreover, through the class, teacher need to develop their students’ critical thinking. Hence make them think everything in the most efficient way [2]. Current studies suggested that developing students’ critical thinking could eventually improve their academic performance. Despite its academic relevance, especially in university, critical thinking is useful to produce plan, organize, supervise, and, measure academic tests which directed beyond the classroom and into students’ personal and social lives [10].

Linear teaching method such as the use of outlines, and traditional note taking are still dominant as the attributes to standard teaching. Although these techniques are helpful, the methods discourage students to have engagement in class, associations, and creativity [11]. Buzan [8] introduced a learning method that could promotes radiant thinking that help students engage with their class. The theory of radiant thinking promotes diverse aspects of the brain working in synergy, a natural process, with thought starting from a central point. The mind-mapping technique facilitate the use of our natural ability to think in a radiant manner [8]. Mind mapping has been claimed to help student improve academic performance especially in science [12][4][13][14][15]. To the date, regarding on mind map implementation, there are no study dealing with student without background knowledge in science such as new entrants of undergraduate physical education program. Therefore, this study aims to investigate the effectiveness of mind map as a learning strategy for first-year student of PE undergraduate program in Anatomy subject.

2 Method

2.1 Study design

This is a comparative study of the effectiveness of using mind mapping (MMP) as learning strategy versus standart note taking (SNT). SNT is describe as any study approach that does not include reorganizing information using special form as can be observed in a concept map or mind map[16]. SNT is process whereby notes are compiled in a hierarchy from the top of the page to the bottom, or from left to right without any hierarchy[15]. This study design as quasi experiment with control group and experimental group. This study explores the relationship between : 1) Mind mapping (MMP) and students’ achievement in Anatomy tests; 2) Standard note taking (SNT) and students’s achievement in Anatomy test.
2.2 Subjects and intervention

The subjects consisted of male and female students. The subjects are new entrants undergraduate student majoring in physical education. Subjects is member of anatomy class. A total of 88 students were recruited in this study. Students were randomly assigned to equal group namely control and experimental group. In addition to the mix abilities in groups, lecturers were also asked to ensure that the groups were mixed in gender. Subjects were given an Anatomy lesson for 11 weeks (one session last for 3 hours per week). During the 12th week, subject were asked to recall the conceptual knowledge already given in class using MMP (experimental group) and SNT (control group). Prior to mind mapping, experimental group were given explanation about creating mind map and utilize mind map to summarize learning materials. Mind map lesson refered to a prominent mind map website[17] and based on mind map theory developed by Buzan [8].

Students completing the 12th week class session were asked to summarize Anatomy lesson using MMP or SNT respective to their group. Students were given 30 days to prepare themselves for formative asessment to measure their depth of knowledge in Anatomy course. Formative assessment was implemented by the reseracher using short essay question. In the completion of the research session, a self-administered questionnaire were given to experimental group to obtained their perception regarding mind map. Statistical method of ANOVA and t-test were used to analyze significance difference between two groups.

3 Result

The statistical result identified that experimental group obtained an average mark of 86.36 (SD=12.45) and control group obtained an average mark of 80.73 (SD=17.32) during the final test. Statistical analysis found that sig. .092>0.05 therefore there is no significant difference between the two groups.

<table>
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<tr>
<td>MMP</td>
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<td>54</td>
<td>98</td>
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<tr>
<td>SNT</td>
<td>49</td>
<td>80.73</td>
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However majority subjects (80%, N=39) in the mind map group have argued that it is a good way to learning Anatomy that it is a useful way of memorizing information. Majority subjects also feel that mind map is a fun and interesting learning method (90%, N=39). This is similar to other study which also demonstrated students’ perceptions that mind map is interesting and fun[18].

4 Discussion

The difference in mean score of the test between subjects in the SNT group and MMP group was not significant. This finding suggests that both groups exhibited the same information based upon 11-weeks exposure of Anatomy. Nevertheless, the students of the experimental group as well as the control group were able to obtain a satisfactory performance level after being exposed to a totally unfamiliar topic. A majority of mind map group had grasped the concept and implementation of mind map in their daily course after initial
training. A majority of them used color and picture to customize their mind map. The information in the mind map was varied among students in the experimental group reflecting their personal educational needs.

The final test was given to subjects after the respective subjects were exposed either with MMP or SNT for 6 weeks. Although the mean score of the final test was slightly higher among subjects in the MMP (86.36, SD = 12.45) compared to those in the SNT group (80.73, SD= 17.32), the difference was not significant. The result suggest that mind mapping is not superior to standard note-taking for basic Anatomy lesson. Similar results were also found in others study (Antoni, Zipp, Olson, & Cahill, 2010; Wickramasinghe et al., 2011). However, it is important that subjects in MMP group did not have score less than those in SNT groups despite that they only receive a brief period of introduction on mind map without further practice to improve their proficiency in mind map.

Buzan and Buzan [8] identified that mind mapping promotes the use of radiant or central thinking to enhance the multiplicity of the brain. Mind mapping facilitates the students explore the concept and its key associations in an organized, colorful, vibrant, and logical manner. When applying mind map in their course, students found themselves attracted to the method. The fact that no significant difference was found between groups may lend support to SNT as a traditional method that has been part of their previous educational background. Familiarization of a certain learning method maybe useful to student to optimize their learning. The subjects in MMP groups may have been distracted to learned something through writing notes in a completely new way. Especially when Anatomy is a new subject for them where learn something new required consistency and determination. Any distraction may have decreased their performance.

4.1 Limitations and future research

The mind map introductory for experimental group was time limited. By the end of the session most of the student in the experimental group still not finished their mind map project during the class. Then researcher ask them to take it as a homework without supervision. A potential time limitation may reduce their understanding regarding application of mind map. Following the mind map session, students were given the freedom to study their mind map prior the test. The process went without supervision. It was likely unknown whether during their free time they review their mind map or not.

Because critical thinking required long time to develop, short-term alterations in critical thinking was another limitation of the present study. Numerous mind-map sessions may be important for students to improve proficiency in the strategy before major changes in the acquisition of critical thinking occur [9]. Product quality of mind map from the subject was not being measured. Product quality of mind map refer to mind map depth. As other studies suggested mind map depth increases as students gain proficiency in their construction over time[7].

Future studies should accommodate mind map session in more than once to allow subjects create multiple mind maps so they can gain proficiency in the technique. This would benefit them in order to become expert regarding on mind map creation and develop their critical thinking skill.
5 Conclusion

The data obtained from this study does not support any superiority of mind mapping (MMP) over standard note taking (SNT). Eventhough mean score of MMP group is higher than SNT group, they are not statistically significant. However this findings do not reject the usefulness of mind mapping as a learning strategy as the subjects’ product quality of the mind map still not being considered. In order to fully address if mind mapping is effective in organizing, prioritizing and integrating material which foster the development of critical thinking skills, length of mind map exposure should be added with two or more session. To fully understand the changes effect of different learning methods, pre/post test should be implemented during study. In addition, the use of standardized critical thinking assessment tools such as pre post measure on the Health Sciences Reasoning Test (HSRT) also necessary

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References


Strengthening Character Education through Outbound Learning on Elementary School Students

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Abstract. The objective of this research was to identify the character education building through outbound learning at Muhammadiyah Alam Surya Mentari Elementary School in Surakarta. The method used in this research was descriptive qualitative. The data were collected through observation, interview, and documentation. Observation was carried out in learning process. Interview was conducted by questioning the teachers and the headmaster. Documentation was obtained by collecting various supporting documents. This research took place at Muhammadiyah Alam Surya Mentari Elementary School in Surakarta. Triangulation methods, namely triangulation of sources and techniques, were used to validate the data. The results of this research show that: (1) characters education building is integrated in outbound learning; (2) there are five core values of character that can be developed through outbound learning, those are: religiosity, nationalism, cooperation, integrity, and self-dependence.

Keywords: characteristic education, elementary school, outbound learning

1. Introduction

In accordance with Presidential Decree no. 87 of 2017 [1] on Strengthening Character Education in Indonesian this term is well known by PPK, character education is necessary to create a cultured nation by strengthening the values of religiosity, honesty, tolerance, discipline, hard work, creativity, democracy, curiosity, patriotism, nationalism, appreciation of achievement, communicative-competency, pacifism, reading fondness, social responsibility, and responsibility in general. PPK plays an important and strategic role in planning character revolution of a nation, as stated in Nawacita, which is to encourage National Movement of Mental Revolution [2]. PKK is an educational movement aimed to strengthen students' characters at school through the harmonization of emotional training (olah hati), will training (olah rasa), mind training (olah pikir), and physical training (olah raga) supported by public participation and cooperation of school, family, and society [3].

PPK aims to: (1) build and equip students, as the Indonesia 2045 Golden Generation, with the spirit of Pancasila and good character education to challenge the dynamic of change in the future; (2) develop national education platform that puts character education as the main spirit in education administration for students, supported by public participation that consider the cultural diversity in Indonesia; and (3) revitalize and strengthen the potential and competency of educators, staffs, students, society, and family environments in implementing PKK [1].
Seeing this noble goal, the promotion of PKK shall be supported by each part of society in order to create a generation with good character and is able to survive in its era.

Moreover, the urgency of character education is important to help students develop their positive characters to improve their quality as human beings; to promote character development through ethics integrated into curriculum; to develop a positive moral climate by involving students, teachers, staff, parents, and communities; to teach students to handle a conflict justly; to create a safer school; to reassure; to teach students and adults to understand, participate, care, act ethically and justly, be responsible to themselves and others at school and in a bigger communities [4].

PPK also answers the challenge facing this nation, in which there are many cases found related to the low character of students in formal education field, such as: death of a teacher killed by his own student [5]; theft done by an elementary school student [6]; a junior high school student getting pregnant by an elementary school student [7], etc. This situation is quite alarming, since PPK has actually been integrated into RPJMN 2015-2019: "Strengthening character education on students from all levels of education to reinforce their moral values, character, and personality by strengthening character education integrated into curriculum" [8]. However, we can still find many facts about students with low character. Such problem becomes homework in education, especially school as the second home for student, since superior generation should be started from good characters. Those characters will shape a whole, principled, and civilized human.

Other challenges facing this character building are complex, such as: (1) the large numbers of students, teachers, and schools in Indonesia; (2) the synergy between schools, parents, and communities that have not been maximized yet; (3) inevitable globalization challenges. School as a formal education provider is not the only organization involved in character building, but it definitely plays huge role in shaping strong character on its students. It is in line with the opinion of Agboola and Chen [9], that character education does not immediately functions in justifying student's deviant behavior since there are other factors influencing it, such as: family, social environment, and cultural issue. One thing that school can do is integrating character building through PPK into intracurricular, hidden-curricular, and extracurricular activities that are able to synergize four dimensions of Ki Hajar Dewantara character processing, which are physical training, mind training, will training, and emotional training.

Considering the importance of PPK and challenges facing by this nation, it is necessary to understand the extent to which PPK is implemented at school. One of many activities that can synergize Ki Hajar Dewantara character processing is outbound. Ganet [2] stated that outbound is a joyful outdoor activity with games; which contains philosophy, life simulation, mind training, study case, role play, and direct practice using experience (experiential learning) as an approach. Learning process will more effective and yield a good effect if the learning process conducted by various activity, such as in outdoor or outdoor learning. When engaged in outdoor activities, students are more likely to protect the environment [10]. Outdoor play also important for children’s social emotional, physical development, and social emotional [10]. One of outdoor learning can be conducted through outbound learning.

According to Susanta [11], the advantages of outbound are to: (1) train mental endurance and self-control; (2) grow empathy; (3) encourage healthy competition; (4) improve leadership skills; (5) understand that one's weakness is not an obstacle; (6) improve decision-making skill in a difficult situation quickly and accurately; (7) grow self-confidence; (8) increase the sense of need in team cooperation to reach a target optimally; (9) narrow the gap between new and old friends and strengthen solidarity; (10) promote unyielding attitude and self-confidence; (11) train social skills; (12) improve skills on knowing one’s own self and other people. Considering
those advantages mentioned above, we are interested in doing research on character building through outbound at school. One of the schools that implements outbound learning as its learning subject is SD Muhammadiyah Alam Surya Mentari.

According to Presidential Decree no. 87 of 2017 [1], strengthening character can be done by internalizing the key values of PPK; namely religiosity, nationalism, self-dependence, cooperation, and integrity in each learning activity. Religiosity includes: having faith and devotion to The One Almighty God, performing religious services diligently, being grateful, praying before and after doing activities, etc. Nationalism includes: patriotism, having spirit of nationality, respecting differences, embracing national and folk songs, loving Indonesian products, pacifism, willingness to sacrifice, obeying the regulations, etc. Self-dependence includes: being discipline, confident, curious, tough, hard worker, independence, creative, innovative, lifetime learner, etc. Cooperation includes: helping others; willingness to cooperate; taking care of each other; being considerate; protecting the environment, cleanliness, and tidiness; having spirit of kinship; participating actively in social activities, etc. Integrity includes: being honest, humble, polite, responsible, precedent, morally committed, righteous, true to one's own word, uncorrupted, etc. The key value indicators in this research are limited to: religiosity, that includes: having faith and devotion to The One Almighty God, performing religious services diligently, being grateful, praying before and after doing activities, etc. Nationalism, that includes: patriotism, having spirit of nationality, respecting differences, embracing national and folk songs, loving Indonesian products, keeping peace, obeying the regulations, etc. Self-dependence, that includes: being discipline, confident, curious, tough, hard worker, independence. Cooperation, that includes: helping others; willing to cooperate; taking care of each other; being considerate; protecting the environment, cleanliness, and tidiness; as well as having spirit of kinship. Integrity, that includes: being honest, humble, polite, responsible, righteous, always true to one's own word.

SD Muhammadiyah Alam Surya Mentari is a school of nature that implements the basic concept of character building on its students through outbound learning. The outbound is held every day at SD Muhammadiyah Alam Surya Mentari with an adjustment to class learning schedule.

The objective of this research was to identify the character strengthening through the outbound learning at SD Muhammadiyah Alam Surya Mentari.

2 Method

This research applied a qualitative method.

2.1 Research Location and Period

This research took place at SD Muhammadiyah Alam Surya Mentari located on Jl. Mangga no.6, Surakarta. This research was carried out from February 2018 until June 2018.

2.2 Data

The data in this research were information collected from the informants; namely the headmaster, the outbound teacher, and the students related to the research problem.

2.3 Data Collection Techniques

The data in this research were collected through observation, interview, and documentation. Observation is an act of collecting field notes [12]. The observation was carried out by observing and taking notes on the students as the object of this research during outbound learning to understand how the teacher strengthened the character education, how was the development, and
what kinds of characters were able to be strengthened. Qualitative interview happens when a researcher is asking various open questions to participants and taking notes on their answers [12]. The interview was used in relation with the outbound learning process, the implementation of strengthening character education through outbound learning, and the variety of characters that could be strengthened in outbound learning. The documentation used in this research were lesson plan and other documents.

2.4 Data Analysis Technique

This research used interactive analysis consisted of three components: data reduction, data presentation, and conclusion drawing or verification. Those three components were interweaving and conducted continuously in the process of Milles and Huberman data collection.

2.5 Data Validation

Triangulation research is used to understand how valid certain data are. Triangulation is defined as a data collection technique that combines various techniques and available sources [13]. In this research, there were two type of triangulations used: technique triangulation and source triangulation.

3 Result And Discussion

SD Muhammadiyah Alam Surya Mentari's vision is to: "become a nature-oriented educational institution with healthy environmental insight to prepare a generation with good morals, strong characters, extensive knowledge, and excellent achievement. Meanwhile, the missions are to: (1) Organize a high quality nature-oriented education in developing logical sense through optimal interaction with nature to thank God for His creation, (2) Grow empathy for living environment and surrounding nature; (3) Prepare student to be a human being with strong character that is honest, polite, brave, and caring; (4) Develop a comprehension and implementation of Islamic values to become a khalifatul fil ardhi; (5) Become a generation with entrepreneurship that is ready to compete in global era (6) Optimize guiding effort on student to result in high quality, competitive, and productive output.

SD Muhammadiyah Alam Surya Mentari aims to: (1) Improve religious learning practice and accustom students on noble manners; (2) improve its teachers and staff quality; (3) prepare a generation with self-dependence, responsibility, and high compassion on nature and any God's creatures; (4) grow entrepreneurship; (5) tighten relationship with school committee to improve the questioning role in educational administration. The above-mentioned vision, missions, and objectives show that SD Muhammadiyah Alam Surya Mentari supports government movement on character. The support is generated into PPK-based school activities. One of the activities that is in line with PPK is outbound learning intracurricular. This finding is supported by the results of the study of Buchori [14] that outbound activities are effective in increasing honesty and integrity. Outbound learning can build understanding of concepts and build individual character behavior. The character is well embedded and students can become better personalities.

The implementation of character education at SD Muhammadiyah Alam Surya Mentari is derived from school's vision and mission. Since SD Muhammadiyah Alam Surya Mentari aims to make their students human beings with strong characters, as a khilifah fil ard, the students are taught to prioritize character education. The intention is that the students are able to live in their times in accordance with the provisions of Allah SWT. When they understand their identity as human beings that should protect, preserve, develop, and utilize the universe; they are expected to possess strong and noble characters, and are able to be future leaders. In accordance with the opinion Machsunah [15] that character education from an early age is very important. Character education is provided through exemplary educators in the school environment.
The implementation of character education in SD Muhammadiyah Alam Surya Mentari is started from the four main characters, which are integrative implemented on activities inside and outside the class, even outside the school. When learning in class, students are emphasized to learn well by implementing the four main characters—brave, honest, caring, and polite—which are the slogan of this school. Whereas, character education outside the class is implemented through outbound learning.

Outbound learning is integrated as a subject given to students in grade I to V once a week, designed by the outbound teacher by adjusting it to the learning topic in each class. This outbound becomes a subject that is used as a medium to develop and shape students' mental and attitude. Outbound learning is taught in fun ways and leave impression for students. Outbound is a way or method to develop bonding and care about friends and environment. This is in line with an expert's opinion, that outbound is a joyful outdoor activity with games; which contains philosophy, life simulation, mind training, study case, role play, and direct practice using experience (experiential learning) as an approach [2] and outbound is able to improve creativity and cooperation among the students in elementary students [16].

Outbound learning at SD Muhammadiyah Alam Surya Mentari acts as a medium to manifest school pillars—braveness, honesty, politeness, and caring for others—in accordance to the school of nature's motto. Those pillars become basis in developing students' characters in this school.

Meanwhile, outbound aims to: (1) identify the students' strengths and weaknesses; (2) uplift their spirit and motivate them to be continuously involved in activities; (3) promote self-dependence and act according to their will; (4) grow empathy and sensitivity to others' feeling; (5) build communication skill; (6) be a medium to learn effective and creative communication; (7) engraft positive values to shape character through various real-life examples; (8) implement and give examples on good character to environment. This finding is reinforced by Hakim and Kumala [2] that students need positive activities to develop their talents and abilities in all fields. Outbound activities can provide learning for students to have good character. Outbound activities have a direct impact on the formation of morals and character so that it can improve the quality of education. In addition, outbound activities require teamwork and mutual trust between children. This can encourage children to be able to interact with other people [17]. Outbound can be a teacher's effort in developing children's social maturity.

The achievement of character building was determined from the indicators shown by the students through outbound learning. The following table shows the character building appeared from the activity.

<table>
<thead>
<tr>
<th>Main Value</th>
<th>Aspect</th>
<th>Outbound Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religiosity</td>
<td>having faith and devotion to The One Almighty God, performing</td>
<td>1. Praying before the class starts</td>
</tr>
<tr>
<td></td>
<td>religious services diligently, being grateful, praying before and after</td>
<td>2. Praying after the class ends</td>
</tr>
<tr>
<td></td>
<td>doing activities, etc.</td>
<td>3. Giving and answer greeting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Thanking God after successfully doing something</td>
</tr>
<tr>
<td>Nationalism</td>
<td>patriotism, having spirit of</td>
<td>1. Playing puzzle of heroes</td>
</tr>
<tr>
<td></td>
<td>nationality, respecting differences, embracing national and folk</td>
<td>2. Knowing heroes name and their homelands</td>
</tr>
<tr>
<td></td>
<td>songs, loving Indonesian products, keeping peace, obeying the</td>
<td>3. Speaking in good and proper Indonesian</td>
</tr>
<tr>
<td></td>
<td>regulations, etc.</td>
<td>4. Not fighting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Not blaming others when lose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Shaking hands after playing</td>
</tr>
</tbody>
</table>
### Self-dependence

- being discipline, confident, curious, tough, hard worker, independence.

1. Wearing outbound uniform
2. Finish playing on time
3. Obeying game rules and regulation
4. Following rules orderly
5. Being brave to perform in front of friends and teacher
6. Getting interested in trying a game
7. Being enthusiastic on the given game rules
8. Being happy when trying new game
9. Willing to playing games or obstacle until the end
10. Engaged in healthy competition
11. Willing to put in the utmost effort to get the best result
12. Playing individual/team game
13. Doing activities with his/her own ability

### Cooperation

- helping others; willing to cooperate; taking care of each other; being considerate; protecting the environment, cleanliness, and tidiness; as well as having spirit of kinship.

1. Developing bonding between student's own and opposing team
2. Helping injured friend
3. Cleaning environment together
4. Throwing garbage in its place
5. Collecting litter and throw it away after outbound learning ends

### Integrity

- being honest, humble, polite, responsible, righteous, always true to one's own word.

1. Playing according to the rules
2. Maintaining score point
3. Saying the truth
4. Admitting mistakes
5. Admitting weakness
6. Admitting friends' strengths
7. Being humble after winning a game
8. Playing well
9. Finishing game on time
10. Disciplining team member (for team leader)
11. Being responsible for all of his/her own actions

According to the table 1, it shows that character building through outbound learning is able to penetrate the main values of PPK and when this activity continues, those characters are able to internalized well in each student. This finding is reinforced by Agung [18] that Character Education not only intends to instill, shape, and direct the behavior of students who are moral, noble, virtuous, and civilized, but also the ability to anticipate, be responsive, and be adaptive to developments and changes in the global environment.

### 4 Conclusion

The results of this research are: (1) characters education building is integrated in outbound learning; (2) there are five core values of character that can be developed through outbound learning, those are: religiosity, nationalism, cooperation (gotong royong), integrity, and self-dependence.
References


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