Proceedings of the 1st International Seminar on Teacher Training and Education
17-18 July 2021, Purwokerto, Indonesia

ISTED 2021

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Preface

Praise be to Allah who has given us His blessing and mercy, and may peace be upon His messenger, the prophet Muhammad.

Ladies and gentlemen, first of all on behalf of the committee, I would like to thank the Rector of University of Muhammadiyah Purwokerto, who has provided us with everything that we need for the success of the is conference. Our thanks also goes to the keynote speakers, Prof. Dr. Zainudin Bin Hassan from Universiti Teknologi Malaysia, Dr. Venus Agustin, President of International Peace Leadership College, Phillipines, and Dr. Eun-Ji Amy Kim Lecturer, Griffith University, Australia; and Drs. Eko Suroso, M.Pd, the Dean of Teacher training and education Universitas Muhammadiyah Purwokerto.

Ladies and gentlemen, we also would like to express our gratitude to contributors of papers which will be presented in parallel sessions and participants of this conference who have been willing to share their visions, insights, and ideas.

In the current conference we could collect more than 60 articles that will publish in some reputable proceeding and journal.

Last but not least, we have tried to do our best to make the organization of this conference perfect for all of you, but we realize that nothing is perfect and therefore we apologize should there be any inconvenience which you may experience as a result of our limitedness. However, with all that we can offer and provide, we wish you a meaningful and joyful discussion in this conference. May Allah bless what we do in this conference.

Malim Muhammad, M.Sc.


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<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhma Reza Ika</td>
<td>Universitas Muhammadiyah Purwokerto, Indonesia</td>
</tr>
<tr>
<td>Salsabila</td>
<td>Universitas Muhammadiyah Purwokerto, Indonesia</td>
</tr>
</tbody>
</table>
## Contents

Teachers Barriers to Promote Distance Learning in The Era Pandemic Coronavirus Disease (Covid-19)  
Sandy Tegariyani Putri Santoso, Wiku Aji Sugiri, Rizki Amelia, Sigit Priatmoko  
1

Sociolinguistic Studies: Phenomenon Of Diglosia In Postgraduate Students Of Indonesian Language And Literature Education Class Of 2020 University Of Muhammadiyah Purwokerto  
Bella Allivia Sativa Turmono  
11

Inventiveness during Pandemic:Formulating and Translating Short Stories from Indonesian to Bangka Malay Language  
Bob Morison Sigalingging, Diana Anggraeni, Herland Franley Manalu  
16

Society's Attitudes towards National Examination and Teacher's Response to National Assessment  
Salsa Belladinna Putri Utami, Heri Retnawati  
25

Implementation of Problem-Based Learning to Critical Thinking Ability in School: A Systematic Literature Review  
Hana Maharani Fahimah, Trisno Martono, Khresna Bayu Sangka  
34

An Evaluation Content In Curriculum 2013 At High School Stella Duce Dua Yogyakarta  
Jemi Fantula, Aman Aman, Johan Setiawan  
49

Potential Design of Photovoltaics-Pumped Hydro Storage System at Ex-Paser Mine Holes in East Kalimantan  
Ilham Muhammad, Thabed Tholib Baladraf  
61

How Overtourism in Bali Destroy Balinese Women’s Livelihood  
Leonardus Aditya Krisnadi, Septiana Dwiputri Maharani  
69

The Implementation of Scaffolding with The Breakout Room Feature On Zoom Meeting In Online Indonesian Mpk Learning  
Kadek Wirahyuni, I Wayan Rasna, I Nengah Martha, Nyoman Sudiana, I Nengah Suandi  
78

Kirkpatrick's Evaluation and Importance Performance Analysis of Tax Instructor Functional Distance Training  
Agus Suharsono, Aniek Juliarini  
90

Poverty Analysis and Factors Which Affects Indonesia  
Nur Yuliany, Nursini Nursini, Madris Madris, Agussalim Agussalim  
102

The Legalization Process of Persons of Indonesian Descents (PIDS) in Mindanao and Their Reasons to Remain in Mindanao after Nationality Awarding  
Putrie Agusti Saleha, Benny Teh Cheng Guan  
109

Strategy to Increase Work Productivity Among Millennial Generation  
Yeni Nuraeni, Faizal Amir P Nasution  
117
Effect of Good Corporate Governance and Investor Protection on Real Activity Manipulation (RAM) in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)

Muhammad Andryzal Fajar, Dhyah Setyorini

128

Relationship Between Education History, Income, Employment Status with Quality of Life in Elderly

Astri Dyah Kustiar, Eti Poncorini Pamungkasari, Selfi Handayani

142

The Effectiveness of the Quantum Method on Student Ability in Making a Creative Book

Sukirno Sukirno

147

The Concept Of Model Evaluation Kirkpatrick Plus Return On Training Investment (To Improve Public Services Of The Government)

Irfan Abraham, Ahmad Ridwan, Burhanudin Tola

162

Integrated Learning Components of Cloud System-Based Office Administration in Vocational High Schools

I Nyoman Suputra, Ari Gunawan, Andi Basuki, Madziatul Churiyah

169

Islamic Journalism reporting of the 2019 Indonesian presidential election

Dio Damika Suhenda, Andari Karina Anom

182

Online Learning Using The Zenius App At Madrasah Ibtidaiyah Negeri 8 (MIN) Central Aceh

Suwarno Suwarno, Firmansyah Firmansyah, Andika Hariyanto Surbakti, Indra Indra, Muchamad Suradjii

195

Blended Learning System in The Pandemic Era: How is The Integration of Science Learning Creative Thinking Skill in Elementary School?

Ferrinda Prafitasari, Sukarno Sukarno, Muzzazinah Muzzazinah

209

Prediction of Success Construction Claims by Construction Provider Due to Delays in Completion Work

Novera Meylinda, Ayomi Dita Rasati

224

The Evaluation of the Learning Management System Implementation for Functional Distance Learning of Basic Tax Instructor

Mohammad Djufri, Aniek Juliariini

234

Relationship Between Knowledge And Perceptions Of Geodiversity, Biodiversity, And Cultural Diversity With The Formation Of Students' Environmental Care Attitudes To The Existence Of The Ciletuh Pelabuhanratu Geopark Area

Nurul Sucyati, Ahmad Yani, Nandi Nandi

247

The Level Of Community Ecological Intelligence And Local Environmental Conditions On The Incidence Of Dengue Hemorrhagic Fever In Tenayan Raya District Pekanbaru City

Rahmah Rahmah, M Ruhimat, I Setiawan

258

Improving School Quality Through Featured Program in Madrasah Ibtidaiyah Tarbiyatul Islamiyah Winong

Parmanita Hesti Puspitorini, Zainal Airifn, Badi’atul Islami

269

Level of Knowledge and Attitude Achievement of Vocational High School Students in Blended Learning Implementation in The New Normal Era

Olivia Laras Sati, Thomas Sukardi, Puteri Anggieta Cahyani

280
Development Design of Ecological - Contextual based Learning for Prosocial (ECOPS) in Social Studies Subject in Junior High School in Cimahi
Lussy Anggraeni, Bunyamin Maftuh, Nana Supriatna, Mamat Ruhimat

Culture-Based Education Improves National Insight
Dwi Ratna Sari, Mukhamad Murdiono

Strengthening the Character of Independence through Learning Citizenship Education in Networks During the Covid-19 Pandemic
Dina Naseha Kadaria, Mukhamad Murdiono

The Quality of Geography Learning during Covid-19 Pandemic in Public Senior High School in Bandung
Yanuar Firman Ramadhan, Epon Ningrum, Nandi Nandi

The Effect Of Technological Pedagogical Content Knowledge (Tpack) On The Geographic Skills Of Bandung City Senior High School Students
Adella Ramadhani Kusuma Putri, Epon Ningrum, Ahmad Yani

Model of Implementation of Corporate Social Responsibility (CSR) on Regional Roads in Indonesia
Ayu Surya Arsinta, Mohammad Ichsan

Character Education Model In Indonesian History Learning At Islamic Boarding School
Lulu Muthoharoh, Miftahuddin Miftahuddin

Implementation of Scientific Approach with Video Media in Learning Social Sciences in Elementary Schools
Tri Murwaningsih, Muna Fauziah

Case Study of The Utilization Zoom Cloud Meeting for Natural Science Learning PGSD STKIP Muhammmadiyah Muara Bungo Students
Tri Wiyoko, Titis Wulandari, Megawati Megawati, Nurlev Avana, Randi Eka Putra

Development of Mobile Media “GeMBul” in Science Learning: The Validity and Reliability Study
Windy Kasmita, Ida Hamidah, Diana Rochintaniawati

Instagram: A Platform for English Learning or English Language Business?
Irmawan Rahyadi, La Mani, Abdul Razak Mozin, Zakirah Tamimi

Look who’s talking: Means of interpersonal communication between librarians and library users
Irmawan Rahyadi, Masykur Dungcik, Nurul Jannah, Irsyad Ghifari

EFL Student Challenges, Preferences, and Reactions towards Moodle-Based Online Learning under the New Normal in Indonesia
Mahmuda Akter, Tono Suwartono, Muhammad Lookman Hossain Khan

Development And Validation Instrument To Measure Teacher Knowledge About HOTS Mathematics Assessment
Agung Gumelar, Edi Istiyono

Implementation of Fuzzy C-Means and K-Medoids in Grouping People’s Welfare Indicators (Case Study in Riau Province in 2020)
Safira Naila Farafisha, Achmad Fauzan, Afdelia Novianti
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Study on Javanese Learners of English and Compliment Response Strategies</td>
<td>424</td>
</tr>
<tr>
<td>Qanitah Masykuroh</td>
<td></td>
</tr>
<tr>
<td>Development of Chemical Learning Media in Reagent Bottle with QR-code</td>
<td>433</td>
</tr>
<tr>
<td>Isnanik Juni Fitriyah, Munzil Munzil, Erti Hamimi, Yessi Affriyenni</td>
<td></td>
</tr>
<tr>
<td>Students' Mathematical Critical Thinking Ability in Solving The Application of First-Order Differential Equations</td>
<td>439</td>
</tr>
<tr>
<td>Arfatin Nurrahmah, Stevanus Budi Waluya, Tri Sri Noor Asih, Nurina Kurniasari Rahmawati, Arie Purwa Kusuma</td>
<td></td>
</tr>
<tr>
<td>Identification of Epicatechin Gallate and Other Phytochemicals in Methanol Extract of Fresh and Dried Star-Fruits (Averrhoa carambola Linn.) for Treatment of Type 2 Diabetes Mellitus</td>
<td>448</td>
</tr>
<tr>
<td>Yustika Sari, Dono Indarto, Brian Wasita</td>
<td></td>
</tr>
<tr>
<td>The Effect of Consumption of Whole Fruits before Meals and Walking 10 minutes after Meals on Daily Food Intake in Overweight Adults</td>
<td>460</td>
</tr>
<tr>
<td>Maulidia Agustina Mardika Putri, Dono Indarto, Vitri Widyaningsih</td>
<td></td>
</tr>
<tr>
<td>Fractionation of Snake Fruit Seeds Pondoh for Development of Anemia Treatment</td>
<td>466</td>
</tr>
<tr>
<td>Kiki Natasia, Dono Indarto, Brian Wasita</td>
<td></td>
</tr>
<tr>
<td>Comparison of Ethanol and Methanol Extracts of Bay Leaves (Syzygium polyanthum) in Terms of Vitamin C, Iron and Phytochemical Levels</td>
<td>473</td>
</tr>
<tr>
<td>Suharni Suharni, Dono Indarto, R Cilmiaty</td>
<td></td>
</tr>
<tr>
<td>Promoting Students Critical Thinking through Massive Open Online Course</td>
<td>479</td>
</tr>
<tr>
<td>Saefurrohan Saefurrohan, Lutfi istikharoh</td>
<td></td>
</tr>
<tr>
<td>Critical Review Of Darwin Evolution Theory And Debilitating Facts</td>
<td>483</td>
</tr>
<tr>
<td>Susanto Susanto</td>
<td></td>
</tr>
<tr>
<td>Description of Mathematical Problem-Solving Skills Reviewed from Student Learning Independence</td>
<td>493</td>
</tr>
<tr>
<td>Malim Muhammad, Ayu Sagita</td>
<td></td>
</tr>
<tr>
<td>Description of Students' Mathematical Creative Thinking Skills Reviewed From Gender Differences</td>
<td>504</td>
</tr>
<tr>
<td>Malim Muhammad, Elma Hidayatun Nikmah</td>
<td></td>
</tr>
<tr>
<td>Recommendation System Using User-Based Collaborative Filtering and Spectral Clustering</td>
<td>511</td>
</tr>
<tr>
<td>Malim Muhammad</td>
<td></td>
</tr>
<tr>
<td>User-Based Collaborative Filtering Using Agglomerative Clustering on Recommender System</td>
<td>523</td>
</tr>
<tr>
<td>Malim Muhammad</td>
<td></td>
</tr>
</tbody>
</table>
Teachers Barriers to Promote Distance Learning in The Era Pandemic Coronavirus Disease (Covid-19)

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Universitas Islam Negeri Maulana Malik Ibrahim Malang¹,²,³,⁴

Abstract. The implementation of distance learning during the pandemic has had a significant impact on teachers. This study aims to describe the various teacher barriers to promote distance learning. This study used a survey method with an online questionnaire. The research subjects were teachers at all levels of education. The results showed that most teachers had provided socialization about implementing distance learning to parents and students. The technique of delivering material from the teacher to students' parents is by sending videos or worksheets. Teachers' barriers are related to supporting electronic facilities, parents' educational background, geographical conditions, and signal quality. Although teachers are satisfied with the implementation of distance learning, there is still a great need for continuous socialization for parents regarding implementing distance learning.

Keywords: Teacher Barriers; Distance Learning; Covid-19.

1 Introduction

At the end of March 2020, the Indonesian government implemented a social distancing policy to reduce the spread of Coronavirus Disease (Covid-19). This policy has a significant influence on the implementation of the education system. Distance learning (DL) is the main alternative in providing learning services. DL can offer students and teachers space to continue to carry out knowledge without direct physical contact [1]. This aims to avoid the threat of massive Covid-19 transmission [2]–[4].

So far, studies on the implementation of DL during the Covid-19 pandemic have tended to address the constraints experienced by students. Several researchers had examined some of these barriers [5] explained a decrease in student motivation when DL was enforced. Students' other barriers are related to supporting electronic devices, such as signal difficulty, limited data quota, slow internet network, and limited gadget ownership [6], [7]. These kinds of situations are more directing students to immediately return to implementing face-to-face learning directly at school [8].

There have not been many studies on the constraints of implementing DL from the teacher's point of view. This aspect is considered necessary because not all teachers are fully prepared to implement DL during a pandemic. Another thing that can be regarded as is the acceptance of teachers in using technological devices.

This article examines the barriers faced by teachers in implementing DL during the Covid-19 pandemic. Another aspect that is also described in this article is related to teachers' techniques
to socialize DL. Furthermore, it will also explain the communication patterns between teachers and parents of students.

2 Literature Review

The Covid-19 pandemic has had a significant impact on the education system. Unesco noted that more than 1 billion students were affected by the shift in learning models during the Covid-19 pandemic [9]. The implemented DL transformation is considered a responsive response to school closures during the epidemic [10], [11].

Several studies related to DL’s implementation explain that teachers, students, and parents faced some barriers. The barriers encountered include the lack of adequate supporting devices to an unstable internet network connection [12]. Furthermore, student learning motivation is currently experiencing a decline [5]. Another problem that arises is related to the technological literacy maturity of all DL actors. Many teachers, students, and parents have not operated technological devices [13], [14].

Specifically, there are several findings that also describe the teacher barriers face in implementing distance learning. Some of these findings are as follows: (a) several parents' gave a complaint to the teachers, they feel burdened by economic, psychological, and social aspects [15]. Many parents stated that DL had demanded that they spend more money to facilitate their children's learning. The simple impact is the increased cost of purchasing internet quotas; (b) Distance learning which should provide a comfortable learning space for students, actually increases the level of saturation [16], and (c) interesting findings also occur in teachers who have to deal with the disability students [17]. Those with disabilities should have the same services in DL during this pandemic. This certainly makes teachers more challenged in carrying out learning.

The number of findings related to these barriers is not an excuse for not providing education services. DL is a learning model that can provide more significant opportunities for teachers and students to communicate and have dialogues or discussions through internet intermediaries [10]. DL can provide time flexibility for students and teachers because they do not always meet physically in the classroom [18]. DL is considered an effort to implement mass education to overcome geographical, socio-economic, and time constraints [19].

Before implementing DL, teachers are expected to analyze various aspects related to the situation of students. For example, the teacher must identify the conditions of the student's family environment. Teachers must have good communication skills with families who will assist students in learning. Since students' environmental conditions significantly affect the success of DL [20].

The teacher must also be able to direct the learning process to be student-centered. Student-centered learning is an approach that can be optimized to increase student participation in the learning process [21]. Students will feel comfortable when given the freedom to express everything related to the material they will study. With various efforts to maximize DL's implementation, it is hoped that the barriers encountered will not become an excessive burden for teachers to facilitate students in learning.
3 Research Methods

This research was conducted through a survey method with the research subjects being teachers at the Early Childhood Education level to Secondary Education as many as 51 people from various Java regions Sumatra and Sulawesi. Data were collected using a questionnaire as the main instrument. The questionnaire was made in the form of a google form so that the reach of respondents was wider and varied. The questionnaire consists of 15 question items that aim to collect information related to the respondents' identity, the forms and media of communication during DL, learning activities carried out during DL, satisfaction with the learning process, and the barriers faced during DL. The questionnaire instrument was first validated by two experts using a questionnaire with an assessment format on a 1-5 scale. Each number in the assessment format is assigned the meaning of 1 = very unclear, 2 = less clear, 3 = clear enough, 4 = clear, and 5 = very clear. To analyze the results of the study by experts, an inter-rater agreement model was used. The expert test index shows a score of 1, which means that the instrument used is feasible and meets the elements of validity and reliability. The data obtained were then analyzed descriptively.

<table>
<thead>
<tr>
<th>Early Childhood Education</th>
<th>Elementary School</th>
<th>Secondary School</th>
</tr>
</thead>
<tbody>
<tr>
<td>57 % (29 Respondent)</td>
<td>33% (5 Respondent)</td>
<td>10% (17 Respondent)</td>
</tr>
</tbody>
</table>

4 Results and Discussion

Results

After the questionnaire was distributed, the results of the data obtained were based on the responses from the respondents, namely as follows:

4.1 Distance Learning’s Socialization

Implementation of DL is new for all levels of education. Changing the learning system from classical to DL should have required regular socialization so that parents and students are ready to run it. However, it turned out that there were schools that did not conduct socialization related to DL implementation during the pandemic. Data related to schools that carry out socialization can be seen in table 2.

Table 2. Distance Learning’s Socialization

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Conduct Socialization</th>
<th>Don't Conduct Socialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Education</td>
<td>28 (96.55%)</td>
<td>1 (3.45%)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>4 (80%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Secondary School</td>
<td>16 (94.12%)</td>
<td>1 (5.88%)</td>
</tr>
</tbody>
</table>

Based on the table, it can be seen that there are schools that carry out socialization in implementing DL, but there are also schools that do not carry out socialization. At the ECE level 96.55% carried out socialization and 3.45% did not carry out socialization. At the elementary
education level 80% carry out socialization and 20% do not implement. At the secondary education level, 94.12% carried out and 5.88% did not carry out socialization.

Schools' media to socialize DL include WhatsApp groups, personal chats, circulars letters, social media, parents' meetings, and school websites. The percentage of each platform used for DL-related socialization is shown in Table 3.

<table>
<thead>
<tr>
<th>Platform Used for Socialization</th>
<th>Early Childhood Education</th>
<th>Elementary School</th>
<th>Secondary School</th>
</tr>
</thead>
<tbody>
<tr>
<td>WhatsApp Group</td>
<td>26 (39.39%)</td>
<td>4 (44.44%)</td>
<td>16 (51.61%)</td>
</tr>
<tr>
<td>Personal Chat</td>
<td>12 (18.18%)</td>
<td>1 (11.11%)</td>
<td>6 (19.35%)</td>
</tr>
<tr>
<td>Written Letter</td>
<td>10 (15.15%)</td>
<td>2 (22.22%)</td>
<td>4 (12.90%)</td>
</tr>
<tr>
<td>Social Media</td>
<td>8 (12.12%)</td>
<td>1 (11.11%)</td>
<td>4 (12.90%)</td>
</tr>
<tr>
<td>Parents' Meeting</td>
<td>10 (15.15%)</td>
<td>-</td>
<td>1 (11.11%)</td>
</tr>
<tr>
<td>School Website</td>
<td>-</td>
<td>-</td>
<td>1 (3.22%)</td>
</tr>
</tbody>
</table>

Based on Table 3, it is obtained data that, on the whatsapp group platform used a number of 26 respondents at the early childhood education level, 4 respondents at the elementary education level, and 16 respondents at the secondary education level. Meanwhile, the personal chat platform was used by 12 respondents at the elementary education level, one at the elementary school level, and six respondents at the secondary education level. The written circular platform is also still used in the socialization of distance learning to parents, including 10 respondents at the ECE level, 2 respondents at the elementary education level, and 4 respondents at the secondary education level. While the social media platform, used at ECE level, a total of 8 respondents, primary and secondary education did not use this platform as socialization. Furthermore, socialization through meetings with parents of students is only used at the level of early childhood education, namely in 10 respondents. Finally, the school website is only used by 1 respondent at the elementary education level and 1 respondent at the secondary education level. Thus, it can be concluded that the most widely used platform in carrying out socialization related to distance learning is the whatsapp group, both in early childhood education, basic education, and secondary education.

4.2 Communication between Teachers and Parents on Distance Learning

Based on the survey, several communication patterns occur between parents and teachers. Some parents gave feedback after they got DL socialization from the teacher, and some do not. Feedback on socialization is considered a two-way form of communication; meanwhile, no input is one-way communication. A summary of how to communicate between teachers and parents at each level can be seen in Table 4, while the level of fluency is described in Table 5.

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Two Direction</th>
<th>One Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Education</td>
<td>25 (86.21%)</td>
<td>4 (13.79%)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>3 (60%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>Secondary School</td>
<td>11 (64.71%)</td>
<td>6 (35.29%)</td>
</tr>
</tbody>
</table>

Although socialization has been carried out, in the process of implementing learning, there are parents who interact with teachers. however, there are also parents who only receive information from the
teacher without any response from the parents. At the level of early childhood education, 25 respondents carried out two-way communication with their teachers and 4 respondents only carried out one-way communication. Furthermore, at the level of basic education 3 respondents communicate in two directions and 2 respondents only communicate in one direction. While in secondary education 11 respondents communicate two-way with the teacher and 6 respondents carry out one-way communication only, that is, information only comes from the teacher without any parental response.

Table 5. Fluency of Communication with Parents

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Not Fluent</th>
<th>Fluent</th>
<th>Very Fluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Education</td>
<td>24.13%</td>
<td>41.38%</td>
<td>34.48%</td>
</tr>
<tr>
<td>Elementary School</td>
<td>40%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>Secondary School</td>
<td>23.53%</td>
<td>41.18%</td>
<td>35.29%</td>
</tr>
</tbody>
</table>

one of the things seen from communication is the fluency of communication between teachers and parents. Based on table 5, it can be seen that at the ECE level, 24.13% of communication is not fluent, 41.38% is fluent, and 34.48% is very fluent. At the elementary education level, 40% are not fluent, 20% are fluent, and 40% are very fluent. At the secondary education level, 25.53% were very fluent, 41.18% were fluent, and 35.29% were not. Based on these data, it can still be seen that there are obstacles in communication between teachers and parents.

4.3 Implementation of Distance Learning

Some of the media used by teachers to carry out DL include WhatsApp groups, virtual conference platforms such as Zoom or Google Meet, Google Forms & Quizzes, Google Classrooms, Video Calls, etc. Simultaneously, the material delivery techniques used include sending instructional videos, using print worksheets, using online worksheets such as google forms, and sending video links to parents of students.

Table 6. Platform Used for Distance Learning

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>WhatsApp Group</th>
<th>Virtual Conference</th>
<th>Google Form</th>
<th>Google Classroom</th>
<th>Video Call</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Education</td>
<td>20 (68.97%)</td>
<td>4 (13.79%)</td>
<td>-</td>
<td>1 (3.44%)</td>
<td>2 (6.89%)</td>
<td>2 (6.89%)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>1 (20%)</td>
<td>-</td>
<td>4 (80%)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Secondary School</td>
<td>11 (64.71%)</td>
<td>1 (5.88%)</td>
<td>-</td>
<td>3 (17.64%)</td>
<td>-</td>
<td>2 (11.76%)</td>
</tr>
</tbody>
</table>

The platforms used to deliver activity materials or learning media include the WhatsApp group of 32 respondents (62.7%), virtual meeting applications such as zoom, google meet by 5 respondents (9.8%), google form & google quiz as many as 4 respondents (7.8%), google classroom as many as 4 respondents (7.8%), video calls as many as 2 people (3.9%), and as many as 4 respondents (7.8%) using other media.

Table 7. Material Delivery Technique

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Material Delivery Technique</th>
</tr>
</thead>
</table>

Various ways are used by teachers to convey material to students in addressing DL. These methods include using online worksheets such as google form / google sheet used by 24 respondents (47.1%), sending learning videos to students as many as 20 respondents (39.2%), sending printed worksheets to parents as many as 15 respondents (29.4%), and finally by sending a video link that can be accessed via youtube as many as 10 respondents (19.6%).

Based on the table, it can be concluded that the WhatsApp group is the dominant platform used at the ECE and secondary levels. Meanwhile, at the Elementary Education level, it can be seen that google form is widely used. Meanwhile, in the material delivery technique, sending videos to parents is a technique practiced mainly by teachers at all levels.

4.4 Teacher’s Satisfaction and Barrier of Distance Learning Implementation

In general, teachers are satisfied with the implementation of distance learning. The level of teacher satisfaction is described in table 8.

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Not Satisfied</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Childhood Education</td>
<td>7 (24.14%)</td>
<td>12 (41.38%)</td>
<td>10 (34.48%)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>1 (20%)</td>
<td>2 (40%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Secondary School</td>
<td>7 (41.17%)</td>
<td>8 (47.06%)</td>
<td>2 (11.76%)</td>
</tr>
</tbody>
</table>

In the DL implementation process that occurred during the Covid-19 pandemic, 27 teachers (52.9%) were quite satisfied, 9 (17.6%) were satisfied, 2 (3.9%) were very satisfied, 9 (17.6%) felt less satisfied, 4 people (7.8%) felt very dissatisfied. This is related to the smooth process of communication between teachers and parents/guardians. Based on the results of a survey conducted, only 1 person (2%) had very smooth communication with parents/guardians, 17 people (33.3%) had smooth communication, 20 people (39.2%) were quite fluent, 9 people (17, 6%) answered not fluently, and 4 people (7.8%) answered very not fluently.

Some of the barriers experienced by teachers in DL work include the busyness of parents, the availability of infrastructures such as smartphone ownership, internet quotas, signals, and parent contact numbers that are not known by the teacher, the geographic condition, parents’ education level, the illiteracy of parents and lack technology acceptance from the teachers and parent's side; it is also a barrier in implementing DL. Other barriers include parental concern with the implementation of the teaching and learning process. Parents who have more than one child find it challenging to allocate time to accompany their children.
Discussion

One of the government's efforts to respond to the Covid-19 pandemic is to close schools for all levels. Distance learning (DL) is the main alternative for implementing continuous learning without having physical contact between teachers and students [1]. The implementation of DL, which is relatively new, requires socialization. DL socialization activities to students and parents aim to optimize learning activities so that learning objectives can still be achieved. Participation and interaction between teachers and parents, and students will determine the direction and success of achieving educational goals [20], [22].

Based on the survey results, communication between teachers and parents has been running. The communication carried out is related to the socialization of DL implementation, the provision of material, and the evaluation process of student learning activities. WhatsApp groups are the primary choice for teachers to convey information because they are considered a medium with a broad reach and easy to use. However, it is not rare to find that there was still one direction communication from the teacher who does not fully involve parents. As a result, communication does not run smoothly, and the learning objectives are not achieved.

Communication media is an essential part of implementing DL. Smartphones are the primary media chosen by teachers in the learning process. At the same time, the WhatsApp application is a platform that is often used through chat features, video sharing, video calls, and sharing links to learning materials. Based on research findings by Asongu & Odhiambo shows that the use of smartphones makes learning activities more efficacious [23]. Besides, on smartphones, various kinds of applications can support learning activities, such as YouTube, Khan Academy, Pinterest, and other applications that parents and teachers can use to support student learning [24], [25].

The teacher's role in implementing DL is still the same as in classical learning, namely as a facilitator and motivator. However, the approach used by the teacher will determine the success of implementing DL. Student-centered learning (SCL) is an approach that teachers can use to increase student participation in the learning process [21]. The interaction between teachers and students through various online meeting applications, assessment forms, and virtual classes still does not describe SCL implementation. Teachers still use the platform to deliver activity materials to move the teacher's position from classical to virtual. Teachers play more roles as instructors in the learning process, placing students as learning objects and parents as main facilitators in learning activities.

Distance learning requires teachers to design meaningful learning activities that allow students to improve creative thinking and provide education that focuses on enhancing skills and character building in students. In implementing DL, teachers need to improvise in the process of planning and implementing learning. The teacher must identify the source of knowledge and the conditions of the student's family environment. This is necessary because students' environmental conditions significantly affect the success of DL [20]. Not all students make it possible to learn online; thus teachers, still provide worksheet papers as an alternative so that learning objectives can even be achieved.

As something new, DL isn't relatively as smooth as ever. The survey results showed that more than 50% of respondents just felt quite satisfied. One of the satisfaction indicators used is the level of fluency in communication between teachers and parents. Indonesia's varied geographical conditions are one of the barriers to implementing DL. Several areas do not have internet access. Educational background and economy are also inhibiting factors for DL. Parents' experiences also have an impact on children's learning outcomes. This is correlated with parenting styles and facilities obtained by children in supporting their education [26].
Parent involvement in implementing DL is another barrier experienced by teachers. However, parental guidance is needed in implementing DL, especially in technology [27]. The background of parents with low education (even illiteracy) impacts the ability to master technology. Some parents also have difficulty assisting their children because they have to work. Some parents who have more than one child and are at different school levels also become barriers to implementing DL. Besides, the most challenging problem is the apathy of parents towards children's education.

5 Conclusion

Distance learning which is applied during the pandemic is a new pattern for Indonesia's education system. One of the steps to optimize DL is by conducting socialization with students and parents. By utilizing various media platforms, teachers can establish good communication in carrying out socialization. However, it turns out that, in general, the teachers are still not satisfied with the implementation of DL due to communication barriers that occur. Among them are the parents' activities, the availability of infrastructure, geographical conditions, the educational background of the parents, and the acceptance of technology from both parents and teachers. Therefore, it is hoped that there will be training that will focus on the theoretical aspects of DL and explain the practical aspects of DL. The DL-related activity should involve teachers and need parents' participation, so they also understand the learning process of their children. Besides, in the future, further research is required related to parental involvement in DL and solutions to overcome communication problems between teachers and parents.

References


Sociolinguistic Studies: Phenomenon Of Diglosia In Postgraduate Students Of Indonesian Language And Literature Education Class Of 2020 University Of Muhammadiyah Purwokerto

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Abstract. Language is an arbiter sound symbol system, used by members of a community to work together, interact, and identify problems. Bahasa Indonesia is one of the languages that is often used to communicate and interact socially in the community in everyday life. Sociolinguistics is a science that studies characteristics and variations, as well as the relationship with the function characteristics of language variation itself in a language society. Diglosia is a language situation where there is a functional division of language variations in society. Research conducted on graduate students majoring in Indonesian language and literature education is qualitative research that is descriptive analysis through phonology approach. This research was conducted with the aim to find out related to the phenomenon of diglosia in postgraduate students majoring in Indonesian Language and Literature education class of 2020 in daily life. From the results of the analysis found that Bahasa Indonesia and Bahasa Jawa ragam T (Tinggi) are used when talking to lecturers and employees or during lectures. While Bahasa Indonesia and Bahasa Jawa ragam R (Low) are used when talking to peers.

Keywords: Language, Sociolinguistic, Diglosia, Bahasa Indonesia, Postgraduate Students

1 Introduction

Language is an arbiter sound symbol system, used by members of a community to work together, interact, and identify problems. Language is an organized communication tool in the form of units, such as words, groups of words, clauses, and sentences expressed both verbally and in writing. In this world, there are many languages and each language has its own system called grammar. There are also different grammars for foreign languages and Bahasa Indonesia. Communicating can indeed be done through any medium other than Language. Because in principle man will still communicate using language. In this context the language used is Human language. Basically, in the form of form, language is always in the form of text. Text means a linguistic unit that expresses meaning contextually.

Language has three main functions, namely ideational functions, interpersonal functions, and textual functions. These three functions are commonly called metafunctionals. The ideal function, Language is used to express physical-biological reality and to be related to the interpretation and representation of experience. Under interpersonal functions, Language is used
to reveal social realities and deals with interactions between speakers/writers and listeners/readers. As for textual functions, Language is used to express semiotic realities or symbol realities and deals with the way text is created in context [1].

Bahasa Indonesia is one of the languages that is often used to communicate and interact socially in the community in everyday life. Iryani in her book [2] says that bahsams is a means of human communication in delivering messages between each other. In the field of education, Bahasa Indonesia is the main language used during the learning. However, people are more familiar with the language of the region compared to Bahasa Indonesia. This is because of the mother tongue or the first language they can get is their own regional language. So, Bahasa Indonesia becomes the second language for the community. The linguistic phenomenon that occurs in Indonesia, indirectly encourages people to be able to speak more than one language. Fishman [3] says that diglossia can happen to people who know one language with only two varieties but also in people who know more than two languages.

Sociolinguistics is a science that studies characteristics and variations, as well as the relationship with the function characteristics of language variation itself in a language society. Hidayati (2011) said that, Indonesians who master several languages tend to use several different languages in communicating, so indirectly this is what causes language variations. Indonesian society consisting of a variety of tribes, cultures and races led to the mixing of languages. It is also one of the causes of one’s language [4]. Kedwibahasaan is one of the phenomena of two languages in a act of speech [5]. The occurrence of Language contact is due to the existence of language.

According to Ferguson (2016:571) diglossia is a situation about the existence of Language variations in a community and these variations play a defined function by the user. The variations in question are High language (H-High) and low language variation (L-Low) [6]. Halim in his book conveys that diglossia realizes a high language rating (H) and low (L) due to the purpose or function of its use and influenced by the user group of something language in a formal state or vice versa.

Diglosia is one of the studies in sociolinguistic science that discusses a phenomenon of language, especially the use of a variety of appropriate languages in the community. A Language has a specific code or variety or dialect used when communicating. This is in accordance with Iryani's statement (2017) that diglosia hamper is similar to bilingual but diglosia has a high language and low language (based on Fishman's theory) [7]. Language has a variety of verbal and non-verbal communication, people can use formal, informal and nonformal language, baku and nonbaku based on the function and hierarchy of the language speaker class [8]. According to Sunardi (2018) diglosia is a language situation where there is a functional division of language variants or languages in the community [9].

This diglosia phenomenon requires the speaker to choose the language used when interacting. According to Simatupang (2018:2) conveying related objects of sociolinguistic studies is the choice of languages that exist in the community of various languages such as people who master two or more languages that must be chosen at the time of speaking [10]. With the phenomenon of diglosia, it is expected that Bahasa Indonesia is still used properly and correctly. Knowledge of sociolinguistic science is also important to be given to the community so that the use of language in the community can still run properly and correctly.
2 Research Methods

The method used in this study is qualitative research that is a description of analysis, which is an object of how different languages are used when talking to a person. Data collection techniques and data analysis, namely, (1) observing the state of students when speaking using Bahasa Indonesia, (2) collecting data, in the form of several sentences that are applied when speaking, (identifying data, the sentence falls into the category of variety of T language or variety of R language [11].

3 Results and Discussion

Postgraduate students of Indonesian Language and Literature education mostly use two languages in daily communication activities. Both languages are Javanese and Bahasa Indonesia. The languages used also have a variety of T (high) and R (low) languages. In Bahasa Indonesia, the variety of T is commonly used when in lectures, where the language is used to communicate with lecturers or employees. While Bahasa Indonesia with a variety of R is commonly used when outside lectures, such as the kind of communication with peers.

Language acquisition also varies, because not all students state that their native language is Bahasa Indonesia. More than 100,000 students have stated that their native language is Javanese. This happened because they were born in java, so the first language taught is baahasa Java, both in the variety of T and variety R [12].

The origin of the students' area also affects the ability to speak. Those who come from outside Java, claim to be quite difficult to accept the intentions of the interlocutor who uses Javanese language [13]. So, to overcome these problems, graduate students majoring in Indonesian Language and Literature education more often use Bahasa Indonesia in conversation or daily communication. It is different from Javanese people and their mother tongue is also Javanese, they will be easier to use and accept the intention of the interlocutor if using Javanese. However, it does not close the possibility that not all students can understand all Javanese accents. For example, Yogyakarta javanese accent with Javanese accent in Banyumas. There are differences especially in terms of phonology in the sentences used as follows:

<table>
<thead>
<tr>
<th>Bahasa Jawa Ragam R (Yogyakarta)</th>
<th>Bahasa Jawa Ragam R (Banyumas)</th>
<th>Arti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aku nyuwun pirsa, daleme Bu Tri kuwi, neng ndi yo?</td>
<td>Nyong arep takon, umaeh bu Tri kuwe nang ndi ya?</td>
<td>Saya mau bertanya, rumahnya bu Tri di mana ya?</td>
</tr>
<tr>
<td>Sammpayan tindak menyang kampus?</td>
<td>Kowe arep lunga ming kampus?</td>
<td>Kamu mau pergi ke kampus?</td>
</tr>
</tbody>
</table>

Basically, in a society that uses several languages will definitely experience problems that are related to the function and position of the language contained in it. In the life of graduate students majoring in Indonesian language and literature education, the T variety is used when communicating with older people and have positions. This variety of T is usually obtained from
formal education. For example, with lecturers, study program chairmen, postgraduate directors, and so on. While the variety of R language is commonly used to communicate daily in most of the life of graduate students majoring in Indonesian language and literature education. This variety of R language is obtained from association with family and friends every day. There are several examples of sentences that are usually used by students as follows:

<table>
<thead>
<tr>
<th>Table 2. Examples of sentences that are usually used by students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bahasa Indonesia Ragam T</strong></td>
</tr>
<tr>
<td>Mohon maaf mengganggu waktunya Pak, saya mohon izin bertemu untuk mengkonsultasikan terkait judul Tesis.</td>
</tr>
<tr>
<td>Permisi Bapak, ada yang ingin kami tanyakan perihal tugas Pengembangan Kurikulum Bahasa.</td>
</tr>
<tr>
<td>Mohon maaf Ibu, di tempat saya sedang terkendala sinyal, sebab sedang turun hujan deras sekali bersamaan dengan petir.</td>
</tr>
<tr>
<td>Maaf Bu sebelumnya, tetapi untuk di waktu itu kami sudah ada jadwal mata kuliah yang lain.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3. Examples of sentences that are usually used by students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bahasa Jawa Ragam T</strong></td>
</tr>
<tr>
<td>Nuwun sewu, kulo badhe nyuwun pirsa, dalemipun Bapak Direktur punika, wonten pundi nggih? (Permisi, saya izin mau bertanya, rumah Bapak Direktur, ada di mana ya?)</td>
</tr>
<tr>
<td>Sugeng enjing bapak, kulo badhe nyuwun konsultasi nilai pripun nggih? (Selamat pagi Bapak, saya izin mau konsultasi nilai bagaimana ya?)</td>
</tr>
<tr>
<td>Nuwun sewu Ibu Dosen, kulo badhe nyuwun pirsa tugas (Permisi ibu dosen, saya izin mau bertanya tugas)</td>
</tr>
<tr>
<td>Sugeng enjing Ibu, kulo badhe nyuwun kisi-kisi ujian pripun nggih? (selamat pagi ibu, saya izin mau meminta kisi-kisi untuk ujian bagaimana ya?)</td>
</tr>
</tbody>
</table>

4 Conclusion

Postgraduate students majoring in Indonesian language and literature education can indirectly be mostly referred to as bilingualism. Because they are able to communicate with two languages, yaakni Bahasa Indonesia and Bahasa Jawa (their respective mother tongues). Some make Bahasa Indonesia as the mother tongue, but others make Javanese as the mother tongue. The use of Bahasa Indonesia variety of T language is used in formal situations and when communicating with older people. While in Javanese, the variety of T language is used to
communicate with older people and have a position or position. The use of Bahasa Indonesia variety of R language is used in non-formal situations by communicating with older people. Various R languages in Javanese are used when communicating with peers.

Reference

Inventiveness during Pandemic: Formulating and Translating Short Stories from Indonesian to Bangka Malay Language

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Abstract. Universitas Bangka Belitung compiled a book entitled Tata Kata: Kumpulan Cerita Pendek for primary school-aged children during a pandemic. The book contains several short stories on the theme of pandemics. This research aims at explaining the process of creating short stories and translating them from Indonesian to Bangka Malay language. This study utilizes a descriptive qualitative method. The researchers decided the data source, classified and analyzed the data, interviewed with open-ended questions and described the writing and translation process. The creation of the short stories was dominantly much influenced by seeking out the proper diction for those in 4-6th grade. Meanwhile, something prominent appeared during the translation process that the translators relied more on spoken language to translate. It was because of their difficulty obtaining the dictionary or good references to help them determine the equivalents.

Keywords: pandemic, short stories, translation, Bangka Malay language.

1 Introduction

The Covid-19 pandemic, in all of its manifestations, has altered the lives of Indonesians in a variety of ways. One of them is education. Indonesia’s national education system, which was running safely and efficiently, suddenly had to turn the wheel 180 degrees to adapt and make peace with the situation. It was March 2020 when the emergence of Covid-19 took place. As the corona virus spread in Indonesia, the government developed educational policies tailored to the Covid-19 emergency status. These policies are still being implemented today, from primary education to higher education, with several developments and evaluations being carried out regularly to maintain educational quality in the face of adversity. Nizam [1] mentions policies involving higher education include: 1) the changing of face-to-face lecture to distance learning conducted from home, 2) lectures prioritizing digital media (fully online), 3) government assistance in the form of internet quotas for lecturers and students to support learning, and 4) the concept of hybrid learning.

The learning from the home program as one of the government’s policies during the pandemic became an opportunity for a group of students of Universitas Bangka Belitung to demonstrate their natural creativity. They strove to advance further the reading literacy level of children, especially those aged 10-12 years (4-6th grade). Referring to the Provincial Alibaca Index arranged by Puslitjakdikbud [2], reading literacy activity (Alibaba) in the Bangka Belitung Islands Province in 2019 showed a moderate level of 41.97%. This fact was the primary motivation for them to formulate an alternative literary work to improve
children’s reading literacy in Bangka. Another supporting reason was that this fictional text, which was compiled by prioritizing culture and social issues, might help provide an experience of getting entertainment, enjoying stories, and contemplating, all of which can be obtained by children aged 10-12 years through searching, accessing, and finding explicit information from the content of short stories in the book so that the Reading Literacy Activity Index (Alibaca Index) of children is expected to increase even more.

The book Tata Kata: Kumpulan Cerita Pendek, written by the students of Universitas Bangka Belitung, is deemed qualified to represent the alternative material for having amusement and increasing children reading literacy. This book has ten short stories for children aged 10-12 years (4-6th grade). Some of them undertake pandemic as a theme. The short stories were composed in Indonesian and translated into English and Bangka Malay language. The product can then be utilized as additional reading material to improve children's reading literacy, introduce folklore, learn English, and preserve the local language. This work is also full of knowledge and moral messages or values embedded in the story content. It is hoped that the target readers will enjoy and appreciate this book as their literacy companion.

2 Literature Review

There have been relatively established either theories or studies in terms of reading literacy, short stories, and translation process. Leipzig [3] states that reading is a multidimensional activity that includes word recognition, comprehension, fluency, motivation, and fluency. Discover how readers use print to create meaning. Making sense of a pattern is what reading is all about. It necessitates recognizing the words in print, constructing an understanding, coordinating identifying words, and creating meaning such that reading is automatic and accurate. That is why the short stories in the book Tata Kata: Kumpulan Cerita Pendek are a valuable tool for children in 4-6th grade to acquire all of the skills mentioned above.

According to Lazar [4], a short story is a work of fiction. It relates a single incident in great detail, discusses something at a critical juncture, introduces persons who are revealed to be fictional, and connects narrative and characters. Moreover, Pourkalhor and Kohan [5] claim that short stories could be beneficial since literature has the property of being universal, and short stories will allow the teacher to address human issues. Therefore, it is believed that a short story as a part of literary work will fully support its readers to increase their reading literacy or skill as long as it is arranged to present advantages to the target readers. Some benefits of short stories for children are namely:

1. Because they are brief and straight forward, short stories facilitate children's reading.
2. Because of their universal language, short stories are appropriate for multicultural settings.
3. Children gain a better understanding of other people and cultures through the reading of short stories.
4. Cultural awareness is increased through the use of short stories.
5. Short stories encourage children to be more creative and critical thinkers.
6. Short stories help children feel less anxious and more relaxed.

Furthermore, Sigalingging [6] defines that translation can be understood simply as a transfer of message using the equivalent word from the source language (SL) to the target language (TL). A translator must be fluent in two languages and two cultures. This is directly tied to the translator's duty for the translation's quality. It means the quality of the translation is
reflected through the process. The translation is more than just transferring meaning from the source language (SL) to the target language (TL). Other factors to consider include lexical and grammatical elements, language style, and the author’s intent when writing the source text [7].

In the context of the translation process, Bathgate [8] mentions several steps that the translator, namely, should pass:

1. Tuning
   It is to get the "feel" of the text to be translated. Translators must develop the language of a poet or novelist, lawyer or economist, research physicist or factory manager, advertising copywriter or biblical prophet, depending on their line of work. If the text is complex or is not familiar, it is advised that the translators read some background literature.

2. Analysis
   Once the translators have "attuned" their minds, they are now ready to analyze the text—to split sentences into translatable units, words, or phrases.

3. Understanding
   After putting the sentences into translatable units, the translators will put them together again in a form that they can understand and respond to emotionally.

4. Terminology
   The next step is to consider the keywords, phrases, or other specific terminologies. In this step, besides having complete and various dictionaries, the translators should have a vast knowledge of both SL [Source Language] and TL [Target Language].

5. Restructuring
   The translators must restructure the translation result by the rules of the TL. The translation should be readable and natural in the sense that it does not sound like a translation.

6. Checking
   The translation process does not stop at restructuring. It also becomes the translators' job to check and recheck the translation result. The translators should be correct in grammar and other visual errors, such as punctuation, spelling, capitalization, etc.

7. Discussion
   It is always advisable for the translators to discuss with other people during the translation process and after the translation is finished. Remember the saying: it is always easier to find one's mistakes than to see our errors. The translation should not be done in isolation.

Syed [9] thinks that literary translation is recognized as a necessary procedure through which the texts are imagined, created, and read. It is regarded as a highly artistic and creative discipline that necessitates careful attention. This concept strengthens the efforts of the students to produce a good translation quality of the short stories in the Bangka Malay language. A translator must comprehend the material to be translated. Understanding the material requires sufficient basic knowledge in the field of science concerned. As a result, a literary translator needs to have the ability to understand and appreciate an academic work.

The presence of local languages is critical to a society's ability to communicate. Bangka language is a part of the Malay cluster. The people of Bangka Island and the surrounding small islands communicate in Bangka Malay. Saputra and Afifulloh [10] explain that the Bangka Malay language in its development has been modified and has many variants. During this time, the Bangka Malay language developed and evolved by the people who spoke it. Several dialects of the Bangka Malay language exist, namely the Pangkalpinang, Sungailiat, Toboali, Mentok, and Belinyu dialects. Translating the short stories from Indonesian into
Bangka Malay is an excellent way to preserve the local language. However, the Bangka Malay language has made significant contributions to the Malay and Indonesian people's civilization.

3 Research Methods

This study is descriptive qualitative research. A qualitative method was undertaken to provide a comprehensive description of the formulation and translation process of short stories from Indonesian into Bangka Malay language in the book Tata Kata: Kumpulan Cerita Pendek. Moleong [11] describes the method as the perfect procedure for attaining descriptive data from either written and spoken discourse and the behaviors of the participants observed from the existing phenomenon. This work aims at rendering a systematic and factual interpretation of the problem from the data obtained by presenting, analyzing, and lastly, interpreting the data [12]. Lincoln and Guba [13] defines the location of study as the focus-determined boundary, the limit used to determine the focus or object of the study. Thus, location is not always geographic or demographic. A book also can be a research location.

The techniques applied in this study were observation, questionnaire, and interview. The researchers directly participated in the discussion by recording the student’s answers to the prepared questions without taking part in the conversation. After gaining the data, the team asked the students or translators to fill out the online questionnaire. All was done to make sure the data obtained are valid. The data was collected through the printed book Tata Kata: Kumpulan Cerita Pendek. Respondents of this study involved the authors and translators of the short stories. The researchers, as well as the team behind data collection, are the instruments of this study. The team involved themselves in observing the bilingual short stories in Indonesian dan Bangka Malay language.

4 Results and Discussion

4.1 Formulation of the Short Stories in the Book Tata Kata: Kumpulan Cerita Pendek

Book Tata Kata: Kumpulan Cerita Pendek lists ten short stories compiled by the students of Universitas Bangka Belitung. They are Sepucuk Surat dari Piko Sang Kelelawar, Aku dan Loli, Awas, Ada Virus!, Legenda Akek Antak, Mbok Ratmi dan Ladang Bertuah, Nek Gergasi, Gila Belanja, Depati Iskandar, Bukit Tamnun Tulang, and Dandi Si Hantu Bijak. Three short stories are related to a pandemic, the following three short stories are inspired by oral literature, and the last four short stories are fantasy.

01/AU-SA/TKKCP/INTR2020/A (00:01:49–00:02:08)
“Sebagian dari tema cerita yang kami buat itu bertemakan Covid-19. Namun, ada sebagian juga yang bertemakan bebas seperti fantasi, cerita anak, yang intinya kayak lebih ke genre family atau keluarga. Seperti itu ...” (Indonesian transcript)

“Some of the story themes we created are Covid-19. However, there are also some free themes such as fantasy, children's world, which basically are more like family genres. Something like that ...” (translated)
The short stories were originally written in the Indonesian language (Bahasa Indonesia) as the source language. The fiction was then scheduled to be translated into two target languages, namely English and Bangka Malay, to facilitate the children aged 10-12 years to increase their reading literacy and language skills.

In the beginning, the authors had to think hard about how to create all short stories with the Covid-19 theme to adjust to the current situation without feeling monotone. They were demanded to be creative. However, they eventually gave up and decided to present some alternatives beyond the pandemic theme.

It was taken to avoid either writer’s block or stagnation. They assumed that the essential thing is that the children will quickly understand the content and deal with the moral values inside the story. Indeed, the writer’s block possibly made the authors not focus on the writing process.
For the short stories inspired by oral literature such as Nek Gergasi, Legenda Akek Antak, and Bukit Tambun Tulang, the authors first surveyed several places in Bangka before creating them. This activity was organized to collect the accurate data used in the short stories. The information was derived from oral tradition. The informant was an older adult who is well-versed in myth or folklore.

Illustrations are used to round out the book. Because the target readers were children aged 10-12 years (4-6th grade), the images were minimalist with two to three pictures to help children imagine the content of the short stories on their heads. They are helpful to construct children’s critical thinking when analyzing each tale.

4.2 Translation Process of The Short Stories from Indonesian to Bangka Malay Language

Translating is not always easy. Nababan [14] claims that the translation process has three stages, namely 1) analysis of source text (ST), 2) transferring, and 3) restructuring. When translating the short stories from Indonesian to Bangka Malay Language, the translators mostly meet obstacles in the second stage. In transferring, the translators are required to find the equivalent of the source language word in the target language. The process of transferring content, meaning, and the message is internal. The process takes place in the translator's mind. After the content, meaning and message are already in their mind, they then express it in the target language in writing. To obtain a better translation by the purpose of the translation itself, the translation needs to be harmonized.
“... pokoknya kayak agak canggung gitu menerjemahkan yang bahasa yang sering kita baca kan buka ceritanya kan bahasa Indonesia tuh tapi ketika kita nulis bahasa daerah, kayak aneh kesannya gitu.” (Indonesian transcript)

"Basically, it is kind of awkward translating the language that we often read. The story book uses Indonesian language, but when I write the local language, the impression is that it looks weird.” (translated)

Diction becomes the biggest problem in transferring stage. Not all words used by Bangka people in spoken language or daily conversation are equivalent to the terms in the source text. If applied, it will be weird. Therefore, the translators had to be very careful to choose and decide the appropriate equivalence.

08/TRL-B/TKKCP/INTR2020/B
(00:02:39–00:03:04)
“Karena saya fokusnya menerjemahkan ke bahasa daerah, kadang juga terjadi apa ya, kesulitan untuk memilih diksinya itu, padanan katanya itu juga agak susah karena nggak semua orang paham tentang bahasa-bahasa daerah yang sudah apa, sudah lebih khusus gitu ga umum lagi bahasanya ...” (Indonesian transcript)

“Because I focus on translating into local language, sometimes what happens is the difficulty to choose the diction. The equivalent words are also a bit difficult because not everyone understands the meaning of local lexical, it should be more specific, it is not common anymore ...” (translated)

However, they seemed unfamiliar with the specific vocabularies in the Bangka Malay language that deserves to be used in the target text. The Bangka Malay language developed and evolved by the people who spoke it. Several dialects of the Bangka Malay language exist, namely the Pangkalpinang, Sungailiat, Toboali, Mentok, and Belinyu dialects. Every area has different local dictons. One word may produce different meanings based on it. For instance, the phrase besok pagi (tomorrow morning) can be translated into so pagi in Central Bangka Regency, but the word so means ‘arrogant’ in Pangkalpinang City.

09/TRL-RA/TKKCP/INTR2020/B
(00:07:21–00:07:51)
“... Terus ada juga kayak kata, perpadanan kata misalnya ‘besok pagi’. Nah, ‘besok pagi’ itu kalau di bahasa daerah, kalau bahasa Bangka Tengah tuh, bahasa Bangka Selatan juga beda-beda kan kayak di Bangka Tengah itu kayak ‘sok pagi’ kalau besok pagi. Nah ‘sok pagi’ itu kalau di...misalnya dibilang ke bahasa umum daerah Pangkalpinang, kayak ‘sok pagi’ itu kayak sok, sok itu kayak menggambarkan sombong atau kayak beda makna.” (Indonesian transcript)

“Then there are also words, equivalent words such as ‘tomorrow morning’. Well, ‘tomorrow morning’ is in the local language, for Central Bangka, South Bangka is also different, like in Central Bangka, it is like ‘sok pagi’. Now, if you say ‘sok pagi’, for example, it is said in the local language of the Pangkalpinang area, like ‘sok pagi’ is like pretentious, describing arrogance or having different meanings.” (translated)
This issue is crucial because of translators’ difficulty getting an official dictionary of Bangka Malay-Indonesian or other printed supporting references. The translators need one until two days to finish their translation. They mostly rely on spoken language to transfer the message from Indonesian to Bangka Malay language. They tend to use ‘general’ dictions of the Bangka Malay language.

10/TRL-RA/TKKCP/INTR2020/B
(00:07:08–00:07:12)
“Kan bahasa daerah ini kan beda-beda nih, kan pengennya bahasa daerah itu yang umum.” (Indonesian transcript)

“The local languages are different, right, I want the common local language.” (translated)

5 Conclusion

To increase children's reading literacy in Bangka, the book Tata Kata: Kumpulan Cerita Pendek was created by a group of students of Universitas Bangka Belitung during a pandemic. Ten short stories are listed there and become alternative reading material for the children aged 10-12 years (4-6th grade). There are three themes applied in the short stories, namely pandemic, folklore, and fantasy. In making the short stories, the authors add illustrations to construct children’s critical thinking when analyzing each tale. Meanwhile, in the translation process of the short stories, diction becomes the biggest problem in determining the equivalents in the Bangka Malay language. It is because the translators have lack strong and credible references to help them in translating. They mostly rely on spoken language to transfer the message from Indonesian to Bangka Malay language. They tend to use ‘general’ dictions of the Bangka Malay language.

6 Acknowledgements

We want to thank the Faculty of Social and Political Sciences and Institute for Research and Community Service Universitas Bangka Belitung, Indonesia, to fund this research and thank the team of researchers who were solid for conducting this research.

References

Society’s Attitudes towards National Examination and Teacher’s Response to National Assessment

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Abstract. This research is aimed to know: 1.) How is society’s attitude toward national examination? and 2.) How is the teacher’s response to the national assessment? Using a sequential explanatory design as its method, the result says that most of the community rejects the national examination because its function is not able to give specific information about student’s capabilities and the real situation among school environment. Nonetheless, teachers say that national assessment which is formulated to fix national examination’s lack is still immature to implement. The form of national examination closely the same as PISA¹ is not yet considered familiar for most of the teachers.

Keywords: Assessment, Attitudes, Education, National Examination

1 Introduction

Measurement as an informative evaluation aimed at acquiring and conveying information on objects of the empirical world [1] is such an important thing to do to evaluate a specific policy or even program in the educational field. In practice, the measurement activity certainly requires the right measurement tool to get an accurate observation result from its measurement process. This can be relevant and answer why the government concern about formulating a measurement tool to assess the students in Indonesia. The National Examination or known as UN² is a government policy that has been in effect since 2005 until now [2] [3] [4]. UN is the form of assessment provided by the government to measure a student's level of competencies in a particular subject according to graduate competence standards. It is hoped that the results of the National Examination can be used as input for improving the learning process in academic units or schools [5]. Long before this exam named UN, the government has been conducted a test with various names. Previously the UN was called EBTA³, which later turned into

¹ PISA stands for Programme for International Students Assessment
² UN stands for Ujian National, which means a national examination held by the government of Indonesia to measure a student's level of competence in a particular subject matter.
³ EBTA stands for Evaluasi Belajar Tahap Akhir, the term for naming the assessment used before it was named as UN
EBTANAS⁴, then UAN⁵, and the last change to UN. The function of UN as a determinant of graduation of students from certain levels of education in both elementary and secondary schools was being the pros and cons, which are pretty complicated and prolonged. Therefore, from 2015 until 2019 as the latest National Examination held by the government, its function is changing, being a tool to drawing the quality of education in Indonesia. Various literature studies that have been conducted found that there is a controversy that occurs among the community related to the government policy in implementing the national examination, even among the policymaker [6]. The controversy is divided into two versions. One version said that the government must continue implementing the National Examination to see and measure the quality of education. In contrast, the other side said that the National Examination did not determine the quality of education because there were many cheats [7].

For the past five years, the government has continued to work on improving national examinations and developing the newest instrument of national examination using a computer equipped with specific software to display questions and answer processes with the same level of difficulty as paper-based national examination [8], which is known as UNBK⁶ to reduce budgets and reduce fraud. It is right that UNBK implementation model directly or indirectly provides benefits, including saving duplication costs, facilitating the distribution of materials, quickly reaching all regions, high security, easy scoring process, and make it easier to print certificates of national examination results [9]. However, many problems happened during the implementation of UNBK, such as technical glitches and networks. Besides that, the minister of education Nadiem Anwar Makarim said that the national examination is a burden on the student and its function could not be captured the whole matter that happened in the learning environment, whereas to enhance the quality of education, a good assessment is needed [10]. Therefore, nowadays, the Ministry of Education helped by Assessment and Learning Center, tries to construct a new form of an instrument named as national assessment or AN⁷ to assist the government in collecting information related to the actual condition in the school environment.

The national assessment contains three types of the test. First, the minimum competency assessment consists of a literacy and numeracy test which is designed based on the model assessment carried out by PISA and TIMSS[11], and the second is a character survey. These two kinds of assessments will be held on the second level of the school, e.g., at the second level of junior high school and senior high school. Third, an environmental learning survey, which is given to all elements of the school organization, including teachers and all staff around. This assessment national planned for changing the national examination as well. But, according to BSNP, as the conception of a national examination, they claimed on their publication written by Doni Koesoema said that AN is quite suitable for helping the government determine the

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⁴ EBTANAS stands for Evaluasi Belajar Tahap Akhir Nasional, the term for naming the assessment used before it was named as UN
⁵ UAN stands for Ujian Akhir Nasional, the term for naming the assessment used before it was named as UN
⁶ UNBK stands for Ujian Nasional Berbasis Komputer or Computer-based national examination
⁷ AN stands for Assessment Nasional or National Assessment
actual condition in the school environment. Somehow, AN cannot change the function of the UN, namely as the government measuring tool in assessing student personal knowledge. Minimum competency assessment allowed the school to assess the students' level of competence by using various kinds of student projects such as portfolios that determine students' evaluation report cards or specific. This situation is a big deal for the teacher who is not familiar with the form of test besides UN. For those reasons above, this research aims to know: 1.) How is society’s attitude toward National Examination in Indonesia? and 2.) How is the teacher’s response to national assessment as a new form of student’s instrument test?

Several studies say attitude is an evaluative statement about an object, person, or event. This reflects one's feelings towards something. Attitudes may result from behavior, but attitudes are not the same as behavior, and attitudes can be positive or negative [12]. An attitude is a set of beliefs about an attitude object, where an attitude object is a person, thing, event, or issue. According to Azwar S [13], attitude is divided into three components that support each other, namely cognitive, affective and conative. He said the cognitive component represents someone’s beliefs, such as stereotype beliefs owned by an individual toward something, issue, or opinion. On the other hand, the affective component is related to someone’s feelings or emotional aspects. He claimed this component mostly being a feeling which might be changing someone’s attitude toward something. At the same time, conative is someone’s tendencies or behaviors reflecting by their reaction in a specific way.

Referring to the explanation of attitude theory above, it can be concluded that attitude is one's tendency to an object with a positive or negative value, where the movement is influenced by three fundamental aspects: cognitive, affective, and conative. Mental elements will bring up attitudes based on characteristics of cognition that are believed by someone about an object which will later lead to an opinion of that object. While the affective will trigger an attitude from the emotional side of a person towards the thing. Furthermore, the conative aspect will bring up attitudes based on behavioral tendencies or reactions carried out by someone against the object.

In this study, the object referred to in understanding the attitude described earlier is National Examination. Researchers have a particular interest in knowing the perspective of the community, especially the people of Cilegon City, towards the National Examination. The intended attitudes, among others, are reviewed from the cognitive aspects, namely public knowledge about the National Examination, general knowledge about the National Examination as a form of assessment of national learning outcomes, and public knowledge about the quality of education through the National Examination. Then the affective aspects, which include community subjectivity, assess the contribution of the National Examination to the quality of education, public subjectivity to the budget of the National Examination funds, general subjectivity addressing the cheating in the National Examination and public subjectivity in determining the pattern of assessment of learning outcomes on a national scale. Then the conative aspects include the tendency of community actions to respond to family members who want to carry out the National Examination, the direction of community actions to respond to fraud in the implementation of the National Examination, and the tendency of community actions to contribute to organizing the National Examination. On the other hand, this study also
tries to reveal the teacher's response to National Assessment as a new form of the instrument made by the government aimed to change national examination to capture the student’s capability, student learning environmental conditions in whole aspects.

2 Research Methods

This research used a combination method with a sequential explanatory design. This research method combines quantitative and qualitative research methods sequentially. The first research stage is carried out using quantitative methods, and the second stage is carried out using qualitative methods [14]. This research was conducted in Cilegon, Banten, Indonesia. In determining society's attitudes toward national examination, samples for this research were 67 people from the community divided into three types based on their educational background. First, people who passed the undergraduate school, then some are passed the graduated school, and some are unidentified respondents who were not giving their complete information while giving the responses. Their profession varies greatly. Some are teachers, some are working in the government, and some are freshly graduated. Then, the researchers contacted some of them for the interview depending on their willingness to share their response to the national assessment.

2.1 Data Collecting Technique

Quantitative data collecting technique
To reach the quantitative information for attitudes, the researcher developed a set of questionnaires consists of 18 items; later, after field trials were conducted, a total of 13 articles were considered to be valid and reliable. These questionnaires consist of three aspects such as cognitive, affective, and conative see Table 1.

Qualitative data collecting technique
To collect the qualitative data for attitudes, the researchers used open-ended questionnaire consist of two questions that require the respondent to give enough information related to their perspective about the implementation of UNBK in 2019. Those questions are: 1) Explain how you responded to implementing the Computer-Based National Examination in 2019. 2) Explain the problems that arose during the implementation of the Computer-Based National Examination in 2019. After having the data, the researcher confirms the respondents' answers by contacting them personally based on the respondents' willingness.

Thus, for having detailed information related to the teacher’s response toward AN, the researcher conducted an in-depth interview with the teachers with the specific question: What do you think about National Assessment.

Table 1. Quantitative data collecting technique
<table>
<thead>
<tr>
<th>Aspect</th>
<th>Items</th>
<th>Type</th>
<th>Number of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>National exams can describe the quality of education in Indonesia.</td>
<td>+</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>An examination of interests and talents should replace the National Examination.</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>National exam questions should be adjusted to the cultural context of the student's home region.</td>
<td>+</td>
<td>4</td>
</tr>
<tr>
<td>Affective</td>
<td>I feel that the different forms of National Examinations are too wasteful of the state budget.</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Because the National Examination is no longer a determinant of graduation, students are not encouraged to get the best grades. Therefore the National Examination should be abolished.</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I feel that the National Examination is not able to reflect student learning outcomes.</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>I feel that the National Examination cannot be used as an educational mapping.</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>For me, the national exam is vital for assessing students' abilities.</td>
<td>+</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>National examinations at the high school level should be done in most subjects.</td>
<td>+</td>
<td>12</td>
</tr>
<tr>
<td>Conative</td>
<td>I will try to voice that the national exam cannot be held with various considerations based on existing problems.</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>If there is a chance, I want to abolish the National Examination.</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>If my brother wants to take an exam, I always facilitate my brother with books or UN preparation applications.</td>
<td>+</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>I registered my child or sibling with a tutoring institution to prepare for the National Examination.</td>
<td>+</td>
<td>11</td>
</tr>
</tbody>
</table>

2.2 Data Analysis

Quantitative and qualitative data analysis

Descriptive quantitative analysis was used in this research. This technique is used to analyze the data and then described and interpreted it without changing the research data results. After obtaining data in the form of numbers, researchers put it by tabulating existing data. Then the researcher analyzes the data using Excel's help to classify the data based on the aspects studied then describes it into a percentage.

And also, for the qualitative, the researcher used qualitative descriptive analysis to describe the qualitative data obtained during the study. The attitudes data were obtained from an open-ended questionnaire and confirmed by personal interview, then the results of teacher response to national assessment were obtained by interpreting the discussion to some of the teachers.
3 Results and Discussion

Society’s attitudes to National Examination

After obtaining the data and turn it into tabulation of data, this research found that society’s attitudes toward National Examination in Indonesia are closely negative. Most of the respondents agree that National Examination should be deleted. Here is the quantification of the result based on the aspects. (See Table 2)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Items</th>
<th>Result in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>National exams can describe the quality of education in Indonesia.</td>
<td>29% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>71% disagree</td>
</tr>
<tr>
<td></td>
<td>An interest and talent test should replace the National Examination.</td>
<td>72.6% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27.44% disagree</td>
</tr>
<tr>
<td></td>
<td>National exam questions should be adjusted to the cultural context of the student's home region.</td>
<td>29.04% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70.96% disagree</td>
</tr>
<tr>
<td>Affective</td>
<td>I feel that the different forms of National Examination are too wasteful of the state budget.</td>
<td>71% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29% disagree</td>
</tr>
<tr>
<td></td>
<td>Because the National Examination is no longer a determinant of graduation, students are not encouraged to get the best grades. Therefore, the National Examination should be abolished.</td>
<td>67.7% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.3 % disagree</td>
</tr>
<tr>
<td></td>
<td>I feel that the National Examination is not able to reflect students’ learning outcomes.</td>
<td>19.35% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70.65% disagree</td>
</tr>
<tr>
<td></td>
<td>I feel that the National Examination cannot be used as an educational mapping.</td>
<td>76% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24% disagree</td>
</tr>
<tr>
<td></td>
<td>For me, the national examination is important for assessing students' abilities.</td>
<td>32.35% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>67.65% disagree</td>
</tr>
<tr>
<td></td>
<td>National examination at the high school level should have been done in most subjects.</td>
<td>63% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>37% disagree</td>
</tr>
<tr>
<td>Conative</td>
<td>I will try to voice that the national examination is not feasible to be implemented with various considerations based on existing problems.</td>
<td>67.8% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.2% disagree</td>
</tr>
<tr>
<td></td>
<td>If there is a chance, I want to abolish the National Examination.</td>
<td>71% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29% disagree</td>
</tr>
<tr>
<td></td>
<td>If my parent wants to take an exam, I always facilitate my parent with books or UN preparation applications.</td>
<td>70.1% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29.9% disagree</td>
</tr>
<tr>
<td></td>
<td>I registered my child or sibling with a tutoring institution to prepare for the National Examination.</td>
<td>66.2% agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33.8% disagree</td>
</tr>
</tbody>
</table>

As shown in Table 2, in a cognitive aspect, most of the society believes that National Examination cannot be used to describe the quality of education in Indonesia. This statement is supported by the speech from the ministry of education said at the Coordination meeting with heads of education offices throughout Indonesia on December 11, 2019. In his presentation, he said that 1) National Examination Material is too dense, so students and teachers tend to test
mastery of content, not competencies. 2) The National Examination is a burden on students, teachers, and parents because it is an indicator of students' success as individuals. 3) National Examination should have the function to map the quality of the national education system, not student assessments. Thus, almost all of the society agree to change the form of the National Examination to become a test of interest and talent. This is also supported by a new policy directive from the Ministry of Education that says that in 2021 the UN will be changed to a minimum competency assessment and character survey.

By seeing the result of the affective aspect and its component, the data shows that almost more than 60% of society in Cilegon negatively tend to perceived National Examination. For example, they said that Nation Examination takes a lot of costs. They also believed that National Examination could not reflect students’ potency or even their skill. For those reasons, society believes the National Examination should be deleted.

In a conative aspect, it seems pretty different. At the same time, some of them believe and tend to support the National Examination. Some of them said that they would help their parents or siblings to get facilitation to prepare for the exam. And they bought some books and references to support. In another way, society said that if they can delete the exam, they will do it. And they will voice to other people by showing the problems that happened in the implementation of the National Examination so that the society can push the government to evaluate or even delete the exam.

After obtaining the quantitative data, the researcher did an in-depth interview with 5 High School teachers in Cilegon. All of them were included in a committee in National Examination in 2019. Based on the discussion, most teachers said that the Computer-based National Examination, known as UNBK, is better than last year. However, there was some problem that happened during the process. Some of them said they have trouble with the system because they are still unfamiliar with those systems at UNBK.

Another problem that occurred during the exam was the server trouble and internet connection crucial for UNBK. This problem making students nervous, and the exam becomes ineffective and inefficient. In addition, the number of computers is limited, so the time to work on UNBK must be divided into three sessions. This situation is directly increasing student’s anxiety. They also said that data synchronization is very long and submission of UNBK results also requires a very long time, so a lot of time is wasted.

UNBK, as it said to answer the problems that happened in the exam like cheating and fraud, seems not practical. It is way too long from what makes UNBK was created for. New problems occurred and still going on now—this problem is in line with society’s attitudes which negatively tend to perceived National Examination.

Teacher’s response to National Assessment

After having an in-depth interview with some of the teachers who prepare for the implementation of the national assessment in schools, some of the teachers said that national assessment is not familiar with their behavioral learning system. In their opinion, the form of national assessment is very similar to PISA. Even though the government has been done the simulation, the state of national assessment is quite challenging to understand by the student,
even by the teacher. In line with the finding above, the research conducted by Novita, Mellyzar, and Herizal [15] also said in their study that the teacher's understanding of the national assessment is shallow, only about 28% from the samples of data very well-understanding the national assessment and the rest is not.

The teacher also says that they are concerned about the national assessment system, which is only given to the sample of the student, not the population. It will make a bias in determining the student's capability if the student who was included as a participant for the national assessment does not represent the whole student's abilities. They said, what if the participants are low-ability students.

For some reason, they said this assessment is good to enhance the teacher’s capability in delivering the materials. But, somehow to change the behavioral learning system is not as easy as it sounds like. Significantly, the result of the national assessment will not be written in numbers that are so far numbers or values being the only tool to determine student’s capability.

4 Conclusion

From this research, it can be concluded that society’s attitudes in Cilegon tend to believe that the National Examination is not a good form to describe the quality of education in Indonesia. The organization also believes that the exam is supposed to be changed into a test of talent and interest. This voice is closely the same as the statement of the Ministry of Education. By the same time, UNBK, as it was created to fix a mess in the UN, still needs to be evaluated. Many problems also happened to this form of exams, such as a limitation of computers, server trouble, and network connection. Otherwise, national assessment as a new instrument created by the government to describe the actual condition in school like PISA tends to confuse the teacher. What makes them confused is because they are not familiar with the form of the test. Most of the test content is intended to measure students' ability to analyze a particular problem in a specific context. At the same time, the student's analytical skills are still in low stages based on the PISA result in 2018. These contradictions include an alert for the government to make sure the policy they created especially for the educational field. Lest because of personal selfishness, wanting to meet more expectations of Indonesian education by implementing various immature academic procedures that ultimately ignore the student’s need.

Acknowledgments

We want to thank society and the teachers in Cilegon for their willingness to participate in this research.

References


Implementation of Problem-Based Learning to Critical Thinking Ability in School: A Systematic Literature Review

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Abstract. The curriculum 2013 encourages critical thinking skills that has a purpose of learning and must be achieved to the education. This research aims to claim the trend of implementation abilities of critical thinking skills in learning at school. The method in this research is a systematic literature review (SLR) study. This research indicates that this trend was initially apparent after its first application of the Indonesian government using a scientific approach. But in fact, Problem Based Learning (PBL) approaches and critical thinking capabilities are incompatible with the context of education. So, the SLR is verifying the essential implementation of the PBL in sharpening the capability of the data on online research from 2009-2018. This systematic review concludes that the following methodological and based literature of key and current literature is necessary. Those research will support scientific comm problem-based learning cities and practitioners for the PBL method and critical of studying.

Keywords: problem-based learning, critical thinking ability, implementation, systematic literature review (SLR)

1 Introduction

One of the most critical cognitive skills that the industrial sector is vital thinking ability (KKN1). Essential thinking ability is necessary to solve various complex problems that can provide innovation to create an advantage. Facing the global rivalry era, educators in the world constantly focusing their attention on the valuable study strategy growing critical thinking ability of students. The Indonesian government also always ensures the capacity of good-minded principals must have by high school students. But in fact, not all the educators have a consciousness of the strategy growing critical thinking ability of students. Even most educated participants haven't felt the way they were taught in school, not allowing any applications to think critically [1]. One of the approaches of the teaching that the government suggested as the principal's critical minds of the school's critical minds are the fundamental lessons of Problem Based Learning (PBL) [2]. The government also continues to attempt to increase the quality of education in Indonesia. One of the ongoing agendas is developing the curriculum development, including the development of the judgment system. The model of judgment used
now is the 2013 curriculum that has adopted the international standard assessment model. One of the characters is more stressed to think critically. The concept is to be strengthened with the previous education purposes but more directed to the formation of the education capabilities. To think critical, creative, creative and innovative, and innovative capabilities as well as able to solve more complex problems in a challenge which he will face in education [3].

Education is expected to produce a generation capable of dealing with the challenges and problems it faces, especially the preparation of future generations and characterful, agile, skilled, critical, and creative. In line with the concept of educational skills in the 21st century, according to Raizen's team focused on four categories, namely ways of thinking (creativity, critical thinking, problem-solving, decision making, learning, and innovation), ways of working, or how to work (communication, problem-based learning, collaboration), tools for working or working tools (I.C.T. and information literacy/digital literacy), living in the world (citizenship, life, and career, personal and social responsibility) [4] are in line with the case in the problem-based learning try of Indonesia. Critical thinking skills have become an essential part as learning goals to be achieved in the world of education, as stated in Permendikbud No. 73 problems based learning 2013 tentang Kerangka Kualifikasi Nasional Indonesia (KKNI). Critical minds of critical thinking capabilities have been developed and conventional schools from a high level, middle and high [3]. Learning is an attempt to lead students to learn the goal of learning process according to the expected [5].

Regardless of the various problem-based learning excess, most educators are reluctant to apply the problem-based learnings in learning process, and even educators tend to do it reluctantly. As for research/research states that great educators prefer to use traditional methods of memorial/conventional and a direct approach of teaching as well as problem-based Learning [26].

Therefore, this research will focus on implementing the development method of development capabilities critical, which is the problem-based learnings. A question that can be asked is whether problem-based learning is effective means to implement or grow the critical minds of the educated participants.

2 Research Methods

This research using the systematic literature method. Systematic Literature Review is literature review that follows a series of basic rules to identify and synthesize research and a matter of judgment to what the subject is known to the subject of the study [23]. This systematic review can provide a significant donation, allowing the policy to compose an approach based on weighing research information and identifying a gap in the following research. Research articles are selected through a database of various types of journals based on keywords used. Keywords used in the search Problem based learning/problem-based learning, critical thinking skills/analytical skills/critical thinking for students in SMA/SMK/MAN in Indonesia. For the purpose of obtaining the latest study, the search has been limited between 2009 and 2018. The criteria are as follows: (a) an observational study that observes the implementation of PBL and measures changes in the level of critical thinking ability, (b) study targeting implementation issues based in Indonesia (c) studies that are written in English and Indonesian language.

A total of 13 studies have been selected to be analyzed based on the four steps in
systematic literature review analysis. The figure 1 have shown the four steps in systematic literature review analysis based on [6]. For the first step which is framing a question. For framing an answerable question in a systematic literature review, the researcher used the PICO framework. PICO is an acronym for “Participant-Intervention-Comparator-Outcomes”. In this research paper, participant refers to individuals or population of interest to researcher. Intervention needs to be as broadly or as narrowly defined keeping only the intervention of researchers’ interest. Comparator refer to either the intervention versus placebo interventions versus conventional treatment or interventions and no treatment are compared. The outcome that researcher is interested can be narrowly or broadly defined based on the objective of the literature review analysis. The outcome is narrowly defined, then literature review analysis is only restricted to that outcome. The researcher is interested to find out if strategy to increase the critical thinking skills in problem-based learning is enhancing students’ achievement.

The second step which is run a search of the literature databases. After the researcher have decided the PICO, the researcher conducted a search of the literature databases. For the third step which is selected the articles for literature review analysis by reading titles, abstracts and full texts. The researcher set up a scheme where the researcher decided to select and reject the articles for literature review analysis. For example, the article is relevant for the study question, the article does not discuss the outcome that is of interest to this research and the article is published outside of the date range. Because of that only 22 articles have been chosen to be analysed. For the last step is abstract the information from articles. In this matter, the researcher abstract the information from articles and then put all those needed information into table synthesis matrix according to subthemes: authors, research objective, sample or respondent, research design, analysed data and the findings. From that table analysis, the researcher can make some similarities and differences in the 13 studies.

3 Results and Discussion

Through the search on the online article database, has been problem-based learning over 25 articles. On 25 articles are then read again to 13 scripts with the consideration of the abstract contents with the conditions of the use. At 22 of these scripts, read full texts and acquire several 13 manuscripts that match all the critically determined. The process we illustrate in the following chart:
Articles read titles and abstracts:
22 articles

Articles read in full
13 articles

Identified articles:
25 manuscripts from Google Scholar

22 papers were read for their titles and abstracts and were then eliminated for the following reasons:
- Subjects are not high school/vocational/MAN. students
- The research location is outside Indonesia

Ten articles read in full are then eliminated for the following reasons:
- Does not measure critical power

Picture 1. Process of identification study
<table>
<thead>
<tr>
<th>Number</th>
<th>Name, Year</th>
<th>Title</th>
<th>The Methods of Learning, Problem, and Research Subject</th>
<th>Design Research and Methods of Research</th>
<th>Research Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Anggraini et al., 2020) [7]</td>
<td>Peningkatan Hasil Belajar Kognitif Biologi Melalui Problem Based Learning Pada Siswa Kelas X SMA Negeri 1 Bulu Sukoharjo</td>
<td>The problem that occurred is the low biology study and root of its problem at biology learning that is not according to the 2013 curriculum. So the solution is classic research by using a PBL model. Data and data sources are from students made subjects of research and biological subjects.</td>
<td>The kind of research used is a P.T.K. made up of two cycles</td>
<td>This research aims to increase the result of biological, cognitive studies through the model of the Based Learning Problem to the 1st State High School Students</td>
</tr>
<tr>
<td>2</td>
<td>(Faizah et al., 2013) [8]</td>
<td>Pengembangan Perangkat Pembelajaran Berbasis Masalah problem based learning untuk Meningkatkan Softskill dan Pemahaman Konsep</td>
<td>According to observation, about 70% of students still consider that chemistry is not easy to nail, mainly to solve the problems of PBL. Inside chemistry, many formulas and concepts require a more significant problem-based learning method. Besides, students consider that the poem is less app-trained, but only as a theory and a memorial. One of the causes is a method of learning. Rejected from the problem, then in needs a creative and exciting learning device to learn to be more coated and centered on students and a mena skill set up early. One of the model Learning is the introductory learning lesson of PBL. The subject of research is a class of XI-6 science students as a comprehensive test class, a class XI-7 science students as a limited test class.</td>
<td>This research method is Research and Development.</td>
<td>This research aims to analyze the validant elevation of learning devices, increase soft skills and forgeries, and student response. The results pointed at the development of a learning device based on the hydraulic that the salt-based material has valid criteria with a 3.57, there is a soft skill with N-Gain.</td>
</tr>
</tbody>
</table>
Pengaruh Model Pembelajaran Berbasis Masalah Berbantuan Media Animasi Terhadap Kemampuan Berpikir Kritis dan Hasil Belajar Fisika Siswa SMAN 5 Mataram Tahun Ajaran 2016/2017

During the study process, the teachers should help students actively look for concepts, principles, and facts to themselves, not just give lectures and control classes. The study process that Teacher-Centered is still in high school 5 Mataram. It’s based on the results of observations that have been done in high school 5 Mataram. To overcome such a necessary study model. One of the models of learning that can be used is a problem-based study model with animated media.

This kind of research is an experiment of perfection. Experimental research is a way to test the cause-effects, where given treatment to a particular subject to find its effect.

The industry is a pretty partner of students who are proud partners in the Smart Information Surakarta (SMKITSI); it is less creative in completing the work you give. The industry delivers, when students are given a job to fix the P.C., students have trouble in mending the planes facing P.C. damage, so when determining repairs, that must be in doubt.

All this time, in the process of defense of the seldom of P.C. damage that man is given to simple, students also feel difficulty facing the real problem. Through the peddles of critical thinking skills, students will be helped in the process of identifying.

To build critical thinking skills, teachers can give experience study by designing the study process. The teacher prepared the learning by providing the issues that meli-batted student’s thinking skills and the Meli batting process based on a real problem. One of the applied learning models is the Based Problem-Based Learning for Middle Computer Problem (T.K.J.) in studying P.C. models and research problem-based Learning

This research aims to increase critical thinking skills and studies critical students and studies for students in the Middle Computer Computer Problem (T.K.J.) in studying P.C. models and research problem-based Learning

This research aims to know the effect of studying subject-based problems (PBLM) with animation of critical thinking skills and studying high school physics in 2016/2017.
Learning Problem or the problem-based studies. The subject in this research is a class of XB SMK IT SI, where the students are at the semester of the even-semester of repair material and reclaim P.C.

Based Learning problems can facilitate critical thinking students. The specific process in the U.N. theoretically supports the development of essential students according to the applied design (Masek) Yamin, 2011.

The research subject is an 11 State High School student of the 11th City, Southern Army of the X-class who is 64 students.

The lack of pro-educated participants in the process of learning to lead to independence, and the process of thinking is not well-understood so it doesn't accomplish a meaningful study process. The pro competitors experienced certainly results in low learning results (Barus, 2018, P. 18. The development of studying the protégé shows it acquired the average of the determined K.K.M.

This research was performed at ICIP PGRI Pontichild students at a semester II student studies for 34 students.
One of the challenges that the teacher made was to confront the students with problems.

As for the evaluation of M.P.S. effectiveness in increasing student's critical skills, models the direct lesson is used as a comparison.

The population in this research is high school students in the Bali Bullet. The number of schools involved in this research is four high schools. Every school was taken two parallel classes, which was class XII.

This research is aiming for testing the effectiveness of the model of learning based problems and question Socratic to increase the skills of students' critical thinking skills on science subjects.
According to the research, observation was problem-based learning problem, which is some students don't listen to the lessons that are taught by educators (talking to the other friend, often admitted to the toilet, sleepy, passive, complex to understand the concept of matter, and practiced their critical power in confronting. And the issue of educators, which is the educator still dominates classes, tends to lecture, less motivation, and low-volume of educators in matter delivery. As for the learning model that was capable of developing and adopted, so the protégé was stationed as the learning center by applying models study.

This research is in the X-High-School N1 away of Eastern Labor, 70 students of the educated.

Education is the education of the student's liberation available as student books, teaching books that don't use the education models or by the government is K-2013. The development of student books is required because the education of the students' limits in explaining material in learning material to complete and aiding education models to meet and aid education models based to contain student's development of problem should be carrying a basic education model.

Developing student books by using a creative prophecy model-based learning, it may be possible to contribute not only to student understanding and the student's ability to vary answers soother than increasing the educational understanding of its own.
| 10 | Model Pembelajaran Berbasis Masalah untuk Peningkatan Keterampilan Pemecahan Masalah dan Berpikir Kritis (Rehana, 2013b) [15] | The papers made by each group of the educated participants indicate that the fewer participants were educated appearance solving problems. The educator only uses one sourcebook. The pro does not seek another reference to enhance his discussion in the paper. As a result, a debate made by a very shallow participant and strictly follow the sequence of material that exists in one. The teacher provided the sourcebook. And according to U.H.'s grades, the grades of the steps and the stages of this pro-up value are still going to need to be repaired and upgraded. The ability of the education can still be enhanced if that learning it was applied to give a chance to a pro-educated trainee to use and develop critical thinking skills in the process of solving problems. | The study of class acts was executed in two cycles. | The study of this class acts is aiming for increase the skill of solving problems and thinking critical students by applying studies-based problem. |
| 11 | Exploring the relationships between tutor background, tutor training, and student learning: A problem-based learning meta-analysis (Leary et al., 2013) [2] | This research analyzes the gaps in the relationship between research designs with the educational abilities in learning. | Meta-analysis research that uses precise methods and cross-discipline. | The primary objective of this research is to expand an attempt to review what exists by investigating the connection between tutor training, tutor background, and student studying results. |
The effectiveness of problem-based hybrid learning model in physics teaching to enhance critical thinking of the students of SMAN. The problem that appears is how effective the pro-ball teaching is. Regarding the low-level high school classes in Bali, alternative solutions need to be problem-based learning to train student C.T.s according to the 2013 curriculum. One alternative model considered capable of training C.T.s with the Based Hybrid Learning Problem model. Model to boost high school students C.T.s The model of the Based-Hybrid-hybrid Learning (Pro-BHL) which reports that the study of physics with a pro-BHL model can improve the skill of effectively pre-BHL-hybrid one st-BHL (Pro-BHL), which reports that the study of physics with a pro-BHL model from High 1 Singarang. This research involves 86 students divided into three groups class X.

This research stressed an analysis of pro-B.H.L. influence analysis in the physical studiesof student C.T.s, Therefore in this research used pre-experimental with pre-test-test designs and post-test

This research aims to analyze the effectiveness of the Based-hybrid Problem
The pro-BHL research to increase the critical thinking ability of high school students physics lessons.
The study process with the ICT-based PBL strategy has a significant influence on concept understanding and the ability of the educational problems. The population is the entire state X-X-1st High School student 2012-2013. Sample 72 students divided into two classes taken with Random Purposive Sample. The instruments used are grains of concept understanding and the ability to solve problems in the form of an outline.
3.1. The lesson

The following research results were acquired from 13 journals based on the subject and matter discussed with a model learning subject. Once the analysis of 13 journals, then it's seven subjects and material discussion. The subject of a debate is physics, biology, technology, science, mathematics, automotive, and organization behavior. That three journals discuss physics subjects, and two journals discuss biology subjects. Another lesson is, technology, science, mathematics, automotive, and organization behavior is one journal discussion. Based learning's subject is a subject to a fundamental basic learning problem in increasing the critical ability of students' critical thinking of science. But the lack of influence on social subjects, the vital thinking student's ability to experience a good change after using model problem-based learning [13]. There are increased critical mindset and anxiety in learning progress with problem approaches-based learning. Besides, there's a correlation between the based learning problem syntax with essential indicators of thinking so that the based learning problem can push the critical ability of students [25]. The impact of model problem-based learning can positively affect necessary mindset and study results [17].

3.2. Research instruments

While other studies, even though it's not narrow, defines the problem-based learning's approach as solely supplies of problems or cases to students, they also do not adapt other vital components in the issue-based understandings. For example, [7], [7] does not give students a chance to collaborate on cases as [18], social constructive located in the heart of the problem-based learnings approaching students demanding a solution solutive and transaction. Barrows (1986) [19] Argues that the group's work is essential in problem-based learning because one of the primary goals of the problem-based learning approach is developing professional skills of student's future, and working together is one of these skills.

In a world that's more obscures geographic bulbs, collaboration is the key to confront the era of global competition. The teacher must realize this and understand that PBL can be the means to prepare the students to face the global challenges of the future. According to the leading U.B.S. researchers, the role of teachers is far more vital than the role of teachers in the traditional approach [20] and [18]. Teachers in the problem-based learnings approach should be more thorough in social engineering to ensure the nuances of learning that encourage collaboration and display cases that stimulate education's passion.

There seems to be a terrible understanding about the role of situation-based learnings in issue-based learnings. Of twenty studies, only three studies have the correct view of teachers as facilitators in the problem-based understandings. These studies are [21], [22]. While the teacher in the traditional teaching classes is the center of learning where teachers control matter, problems, and procedure solving students, teachers at the issue-based learnings “encourage students with meta-cognitive questions and give explicit directions to what to look for where to find information. The teacher provides an environment of studying central students by pushing independent learning lessons, integration lessons with previous knowledge, interacting with students, and guiding learning process” [2]. Thus, the Problem Based Learning teacher played a guide, not just a pitcher.

As Barrows said [20] and became consensus [18] [2]; the U.S. Walker made up five key elements obligated and supporting each other. Those elements are the learning-centered on students, teachers as facilitators, actual cases or unstructed, emphasis on long-term professional career skills, and cooperation among the educated experts of the group.
4 Conclusion

This literature review demonstrates the generally positive effect of educational critical thinking ability in PBL. Further research into the various applications of educational technology in PBL curricula is needed to fully realize its potential to enhance problem-based approaches in vocational education and to review aims to assess the implementation Problem-Based Learning (PBL) in increasing the critical ability of educated scientific methodology and tested the extent of sound scientific methods. The result of systematic literature reviews identified 22 research that the majority reported a significant influence of the implementation approach learning to the educated analysis of Indonesia.

References


H. Barrows, “Is it truly possible to have such a thing as dPBL?,” Distance Educ., vol. 23, no. 1, pp. 119–122, 2002, doi: 10.1080/01587910220124026.


An Evaluation Content In Curriculum 2013 At High School Stella Duce Dua Yogyakarta

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Abstract. This study aims to reveal: (1) the effectiveness of implementing the curriculum in the aspects of goal, content, learning activities, and evaluation, and (2) curriculum discrepancy, this research is a program evaluation using a discrepancy evaluation with the quantitative approach. The program evaluation refers to the national standard criteria for education 2016. The instrument validation used the Aiken formula, and Microsoft Excel with the Pearson formula and reliability used Alpha Cronbach. Data analysis uses descriptive statistics. The results of the study show that (1) the average percentage of the efficient application of curriculum objectives is 82%, curriculum content is 83%, learning activities in the curriculum is 81%, and curriculum evaluation is 88% curriculum evaluation; (2) the highest gap in the administration of the curriculum in High School Stella Duce Dua Yogyakarta is in the aspect of learning activities in the curriculum with the discrepancy of 19%.

Keywords: curriculum evaluation, discrepancy evaluation

1 Introduction

The 2013 curriculum, in its implementation, experienced multiple challenges and obstacles. At the beginning of the performance of the 2013 curriculum, there are pros and cons. It is caused by the assumption that it does not appropriate with the expectations and the condition in the field. As one of the defining factors of the success of the 2013 curriculum, the teacher still feels confused with the implementation of the 2013 curriculum [1], [2]. 2013 curriculum evaluation development needs to be done through the accompaniment and supervision sustainably. As part of the curriculum development, curriculum evaluation is conducted at the beginning of the idea of curriculum development, document development, and implementation until the curriculum result already impacted the community [3]. Curriculum evaluation is a crucial component to assess how far and good the implementation and the learning process goes. Besides, curriculum evaluation can measure the effectiveness level of implementation in the school. With the evaluation, it can be seen whether the target can be achieved or not so that the feedback will be obtained and the weaknesses can be fixed [4].
There are several essential goals in curriculum evaluation: (1) knowing how far a student can achieve the progress which already determined, (2) assessing the curriculum effectiveness, (3) defining factors of cost, duration, and curriculum success level [5]. All of the aspects lead to the success of educational goals through the curriculum. At least, there are two factors on the 2013 curriculum success. The first one is determinant. It is the suitability between the competence of the teacher and educational staff and between curriculum component and textbook. The second one consists of three elements, (1) availability of books as teaching materials and learning sources that integrate the curriculum formation standards [6].

Related to the importance of the teacher's role in the 2013 curriculum implementation, it aims to encourage the student to act better in observing, asking, thinking logically, and communicating what they got after through learning activity. On this side, the teacher plays a significant role in applying each learning process in the 2013 curriculum. The teacher's role as an implementer of the curriculum is affected by the support of academic staff to cultivate the curriculum implementation. Based on the description above, the researcher can identify the problem and obstacle that happen on the performance of the 2013 curriculum in SMA Stella Duce Dua Yogyakarta through the 2013 curriculum evaluation and follow-up the difficulties encountered in the implementation of the 2013 curriculum.

This evaluation is held to serve information about the good and the flawed process of the activity result. Evaluation is a systematic and continual process for gathering, describing, interpreting, and presenting information used as a basis for making decisions [7]. Safruddin and Arikunto said that evaluation is an activity to collect information about how things work, which later on the data used to decide the proper alternative way to take a decision [8]. Besides as an alternative way in making a decision, evaluation can interpret as an activity that is usually done for assessing the feasibility of a plan, implementation, and result of a program or policy [9]. Arifin said that evaluation is a systematic and sustainable process to define the quality (value and meaning) from the things based on the particular consideration and criteria to make a decision [10]. To make a decision, evaluation can be interpreted as a process to define the result achieved in several planned activities to achieve the goals. Based on Fitzpatrick, Sanders, and Worthen, evaluation is an activity to decide an object (valuable and acceptable) by identifying, clarifying, and amplifying the criteria [11]. All the requirements above are essential things. Evaluation is not only an activity to define the value, but Banner defines that evaluation as a learning program through collecting information. The information collected later on will be used as a base to make a decision [12]. As a base, evaluation has a procedure. Kossoff and Fink said that an evaluator uses a specific approach to assess service programs and provide information about the goals, expectations, activity, result, effect, and cost [13], [14], [15].

Malcolm Provus develops an evaluation model entitled Discrepancy Evaluation Model and use it in the research, which the subject of the curriculum. Generally, curriculum defines as an administration tool in the school to achieve the education goals. In a different meaning, the curriculum comes from Latin, *cure*, which means track, and *culum*, which means horse. Those points that curriculum is a track that a horse should pass while it is competing. The definition of the curriculum has various interpretations. As stated by Howell & Nollet, “a curriculum is a structured set of learning outcomes, or tasks, that educator usually goals or objectives. The student is expected to learn the information specified in the curriculum to have the skills needed to transition from childhood into adult life. The curriculum is intended to prepare students to succeed in society” [16], [17].
The curriculum is seen as a set of curriculum education goals and has an important role. Therefore, the education goal will achieve. Curriculum-based on Seel & Dijkstra defined that curriculum as a plan and instruction in a learning process (Sell & Dijkstra, 2004). The learning plan will give the student needs a detailed explanation of how the learning process is held. “Curriculum development results in the construction of resource units, unit plans, courses, and other curriculum guides those teachers and students can utilize to help them learn more effectively.” [18], [19]. The curriculum should be developed to simplify and facilitate the learning process [20].

The curriculum facilitates a learning process that needs to be explained in detail. Outline what students should learn in a specific school subject over the course of their study in a document published by an educational system. The curriculum makes all of the learning plans for students through the program caused by the education unit as a document that can bring students or lessons to achieve the education goals [20]. Based on Wright, Judith, & Johnson, the education unit designed and planned the curriculum with load materials taught to students [21]. The curriculum is seen as an element covering students, teachers, and learning method that is used.

Elements that consist in a curriculum are a design provided by the school to achieve education goals. Omar Hamalik states that curriculum is an education program provided by the school institution [22]. Based on the education program, students do various learning activities to support the development and growth, which adjust with the education goals. In other words, a curriculum is a school program that provides an educational environment to growing up. That is why the curriculum is arranged so that students can do many kinds of learning activities [21], [23], [23], [24].

The curriculum is not limited to several subjects but also all the things that can affect the development of students, such as school building, learning tools, library, school staffs, paintings, schoolyard, and many more. Based on the explanation above, curriculum activities are not only in the classroom but also outdoors. The modern view explains that extracurricular and extracurricular activity has no clear division. From the several explanations above, it can be concluded that curriculum is all held by an educational institution that involves all the elementary education and involves all the documents and learning processes related to the learning method used.

2 Research Methods

This research is categorized as evaluative research by using the discrepancy evaluation model. The discrepancy evaluation done by curriculum program involves goals, content, process, and assessment towards learning result based on Permendikbud 2016 No 20, 21, 22, 23. The result of the curriculum program can be seen through the evaluation combatively. Later on, the result will be compared with the criteria program as a reference of fruitfulness. After measuring and achieving the implementation program, it can be concluded that as information, it becomes a program recommendation for the school. The kind of approach in this research is helped by using the quantitative method [25]. Assessment and program results showed numeric symbols such as average, percentage, and frequency distribution. All the quantitative data from the various measurement scale analyzed using statistic descriptive [26]. This research is done in the Stella Duce Dua Yogyakarta senior high school with evaluation subject of all XI students who are done the learning process by using the 2013 curriculum. Number of students in the XI class is 127 students. In detail, the amount of respondent based on their own classes are XI IPA= 27, XI IPA 27, XI IPS 1 = 28, XI IPS 2= 28, XI BB= 17.
Later on, collected data analyzed by using descriptive quantitative analysis. Questioner data analyzed quantitatively while interview data and documentation complete the questioner data. The analysis result of the curriculum will compare with the criteria that are already set. It can be seen through Table 1.

<table>
<thead>
<tr>
<th>Score</th>
<th>Result Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>( X \geq \bar{x} + 1.96 \times S.D )</td>
<td>Very Positive/Very High</td>
</tr>
<tr>
<td>( \bar{x} + 1.96 \times S.D &gt; X \geq \bar{x} )</td>
<td>Positive/High</td>
</tr>
<tr>
<td>( \bar{x} &gt; X \geq \bar{x} - 1.96 \times S.D )</td>
<td>Negative/Low</td>
</tr>
<tr>
<td>( X &lt; \bar{x} - 1.96 \times S.D )</td>
<td>Very Negative/Very Low</td>
</tr>
</tbody>
</table>

### 2.1. Curriculum Component Analysis

Curriculum component analysis is done to know the category in every component already set in the school. Curriculum frequency distribution is based on the type of curriculum component [27]. It can be seen in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Range of Score</th>
<th>Category</th>
<th>Objectives N</th>
<th>Objectives %</th>
<th>Content N</th>
<th>Content %</th>
<th>Learning Activity N</th>
<th>Learning Activity %</th>
<th>Evaluation N</th>
<th>Evaluation %</th>
<th>Total N</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.67-5.00</td>
<td>Very High</td>
<td>104</td>
<td>82%</td>
<td>110</td>
<td>87%</td>
<td>100</td>
<td>79%</td>
<td>119</td>
<td>94%</td>
<td>108</td>
<td>85%</td>
</tr>
<tr>
<td>2</td>
<td>3.00-3.66</td>
<td>High</td>
<td>22</td>
<td>17%</td>
<td>14</td>
<td>11%</td>
<td>25</td>
<td>20%</td>
<td>6</td>
<td>5%</td>
<td>17</td>
<td>13%</td>
</tr>
<tr>
<td>3</td>
<td>2.33-2.99</td>
<td>Low</td>
<td>1</td>
<td>1%</td>
<td>3</td>
<td>2%</td>
<td>2</td>
<td>2%</td>
<td>2</td>
<td>2%</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>4</td>
<td>1.00-2.33</td>
<td>Very Low</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 2 shows the information on frequency distribution based on four curriculum components: goals, content, learning activity, and evaluation. Based on information in Table 2, it can be seen that the category of frequency curriculum goals is 82% which very high, 17% high, 1% deficient, 0% deficient. The category of curriculum content frequency is 87%, which is very high, 11% high, 2% low, and 0% deficient. Besides, the learning activity is 79% very high, 20% high, 2% low, 0% deficient. On curriculum evaluation is 94% very high, 5% high, 2% low, 0% very low. Information in Table 2 shows the 127 respondent's answers contain very high, high, low, very low.

The information in Table 2 shows the respondent's choice of answers in each category. Each category contains very high, high, low, and shallow criteria. One hundred twenty-seven respondents' responses can be seen in Figure 1.
Figure 1. Distribution of Respondent’s Answer

Figure 1 shows the average distribution of respondent's answers in choosing the score of curriculum component. The answer distribution not only gives information of four categories but also give information about the score distribution in each curriculum component, which is: range of score 3.67-5.00 or 85% very high, range of score 3.00-3.66 or 13% high, range of score 2.33-2.99 or 2% low, and content of score 1.00-2.33 or 0% deficient.

2.2. Analysis of Component Goals

Analysis of component goals of curriculum is a legal analysis of graduate competency [28]. Based on the analysis done on the curriculum goals component, the average result is 4.09, which in the interval of 3.67-5.00. The result of component goals can be seen in Table 3.

<table>
<thead>
<tr>
<th>Component Objectives</th>
<th>Total score</th>
<th>Average</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4165</td>
<td>4.09</td>
<td>82%</td>
<td>Very High</td>
</tr>
</tbody>
</table>

Based on the analysis result in table 3, the category is very high. The average is 4.09. Therefore, an objective component of the curriculum is in the very high class. The result can be seen in Figure 2.
Figure 2 displays achievement and curriculum discrepancy in the objective components. The research results explain that graduate competition has an average of 4.09 with 82% achievement and a difference of 18% so that graduate competency has a very high category.

2.3. Content Component Analysis

Content component analysis of curriculum is a formal content analysis [29], [30]. Analysis result on the curriculum content got an average of 4.16 in the 3.67-5.00 interval. The calculation of the content component of the curriculum can be seen in Table 4.

Table 4. Content Component of Curriculum

<table>
<thead>
<tr>
<th>Component</th>
<th>Total score</th>
<th>Average</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>4231</td>
<td>4.16</td>
<td>82%</td>
<td>Very High</td>
</tr>
</tbody>
</table>

Based on the result analysis in Table 4, the component content of the curriculum has a very high category. The average is 4.16. The content component of the curriculum can be seen clearly in Figure 3.

Figure 3 displays the achievement result of the component content curriculum. The result above explains that component content of curriculum has an average of 4.16, achievement 83%, and discrepancy 13%, so that curriculum content has a very high category.

2.4. Analysis Component of Learning Activity

Analysis of learning activity is a standard analysis process on the curriculum. Analysis result of learning activity in a curriculum get an average of 4.07, and the calculation is in the 3.67-5.00 interval. The result can be seen in Table 5.
Based on the analysis Table 5, the average learning activity component is 4.07, so that the element of the learning activity category is very high. The result can be seen in Figure 4.

The analysis of Figure 4 on the learning activity component shows that learning activity has an average of 4.07, achievement 81%, and discrepancy 19%, so that learning activity component has a very high category.

2.5. Analysis Component of Learning Result Evaluation

Curriculum evaluation analysis is a formal analysis of curriculum assessment. Based on the analysis done, the evaluation curriculum's average component is 4.38, and the calculation is in 3.67-5.00 intervals. The result can be seen in Table 6.

Table 5. Learning Activity Component

<table>
<thead>
<tr>
<th>Component</th>
<th>Total score</th>
<th>Average</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Activity</td>
<td>5174</td>
<td>4.07</td>
<td>81%</td>
<td>Very High</td>
</tr>
</tbody>
</table>

Figure 4. Component of Learning Activity

Table 6. Evaluation Component

<table>
<thead>
<tr>
<th>Component</th>
<th>Total score</th>
<th>Average</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>3898</td>
<td>4.38</td>
<td>88%</td>
<td>Very High</td>
</tr>
</tbody>
</table>
Based on the analysis result in Table 6, the category is very high. The average evaluation component is 4.38. Based on the development, the category of evaluation component of learning result is very high. It can be seen in Figure 5.

![Figure 5. Evaluation Component](image)

Based on Picture 5, the average component evaluation is 4.38 with the achievement of 88% and a discrepancy of 12%, so that evaluation component has a very high category.

3 Results and Discussion

3.1. Analysis Component of Discrepancy Curriculum

Analysis component discrepancy is an analysis of the decreased level of curriculum implementation. This analysis is done to know how high fell level in every curriculum component. Curriculum discrepancy can be seen clearly in Table 7.

<table>
<thead>
<tr>
<th>No</th>
<th>Component</th>
<th>Total Score</th>
<th>Average</th>
<th>Percentage</th>
<th>Discrepancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Objective</td>
<td>4165</td>
<td>4.09</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>Content</td>
<td>4231</td>
<td>4.16</td>
<td>83%</td>
<td>17%</td>
</tr>
<tr>
<td>3</td>
<td>Learning Activity</td>
<td>5174</td>
<td>4.07</td>
<td>81%</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>Evaluation</td>
<td>3898</td>
<td>3.38</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>4367</td>
<td>3.925</td>
<td>84%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Based on Table 7, the most significant discrepancy is in the component of learning activity, which is 19%, while the minor difference is in the evaluation component, which is 12%. Table 7 displays curriculum components that consist of objectives, content, learning activity, and evaluation (Bonee, 2014; Nordin, 2013). Based on the discrepancy in all curriculum components, the curriculum is a result curriculum that has not been done yet. Analysis of curriculum discrepancy can be seen in Figure 6.
Based on the analysis in Figure 6, every curriculum component has various discrepancies. Objectives components have an average of 4.09 with a distinction of 18%. The content component has an average of 4.16 with a contrast of 17%. Element of learning activity has an average of 4.07 with a discrepancy of 19%. The evaluation component has an average of 3.38, with a distinction of 12%. This result gives information that the highest difference of component curriculum is in learning activity which is 19%. Second, it is an objective component of 18%, and third is the content component which is 17%. Fourth, it is the evaluation component which is 12%. How big the discrepancy is can be seen in Figure 7.

Based on Figure 7, the discrepancy that has not been done yet in Stella Duce Dua Yogyakarta senior high school is 17%. In other words, a curriculum that has not been applied is 17%.

### 3.2. Objective Component

Implementing the curriculum component to the aspects of goals in Stella Duce Dua Yogyakarta's high school is 82% appropriate. It means that graduate competency standards in national education standard number 20 of 2016 have been applied in the school. A value of 82% is obtained from students who experience how a teacher uses graduate competency
standards directly. Most of the students said that teachers and schools in implementing the curriculum were right as the analysis results. Most students consider that schools and teachers are guided by graduate competency standards in implementing the curriculum.

3.3. Content Components

Implementing the curriculum component to the aspects of goals in Stella Duce Dua Yogyakarta's high school is 83% appropriate. It means that the content standards in the national education standard number 21 of 2016 have been applied in schools. This 83% suitability is obtained from the opinion of most of the students of class XI. It can be concluded that schools in implementing curriculum content are appropriate with the curriculum content standards, as evidenced by the analysis results.

3.4. Learning Activity Components

Implementing the curriculum component to the target aspects of Stella Duce Dua Yogyakarta's high school is 81% appropriate. The standard process contained in the national education standard number 22 of 2016 has been applied in schools. Opinions of most students from schools in the implementation of learning activities are appropriate with the standard process. It can be concluded that the analysis result, which achieves 81%, has been approved.

3.5. Learning Evaluation Component

Implementing the curriculum component to the target aspects in Stella Duce Dua Yogyakarta's high school is 88% appropriate. It means that evaluation of the curriculum in the national education standard number 23 of 2016 has been applied in schools. Most students' opinions in that school in implementing learning activities are appropriate with the standards of the process. The result of the analysis, which achieves 88%, means that it is already fit.

4 Conclusion

Based on the result of the research and discussion that has been explained, it can be concluded that: 82% learning objective which implemented by the teacher in Stella Duce Dua Yogyakarta's high school is very effective. The standard of graduate competency guides the implementation of the curriculum. 83% of learning content implemented by teachers in Stella Duce Dua Yogyakarta's high school is also very effective. 81% of the learning activity implemented by the teacher in Stella Duce Dua Yogyakarta's high school is very effective. The standard of graduate competency guides the implementation of the curriculum. 88% of evaluation of learning results implemented by teachers in Stella Duce Dua Yogyakarta's high school is very effective. The standard guides the implementation of the curriculum involves various aspects. Discrepancy of implementation curriculum is 17%, it is: (1) objectives discrepancy 18%, (2) Content Discrepancy is 17%, (3) Discrepancy of learning activity is 19%, (4) Evaluation discrepancy is 12%.

References


Potential Design of Photovoltaics-Pumped Hydro Storage System at Ex-Paser Mine Holes in East Kalimantan

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Abstract. East Kalimantan has potential for solar radiation of 4,453 kWh/m²/day which can be used to generate electricity using photovoltaics(PV). This utilization has challenges due to intermittent. East Kalimantan has a Paser Mine covering an area of 1,045,060.20 m² and 2,566,678.20 m² which can be intermittency solution used a Pumped Hydro Storage(PHS). This literature review aims to determine the potential design Photovoltaic-Pumped Hydro Storage based on configuration of the mine pit along with charge-discharge of the PHS, capacity of PV, and savings carbon emissions. The writing method uses Engineering Subject Headings include; Carbon Emision, Paser Mine, Photovoltaics, Pumped Hydro Storage, Renewable Energy thus obtaining 30 journals. It was found that the proposed system is capable of supplying electricity with a power of 68.034 MW for 5 hours/day. The system has 451,433 solar panels with a capacity of 115,508 MW on area of 731,321,737 m². The carbon emission saved reaches 90.991%/day.

Keywords: Carbon Emision, Paser Mine, Photovoltaics, Pumped Hydro Storage, Renewable Energy.

1 Introduction

The capital city of Indonesia will be moved to North Paser Regency and Kutai Kertanegara Regency, East Kalimantan [1]. In order for the plan to be realized properly, an in-depth study of the infrastructure of the new capital city is needed. One of these infrastructures is electrical energy infrastructure. Since the relocation of the capital city is targeted for completion in 2045, it is necessary to develop electricity infrastructure within 25 years to increase the supply of electricity by 1,175 MW to the two districts [2].

The new capital concept proposed by the government is a smart and green city [3]. This means that the fulfillment of energy for the new capital must be carried out by considering environmental factors. The fulfillment of environmentally friendly energy can be done by using renewable energy-based power plants. In addition to fulfilling this concept, the generation of renewable energy-based electrical energy is also in line with other Indonesian government targets in the form of a national new and renewable energy mix of at least 31% by 2050 [4].

The development of renewable energy-based power plants must be adjusted to the local energy potential in a region. One of the renewable energy potentials in East Kalimantan is...
solar energy. Solar energy in East Kalimantan reaches 4,629 kWh/m² [5]. With this potential, it is possible to build a photovoltaics (PV) system in East Kalimantan. However, the supply of electrical energy from solar energy can cause new problems, namely the electrical grid system becomes unstable [6]. This is due to the intermittent nature of solar energy. The intermittent nature is indicated by the very varied output of the PV system due to the changing intensity of sunlight.

To overcome this problem, an energy storage system is needed. In practice, there are various types of energy storage systems. One type of energy storage system is Pumped Hydro Storage (PHS). PHS is an energy storage system that is suitable for storing large amounts of energy for a long time. This is due to the low PHS self-discharge and long service life [6]. Unlike batteries which store energy in the form of chemical energy, PHS stores energy mechanically. PHS uses excess energy to pump water to higher ground and drain it back when needed. This PHS system is suitable to be used as an energy storage system for the new capital if a large-scale PV system is to be built to meet its electricity needs.

The challenge in using PHS as energy storage is the preparation of a special location. PHS has a low energy density so it requires a large volume of water reservoir [6]. In addition, PHS requires a place that can store water with a sufficient level (head) difference [6]. In East Kalimantan, there are ex-open pit mines that can be used as water reservoirs.

East Kalimantan has 632 ex-open pit mining pits that have been left unattended [7]. However, not all ex-mining pits can be used as PHS. Holes that can be utilized are holes that meet the criteria described in the previous paragraph. A pair of holes that meet these criteria are the holes studied by Mar’atus Sholichah Zuliana in his thesis "Analysis of Potential Utilization of Ex-Coal Mining Land as a Pumped Hydro Storage Electrical Energy Storage in the Paser Region, East Kalimantan". The volume of a pair of ex-mining holes studied, hereinafter referred to as Ex-Mining Hole X, is 32,552,281 m³ and 191,665,924 m³ with a maximum water level difference of 150 m [8]. The ex-mining pit also has a surface area of 1,045,060.2 m² and 2,566,678.2 m², so it has the potential to be used as a place to place solar panels with a floating PV concept.

The research conducted by Mar’atus Sholichah Zuliana focuses on analyzing the potential utilization of ex-mining pits as PHS, so that the PHS design does not include consideration of the profile of sunlight availability, load requirement profile, and PV systems that supply the PHS system. Therefore, in writing this scientific paper, the design of a PV system with a PHS energy storage system at the Ex-Mining Hole X is carried out whose operating scenario is adjusted to the profile of the availability of sunlight and the profile of load requirements.

2 Literature Review

2.1 Discharge Process

The discharge process is the process of generating electricity by PHS. When the discharge process takes place, water is flowed from the upper reservoir to the lower reservoir through a pipeline. The water will pass through the turbine and drive the turbine blades. The turbine rotates and is connected to a generator so that it can produce electricity. System discharge efficiency is systematically written as follows [9].

\[ \eta_d = \eta_T \times \eta_G \times \eta_P \] (1)

For the calculation of the electrical power of the system, it is obtained using equation (2) as follows
\[ P = \rho \times \eta d \times g \times Q \times h \]  
(2)

For the calculation of the system's discharge and energy, using equations (3) and (4)

\[ Q = \frac{v}{t} \]  
(3)

\[ E = \int P(t) \, dt \]  
(4)

2.2 Charge Process

The charge process is carried out when there is a surplus of energy where the energy produced is more than the energy needed. This charge process is carried out by pumping water into the upper reservoir. To maintain the sustainability of the PHS system, the volume of water pumped back up must be equal to the volume of water that has been lowered during the discharge process [10]

Calculation of pump power can be done with the following equation

\[ P_{pump} = \frac{\rho \times g \times Q \times h}{\eta_c} \]  
(5)

2.3 Turbine

There are various types of water turbines, such as Pelton, Francis, and Kaplan turbines. These turbines have their respective work areas so that the selection of the type of turbine needs to be adjusted to the existing conditions. Pelton turbines are used to generate hydroelectric power with high head and low discharge. Kaplan turbines work well when the water has a low head and high flowrate. Meanwhile, the Francis turbine is in between, i.e. it works well at medium head and discharge. The specific speed of the turbine is defined as follows [11]

\[ N_{spT} = \frac{N \sqrt{Q/P}}{(gHE)^{5/4}} \]  
(6)

2.4 Pump

Like turbines, pumps also consist of several types that work optimally in a certain working range. The parameter that becomes the reference for selecting the pump is the specific speed of the pump. Specific speed is defined as follows [12]

\[ N_{spP} = \frac{N \sqrt{Q}}{(gHE)^{5/4}} \]  
(7)

3 Research Methods

3.1 Method

This type of research is a literature review compiled using secondary data in the form of sources obtained based on the listed bibliography.

3.2 Subject of This Research

The subject of this research is obtain the data from journals in the form of research articles, guidelines, or electronic books such as from Scopus, Elsevier, Google Scholar, and
other technical and energy journals as many as 15 sources. The keywords used include Carbon Emission, Paser Mine, Photovoltaics, Pumped Hydro Storage, Renewable Energy.

3.3 Instrument

The research instruments used were Google Search Engine to search for data, Microsoft Word as a word processing application, MEdely for processing bibliography and Corel Draw X7 as a graphic design application to create designs.

3.4 Data Analysis

The analytical method used is a systematic literature review, namely an analytical method that identifies, examines, evaluates, and systematically develops existing research with a specific focus on appropriate and relevant topics. The analytical methods carried out are (1) determining the configuration of the ex-mining pit; (2) calculate the volume of water operated; (3) calculating the energy potential in East Kalimantan; (4) determine the configuration of PHS discharge and charge processes; (5) determine the configuration of the photovoltaics system; (6) selecting the main components of PHS in the form of pumps and turbines; (7) calculating PHS discharge and charge power; (8) calculate the capacity, number of photovoltaics modules, and land area required by the photovoltaics system; and (9) calculate carbon emission savings.

4 Results and Discussion

4.1 Mine Pit Configuration

In this study, the PHS system was built at Hole Former Mine X located in East Kalimantan. Data related to the volume and contours of ex-mining pits were taken from a thesis research conducted by Mar'atus Sholichah Zuliana. The research has conducted an analysis of the potential for PHS. However, the potential analysis has not considered the load requirements and the availability of solar energy. In addition, the study also did not design a PV system.

The volume of water operated daily in this study was 1/7 of the volume of water operated in the study of Mar'atus Sholichah Zuliana (9,437,167.98 m$^3$) [8]. This takes into account the existence of energy reserves stored in the PHS system if there is no energy supply from the PV system for a maximum of one week. Thus, the volume of water that is operated daily is 1,348,166.854 m$^3$.

4.2 Discharge Process Configuration

In this study, the PV-PHS system is designed to distribute electrical energy when a peak load occurs. The daily electricity load profile for the new capital is assumed to be the same as the Indonesian daily electricity load profile. Thus, the discharge of photovoltaics-PHS was carried out for 5 hours from 7.00 to d. 22.00 WITA.

The water discharge that flows from the upper reservoir to the lower reservoir during the discharge process can be calculated using Equation (3) where the discharge time is 5 hours and the volume of water operated is 1,348,166.854 m$^3$. Thus, the average discharge value is 74,898 m$^3$/s. The average discharge head is assumed to be equal to the median value between the maximum head (when the water level in the upper reservoir is 0 m and the water level in
the lower reservoir is -113.6 m) and the minimum head (when the water level in the upper reservoir is -9.515 m and the water level in the lower reservoir is -105.897 m) [8].

4.3 Charge Process Configuration

Through Equation (3) and the working volume in section 4.2, it is known that the water discharge that is increased during the charge process is 80.895 m³/s. The character of the water and reservoir is the same as the discharge process so that the density, gravitational acceleration, and head values are the same as during the discharge process.

4.4 Pump Selection and Calculation of Power and Energy Charge

The selection of pump type is based on the graph of specific speed, geometry, and pump efficiency in Figure 1 and Figure 2.

Fig 1. Relationship between pump specific speed and pump geometry [13]

Fig 2. Specific speed and pump performance curves [13]

However, since Equation (2.10) shows an implicit equation between specific speed and pump efficiency, an iterative calculation process is needed to determine the type of pump and power required. In the calculation, it is assumed that the pipe diameter, pipe efficiency, and motor efficiency are 6 meters, 96.50%, and 85.00% [11]. The alternator poles are assumed to be 16 pieces with an output power frequency of 50 Hz. Through all of equation, we get a PHS system with a charge system character shown in Table 4.4. Based on Figure 1, the suitable type of pump is centrifugal.
4.5 Potential of Solar Energy in East Kalimantan

In general, the value of the intensity of solar radiation in West Kalimantan ranges from 165-219 Watt/m\(^2\). The difference in solar radiation values at 7 (seven) West Kalimantan BMKG stations is not too significant because the station positions are located between 20LS to 20LU and the station elevations are almost the same [14]. The maximum intensity of solar radiation occurs in July and August, this is because July and August are the peak periods of the dry season so that solar heating to the earth's surface is most optimal. The minimum intensity of solar radiation occurs in December and January because this month is the peak of the rainy season where the growth of convective clouds is very much so that it blocks solar radiation to the earth's surface.

In utilizing the potential of solar energy for power generation, the unit is usually kWh/m\(^2\)day, so that the value of solar radiation in West Kalimantan is between 3.96 - 5.25 kWh/m\(^2\)day. This value is quite high, especially in Mempawah and Ketapang, considering the average solar radiation in Indonesia is 4.8 kWh/m\(^2\)day. This energy, when used to turn on 20 watt lamps, is able to turn on between 19 – 26 lamps assuming 10 hours/day usage and using a 1 m\(^2\) solar panel [14].

4.6 PV System Configuration

The solar panel selected in this system is the Sunmodule Plus SWA 315 Mono made by Solar World Americas Incorporate. The module was chosen because it has high efficiency. The specifications of this solar panel when tested at a temperature of 25 °C are as follows [15].

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Mono-c-Si</td>
<td>-</td>
</tr>
<tr>
<td>Number of Cells</td>
<td>60</td>
<td>-</td>
</tr>
<tr>
<td>Module Width</td>
<td>1</td>
<td>m</td>
</tr>
<tr>
<td>Module Length</td>
<td>1,62</td>
<td>m</td>
</tr>
<tr>
<td>Module efficiency</td>
<td>19.628%</td>
<td>-</td>
</tr>
<tr>
<td>Output power</td>
<td>317,968</td>
<td>W</td>
</tr>
<tr>
<td>Temperature</td>
<td>-0.406%</td>
<td>°C⁻¹</td>
</tr>
</tbody>
</table>

4.7 Calculation of the Number of Solar Panels Needed

The PV system must be able to supply the pump power and energy described in section 4.6. With a pump power of 115.508 MW, the output power of each module is 317.968 W, and the efficiency due to losses is 80.470%, the number of solar panels needed is 451,433 units. Based on the dimensions of the solar panels in Table 1, the number of solar panels requires an area of 731,321,737 m\(^2\). With an upper reservoir surface area of 1,045,060,200 m\(^2\) and a lower reservoir of 2,566,678,200 m\(^2\), the required land area for the PV system is smaller than the reservoir surface area, so that the PV system can be placed on the surface of the
reservoir with a floating PV concept. The illustration of the proposed system is shown in Figure 3. The figure is only an illustration that does not take into account the scale.

Fig 3. Illustration of the proposed PV-PHS system.

5 Conclusions

The proposed PHS design for Ex-Mining Hole X can match the availability of energy supply and load requirements. PHS can store electricity from a PV system with a power of 115,508 MW for 4,629 hours with an efficiency of 73.823%. PHS can supply electricity to the prospective new capital with a power of 68.034 MW during peak loads (5 hours) with an efficiency of 86.175%. The PV system has a capacity of 115,508 MW with 451,433 solar panels occupying an area of 731,321,737 m². Because the surface area of the PV system is smaller than the surface area of the PHS reservoir, the PV system can occupy the surface of the PHS reservoir as floating PV.

Acknowledgements

This article could not have been realized without the help of the Geological Engineering of Diponegoro University lecturer and Agricultural Industry University of Jember lecturer, so we thank you. And to all those who have helped the smoothness of conducting research, thank you.

References

overview on the potential and on the deployment perspectives of electric storage technologies. Germany: RWTH Aachen University; 2012.


How Overtourism in Bali Destroy Balinese Women's Livelihood

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\textbf{Abstract.} This study aims to explain the impact of overtourism in Balinese women livelihood with literature study method. Tourism in Bali is developing very fast. The rapid increase of tourists has led to the escalation of overtourism in Bali. Overtourism demands more infrastructure to fulfill tourist’s need. As a result of this demand, overtourism poses a threat to the sustainability of Bali. In a patriarchal society like Bali, women will be the group that is more affected by overtourism. This study shows that Bali tourism industry failed to empowered women and enforce their position as second class citizen. Gender discrimination and exploitation in tourism industry have become a daily reality for Balinese woman. For Balinese women, overtourism destroy their livelihood. This situation called for total reform in Bali tourism industry to prevent the return of ‘old normal’ overtourism.

\textbf{Keywords:} overtourism, women, exploitation

\section{Introduction}

Tourism has become an inseparable part of Balinese livelihood. Before the Covid-19 pandemic disrupts the tourism industry, the growth of tourists in Bali tends to increase. The development of tourists shows the economic benefit from the Bali tourism industry. \cite{1} The increase in tourists also requires a workforce in the tourism industry. Tourism in Bali creates 409 jobs to accommodate the needs of 1000 foreign tourists. \cite{2} To encourage the growth of tourism in Bali, the government of Indonesia facilitates a visa-free policy.\cite{3}

While tourism in Bali continues to bring profit in the economic report, not everyone can enjoy the benefit. Non-Bali business people mainly own the Bali tourism industry. This situation weakens the bargaining power of the local government and the Balinese people to control tourism on their own island.\cite{4} To prevent uncontrolled tourism development in Bali, the provincial government proposed a new concept of Cultural Tourism.\cite{5} Cultural Tourism is rooted in the Balinese philosophy of Tri Hita Karana, and this concept aims to prevent cultural exploitation in the tourism industry. Tourism should provide empowerment and sustainability in community building.\cite{6} Unfortunately, the local government's effort to avoid uncontrolled tourism often has to give in for the sake of national economic growth. As a result...
of uncontrollable tourism, the Bali tourism industry is now facing overtourism. Overtourism is a condition where unruly tourism triggers a conflict between local communities and tourists. Although overtourism brings excellent economic benefits through increasing tourist visits, overtourism pose a significant danger to Balinese livelihood. In a patriarchal society like Bali, Balinese women will be increasingly affected by over-tourism.

In the Bali tourism industry, women are not prohibited from participating, but most jobs available to women are still identical to domestic roles. Another option for Balinese women to enjoy tourism is entrepreneurship, but their husband's domination also hampers this option. Gender discrimination in the Bali tourism industry shows that tourism does not always empower women. Another impact of overtourism on Balinese women is sex tourism growth. Balinese women are trapped in exotic stigma since the beginning of Bali tourism development. As a result of this stigma, many Balinese women are trapped in sex tourism since their childhood. Sex tourism in Bali was born from tourist demand for Balinese women's exoticism. Some erotic local dancers fulfill this demand in Joged Bumbung dance. This condition shows that women are not empowered in the Bali tourism industry. The tourism industry exploits them. This study tries to discuss how overtourism destroye Balinese women's lifehood.

2 Research Methods

This research is a literature study with philosophical hermeneutics method. This study aims to explain the problem of overtourism in Balinese women lifehood. This research is qualitative research with a descriptive approach. The elements from this research analysis as follows:

2.1 Description
Explain the problem of overtourism in Balinese women lifehood.

2.2 Interpretation
Interpret the problem of overtourism in Balinese women lifehood.

2.3 Critical Reflection
Explain the critical reflection on the problem of overtourism in Balinese women lifehood.

3 Results and Discussion

3.1 A Brief History of Bali Tourism Industry

The development of the Bali tourism industry began shortly after the Dutch East Indies occupation in the early 20th century. The first international tourist in Bali is divided into two
categories, the wealthy Westerner who seek exotic islands as an escape from the horrors of World War I and Western artists who seek new experiences. [5] Some renowned artists such as Walter Spies, Miguel Covarrubias, and Gregor Krause write about their experiences in Bali.

To regulate the Dutch East Indies tourism industry, the colonial government established Vereeniging Touristenverkeer/VTV as the new tourism office in 1908. VTV became the authority to promote Bali tourism with an exotic image such as "island of shipwreck looters"- the law of Tawan Karang and "bare-chested island." [4] Books by Westerner artists in Bali also played a significant role in promoting Bali to European and American tourists. Bali tourism disrupted for the first time during World War II and the Indonesian War of Independence. [4]

After Indonesia's independence, the new government began to developed Bali to attract international tourists. The new construction project of I Gusti Ngurah Rai International Airport and Bali Beach Hotel in 1963-1969 increased international tourist arrival in post-independence Bali. [1] Under the New Order regime, the Indonesian government collaborated with French consultant Société Centrale pour equipment Touristique Outre Mer/SCETO to develop a blueprint for Bali tourism modern development. SCETO consultants, in their master plan, develop a long-term plan to prevent cultural exploitation in Bali tourism development. [5] SCETO recommends the cultural tourism pattern where tourists are invited to experience Balinese culture. The SCETO's master plan became the basis of New Orders' Repelita on Bali tourism development.

After Bali tourism brings a tremendous economic benefit, this situation triggers a shift from cultural tourism to mass tourism. [5] To promote Bali in a mass tourism pattern, the image of Bali as an exotic island is maintained to attract tourists in large numbers. This kind of promotion is the exploitation of Balinese culture. Nowadays, the Balinese community faces a dilemma between economic benefit from mass tourism that exploits culture or maintains Bali's sustainability. [4] In the mass tourism-oriented industry, Bali is facing a new problem: overtourism. Overtourism is an urgent problem that must be solved for the future of Bali.

3.2 Overtourism in Bali

The word "overtourism" originated from Skift's article in 2016. [8] Since 2016, several experts in the tourism industry have attempted to explain over-tourism. The World Tourism Organization defines over-tourism as a result of the lack of good management and regulation in tourism development. Overtourism is described as a condition when the increasing number of tourists disrupts local communities. Overtourism is an excellent problem in several renowned tourist destinations, and this problem triggers local communities' refusal of tourism. [7]

The tourism industry interprets overtourism differently. The tourism industry prefers to replace overtourism with "overcrowded." "Overcrowded" shows a sign of success, not a sign of a problem. [7] When the tourism industry interprets overtourism as overcrowded, the public awareness of overtourism is decreasing. This denial to face over-tourism as a problem also weakens the efforts to develop a new regulation. Current research by World Tourism
Organization concluded that "overcrowded" tourism in 8 renowned European cities does not require tourist restrictions. [8] This conclusion from World Tourism Organization's research shows that the efforts to sustainable tourism are still prolonged.

Overtourism is affected by the shift in the tourism industry's patterns from cultural tourism to mass tourism. In Bali, the tourism industry prefers mass tourism patterns because it brings more significant and faster profit. Bali's mass tourism causes damage to Bali, an increase in waste due to tourism, and overcrowding in some areas. [3] The rise in tourists also demands a plentiful supply of water, which triggers a conflict between the tourism industry and local communities. [16]

The reason why the Bali tourism industry prefers mass tourism is for economic benefit. Mass tourism also easier to bring profit than cultural tourism, as suggested by SCETO. Mass tourism is seen as a successful method to increase tourists in Bali. The visa-free policy applied to 30 major countries also contribute to the increase of foreign tourists in Bali. [3] Before the Covid-19 pandemic, tourists visit in Bali show a growing trend.

Table 1. Number of Foreign Visitor to Bali, 2010-2020. Source: BPS Bali [17]

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2 576 142</td>
<td>8,01</td>
</tr>
<tr>
<td>2011</td>
<td>2 826 709</td>
<td>9,73</td>
</tr>
<tr>
<td>2012</td>
<td>2 949 332</td>
<td>4,34</td>
</tr>
<tr>
<td>2013</td>
<td>3 278 598</td>
<td>11,16</td>
</tr>
<tr>
<td>2014</td>
<td>3 766 638</td>
<td>14,89</td>
</tr>
<tr>
<td>2015</td>
<td>4 001 835</td>
<td>6,24</td>
</tr>
<tr>
<td>2016</td>
<td>4 927 937</td>
<td>23,14</td>
</tr>
<tr>
<td>2017</td>
<td>5 697 739</td>
<td>15,62</td>
</tr>
<tr>
<td>2018</td>
<td>6 070 473</td>
<td>6,54</td>
</tr>
<tr>
<td>2019</td>
<td>6 275 210</td>
<td>3,37</td>
</tr>
<tr>
<td>2020</td>
<td>1 069 473</td>
<td>-82,96</td>
</tr>
</tbody>
</table>

Table 2. Number of Domestic Visitor to Bali, 2010-2020. Source: BPS Bali [18]

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>4 646 343</td>
<td>31,96</td>
</tr>
<tr>
<td>2011</td>
<td>5 675 121</td>
<td>22,14</td>
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<tr>
<td>2012</td>
<td>6 063 558</td>
<td>6,84</td>
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<tr>
<td>2013</td>
<td>6 975 536</td>
<td>15,06</td>
</tr>
<tr>
<td>2014</td>
<td>6 394 307</td>
<td>-8,35</td>
</tr>
</tbody>
</table>
The increasing number of tourists in Bali has proven to produce a tremendous economic benefit. Mastercard, in their report, shows that the Bali tourism industry supported 409 jobs to accommodate 1000 tourists. [2] In the same information, Mastercard offers the average tourist spending in Bali: USD 125/night. Under these circumstances, mass tourism will tend to be maintained because it brings excellent economic benefits. Although data from Mastercard shows substantial economic benefits for Bali's tourism industry, these benefits are enjoyed mainly by entrepreneurs from Jakarta and abroad. [4] It is estimated that 85% of economic profits from Bali tourism go to non-Balinese entrepreneurs. [3] The dominance of tourism entrepreneurs from outside Bali weakens the bargaining position of the Balinese people towards the future of Bali tourism.

The tendency to apply the pattern of mass tourism in the Bali tourism industry does encourage economic growth. Still, it must be monitored as a power shift from the local community to the tourism industry. The domination of the tourism industry, in the end, brought Bali tourism to over-tourism. Overtourism in Bali is a miserable condition where the Balinese are alienated from their island. Tourism has exploited Balinese culture and nature through mass tourism patterns. Overtourism shows the paradox of Bali being a leading tourist destination through its unique culture and losing its cultural identity. [5]

### 4 Results and Discussion

The over-tourism problem in the Bali tourism industry is a way of domination over Balinese livelihood. [5] In a patriarchal society like Bali, the impact of over-tourism is increasingly oppressed, Balinese women. Overtourism, born from profit-oriented over women empowerment, creates gender discrimination in the Bali tourism industry. The oppression of Balinese women due to overtourism also increases from preserving the Balinese women's image as exotic beings. This image triggers a steady demand from sex tourism that traps women as a sexual objects to satisfy tourist's demand for exoticism.

#### 4.1 Gender Discrimination in Bali Tourism Industry

In the tourism industry, women make up the majority of the worker in tourism. [19] It is estimated around 54% of workers in the tourism industry are women. However, World Tourism Organization's 2010 study found that women workers in the tourism industry earned 10-15% less than their man counterparts. [11] Part-time and low-skilled jobs still dominate
most women workers in the tourism industry. This situation contradicts the tourism industry's presentation, where tourism is always described to benefit both men and women economically. [13]

This condition also occurs in the Bali tourism industry. World Tourism Organization found income gap between men and women in Indonesia tourism is 30%. [11] This gap arises from many career restrictions applied to women in the tourism industry. [20] Although tourism creates jobs, not all vacancies are available to women. Jobs vacancies open to women are still identical with domestic roles such as waiters, maid, and finance staff. [10] This kind of job is seen as aligned with the Balinese's traditional values. Balinese communities demand that Balinese women prioritize their domestic duty such as taking care of their children and preparing offerings. [9]

Although the job vacancies for women are often still identical with domestic roles, some domestic-related jobs such as room cleaners are dominated by men. [10] Balinese women are also restricted to work the last shift, which lasts from night to morning. The night shift and room cleaners have great potential to get tips from tourists. This problem prevented Balinese women from pursuing their career potential.

Gender discrimination in the tourism industry has not changed much since 1998. [11] This alarming condition shows that the Bali tourism industry does not empower women. Tourism strengthens Balinese women's position with domestic roles. Another option for Balinese women to economically empower themself is entrepreneurship in the tourism industry. Balinese women mainly take this option after they get married.

Most married Balinese women who work in hotels and restaurants tend to resign and choose to open a stall. [12] This option is considered to be the best choice for married Balinese women because it allows them to carry out domestic tasks and at the same time earn a living. The problem with this option is their husband still dominates the business decision. Tajeddini noted that this condition arises from the assumption of patriarchal Balinese society, which considers women tend to be more emotional to make logical decisions. [12]

The entrepreneur's option in the tourism sector is still very dependent on tourist visits and tourism conditions. [12] When the tourist's visits increase, they will have many clients, but if there is a disruption in tourism, they will lose a client. The dependence of Balinese women entrepreneurs shows the unequal power relations between local communities and the tourism industry. When the tourism industry prioritizes tourists' growth and ignores the reality of tourism workers, gender discrimination and unequal power relations will continue to oppress Balinese women.

Tourism should encourage women's empowerment by not restricting women's potential in the tourism industry. [19] The economic benefit from tourism should be used to improved tourism worker's livelihood. [13] Nor should Balinese women get trapped in the invisible wall that limits their career potential. Ideally, tourism is an equal encounter between tourists and the local community, and tourism should empower local people-including women. [6] To create an ideal tourism industry, tourism development should place women as an equal part, not exploit them. This effort to improve the tourism industry is a long-term plan that requires us to continue discussing how the ideal gender power relation can be realized. [20]
4.2 Sex Tourism in Bali

In Bali tourism development, Balinese women have been used as a part of tourism promotion. VTV used the image of bare-chested Balinese women to formed Bali's exoticism image. [5] After Indonesia's independence, the idea of bare-chested Balinese women in the promotional poster is prohibited by the Indonesian government. [4] However, Balinese women are still trapped in the stigma of exotic sexual objects through promotions by the tourism industry.

One of the art performances that often exploit as an erotic show is joged bumbung. Joged Bumbung as a folk dance is used as an erotic dance to entertain the tourist. [15] Joged Bumbung dance was initially a part of sacred folk performances, but the tourist's demand for exotic Balinese art triggers the increasing erotic Joged Bumbung shows. Balinese community, in general, rejects erotic Joged Bumbung shows. This performance is considered taboo in Balinese culture. Erotic Joged Bumbung dance also finds a form of Balinese women and culture exploitation by tourism. As a result of rejection from the Balinese community, most erotic Joged Bumbung are mainly shown only to tourists. [15]

Economic needs cause the increase of Joged Bumbung performances. Most of the dancers and musicians involved in erotic Joged Bumbung performances because of their financial needs. The financial benefit from this erotic dance show makes it harder to solve the increasing sex tourism in Bali. Significant economic benefits from sex tourism are contributing to the growth of prostitution and human trafficking in Bali. [14]

Throughout 2017, Bali and Batam became the top sex tourism destinations in Indonesia. [14] The problem of sex tourism increasingly concerns because children become victims of sexual exploitation by tourists. In 2017 there was 404 victim of child sex tourism in Indonesia, 71% of the victims are girls. [14]

Sex tourism perpetrators are taking advantage of Balinese women's need to improve their family economic condition. A standard pattern by sex tourism perpetrators is promised to provide educational assistance such as school supplies and scholarships. [14] In current technological advances, sex tourism in Bali is growing fast in overtourism. The increasing number of tourists also increases the demand for sex tourism.

Weak regulation and supervision on Bali sex tourism combined with high dependence on tourism are the causes of vulnerability to Balinese women exploitation. [14] The steady growth in Bali sex tourism demand must be adequately addressed. The increasing sex tourism is the result of unequal power relations between Balinese women and tourism. The wealthy tourists have a high bargaining position against Balinese women. This unequal power relation is getting worse in overtourism.
5 Conclusion

This study tries to discuss the impact of overtourism in Bali on Balinese women. The focus of this research is how tourism failed to empowered women and enforce women's domestic role. Another problem of over-tourism is increasingly sex tourism in Bali. The tourism dominance over Balinese people has resulted in overtourism in Bali today. To formed sustainable tourism in Bali, reform in the tourism industry is urgently needed. The covid-19 pandemic that stopped tourists visit should be the right moment to realize reforms in the tourism industry and formed a new regulation to prevent "old normal" overtourism that oppresses Balinese local-especially women.

References


The Implementation of Scaffolding with The Breakout Room Feature On Zoom Meeting In Online Indonesian Mpk Learning

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Abstract. During the Covid-19 pandemic, online learning becomes a solution to overcome educational problems, especially in teaching and learning. Therefore, this study aimed to determine the appropriate application of scaffolding and classroom management and related to the current online learning conditions. One of the video conferencing applications that are suitable for scaffolding is the Zoom application with its breaking room feature. The present study model was a classroom action research that consists of four stages, namely planning, implementing, observing, and reflecting. The samples of the study were the second-semester students consisting of 4 study groups. Each group consists of 35-40 students. It was proven by the mean value of the pre-test (pre-cycle) with the highest cycle (post-test) score of 38.55 for the pre-cycle, 67.58 for the stage cycle 1, and 95.10 for the stage cycle 2. The students’ response to the scaffolding implementation with breaking rooms feature of Zoom Meeting in online Indonesian MPK learning was 79.6% in agree category, and 20.4% in the strongly agree category.

Keywords: scaffolding, breakout room feature on Zoom Meeting, online Indonesian MPK learning

1 Introduction

The government has issued various policies as the first step in anticipating learning activities during this pandemic, including regulation of Circular Letter Number 15 the Year 2020 concerning A Guidelines for Organizing Learning from Home in an Emergency for the Spread of Covid-19 and Circular Letter of the Minister of Education and Culture Number 4 the Year 2020 concerning An Implementation of Education in the Period Emergency Coronavirus Disease (Covid-19). The General Directorate of Higher Education (Ditjen Dikti) has implemented various strategies in handling the Covid-19 pandemic emergency, which is expected to make the learning process more meaningful. The General Directorate of Higher Education collaborates with multiple parties to assist and facilitate the implementation of online learning. It is started from the collaboration with internet quota service providers. It is free to access online learning through online IPs registered at the General Directorate of
Higher Education, platforms or media for conducting online lectures as well as training and capacity building for lecturers or the academic community to improve their ability in creating a material or continuous online learning content (General Directorate of Higher Education of Education Minister, Republic of Indonesia, 2020).

The educators and students can currently conduct teaching and learning activities from home through video conferencing, digital documents, and other online means. Thus, it is hoped that the teaching and learning activities will not affect the attendance levels of students and educators. Besides, learning objectives can be achieved, and learning materials can be fulfilled. In this industrial revolution era, educators cannot only use technology but also manage the class well. The management in this term means that educators can make the classroom atmosphere more interactive, fun, and innovative, integrated with technology. Educators must be able to use and integrate technology in learning. Suppose the teacher only explains the material and gives assignments without involving the adaptation of technology in it. In that case, it is feared that educators will not face the challenges of this 4.0 industrial revolution. The obstacles in online learning include the limitations of technology and the ability of educators to utilize technology (Kelly, 2015). The role of the teacher to form an agent of change is very necessary. Therefore, educators are needed in professionalism towards the 21st century (Purnomo, 2020).

According to Komori (2014: 149), learning management must be developed through teaching principles that consider systematic learning strategies, which are conceptual but practical-realistic and flexible in terms of learning interactions, class management, utilization of learning resources, and learning evaluation. According to Prince (2014: 234), class management is an effort to organize, actualize, and supervise a program that has been planned so that the teaching and learning process runs effectively, systematically, and efficiently. According to Djabidi (2016: 39), class management is an activity that is conducted deliberately, including some movements such as planning, organizing, actualizing, and supervising the teaching and learning process in the classroom to create optimal activities. However, with today's online learning, educators who use video conferencing applications as face-to-face learning have difficulty managing classes. Face-to-face learning is mainly done by using zoom and google meet the application. Indeed, the use of zoom is the most widely used in virtual meetings. However, the drawback is the limited face-to-face time for unpaid users. Therefore, many educators shift to use google meet to conduct face-to-face learning virtually.

The implementation of video conferencing application in learning still face various obstacles, including the difficulty of managing classes and less optimal mentoring. Virtual face-to-face classroom management is complex, especially for educators who have limitations in the use of technology. It makes students unfocused and less enthusiastic about attending the class. In addition, less optimal mentoring makes students lack understanding of the presented material. Sometimes they are lazy to ask questions because of limited time and unconducive class conditions. At the Ganesha University of Education, the class with the most students per class is the Personality Course (MPK). The MPK class consists of 40-45 groups in which each class consists of 35-40 students. Therefore, the management of the type must be considered. One of the lessons included in the MPK is Indonesian Courses. The Indonesian course is a compulsory subject for the students in the first and second semesters. The questionnaire results showed that many students complained about their class management and less optimal mentoring. Therefore, it is necessary to have proper scaffolding and class management related to the current conditions of online learning.
Scaffolding learning can be interpreted as providing structured learning support, which is conducted early to encourage students in independent learning. The provision of learning support is undertaken not continuously, but along with the increase in student ability, gradually educators must reduce and release students to learn independently. The implementation of scaffolding is the same as mentoring by educators in learning (Sudrajat, 2013). The performance of the structure in education considers the group's distribution to maximize mentoring by educators. In virtual face-to-face learning at university, the lecturers rarely divide students into groups. Several applications support the implementation of this group learning. One of them is zoom meeting. This video conferencing application is suitable for learning using scaffolding because it has a breaking room feature to divide students into groups. Students will join a virtual room in which only consists of a few students. This room will provide a good place for students to discuss, interact with each other, and have an opinion. Educators can join the created rooms so that mentoring can be more focused and intense.

Based on the explanation above, the researchers are interested in conducting a study on scaffolding with the breaking rooms feature of Zoom Meeting in Online Indonesian MPK learning which has never been done. The purpose of this study is to describe the implementation of scaffolding with the breaking rooms feature of Zoom Meeting in the Online Indonesian MPK learning, represent the success rate of scaffolding implementation with the breaking rooms of Zoom Meeting feature in Online Indonesian MPK learning, and find out students’ responses toward the implementation of scaffolding with the breaking rooms feature of Zoom Meeting in MPK Indonesian online learning. The significance of the present study is to increase the students’ insights about scaffolding learning by utilizing the breakout room feature. In addition, the practical relevance of the present study is to provide information about the implementation of scaffolding by using the breakout room feature in online learning.

2 Research Method

The objectives of the study were depended on the use of the method. In this classroom activity, the present study applied the John Elliot model (Purnamasari, 2020). The present study took place at the Ganesha University of Education in the second-semester students who took the Indonesian MPK course. The present study was conducted for six months for doing the observations, questionnaires, and interviews with the research sample, namely the second-semester students consisting of four study groups. Each group consisted of 35-40 students.

The data were collected by conducting observation, questionnaires, and interviews. The obtained data were collected from the word and consultation with the students. The data from the implementation of scaffolding with the breakout room features were taken based on group discussion activities and learning evaluation tests conducted by all students at the end of the cycle. Data analysis was performed at each cycle. The data analysis process consisted of data during field research and collected data. The collected data were in the form of group discussion activities, observations, and interviews.
3 Results and Discussion

The study results showed the implementation of scaffolding with the breakout rooms feature on Zoom Meeting in the Online Indonesian MPK learning, the success rate of scaffolding implementation with the breaking rooms feature on Zoom Meeting in the Online Indonesian MPK learning. Students' responses to scaffolding with the breaking rooms feature on Zoom Meeting in Online Indonesian MPK learning.

Results

The implementation of scaffolding with the Breaking Rooms feature on Zoom Meeting in the Online Indonesian MPK learning. This study consisted of two cycles repetitively covering cycle I and cycle II. In this study, each process included four stages as suggested by Suharsimi Arikunto, Suhardjono, and Supardi (2009: 16), as follows: (1) planning, (2) implementation, (3) observation, and (4) reflecting. The results of the reflection were used as the basis for determining improvement decisions in the next cycle.

The planning stages of the first and second cycles included some activities such as preliminary study and observation of the learning process on the Zoom Meeting room as well as students' learning outcomes, making learning designs based on scaffolding, making zoom meeting rooms for the learning process, compiling test questions to measure students' ability in mastering learning material, making answer keys to the evaluated questions, making observation sheets of students' activities in participating the Indonesian MPK learning activities, and conducting documentation. The implementation action discussed the material of the spelling system for 2 hours of lessons (2x35 minutes). In the learning process, it focused on students' understanding of the word form based on the rules of Indonesian. Initial, core, and closing activities were done at the implementation stage.

The initial activity began with the educator conducting the learning based on the design of the Zoom Meeting; the educator said greetings and invited all students to pray, the educator asked how the students were doing, the educator checked students' attendance, the educator delivered the material and learning objectives, the educator reviewed the last lesson, the educator gave instructions to prepare students' literature, and educators trained to teach media. The core activity consisted of three stages, namely the pre-reading stage, the reading stage, and the post-reading stage. The pre-reading stage begun with the educator presenting the article in learning. Then, the educator asked students to look at the displayed themes. The educator introduced a text for writing analysis. Next, the educator activated the breaking room feature on Zoom and divided the students into several groups. The reading stage began with the students reading the displayed text by the educator. The educator guided the students to do reading activities, and the students checked the predictions by looking for the truth and mistakes of the forecast. At the post-reading stage, the educator allowed students to discuss their findings with their teammates in the breakout room. The educator accompanied them, oversaw the course of the discussion, and rectified the wrong understandings in the debate. The students concluded the discussion session, and the educator turned off the breakout room feature. Then, the educator asked again about the text that students had read. Then, the students presented the results of their analysis.

The closing activity began with the educator providing the conclusions from the learning activities carried out. The educator closed the learning activities and reminded students to learn the following material. The educator closed the lesson by praying and saying goodbye. The observation was conducted to observe the students' behavior and attitudes following the
Indonesian MPK course by applying scaffolding-based learning and utilizing the breakout room feature on Zoom Meeting. This stage was done in the learning process or at the action stage. The observation was directed at the points based on the set indicator. The results of observation of students' attitudes and behavior during the lesson were conducted as material for consideration in reflecting. From the data of students' words during learning, it could be seen that: a) the involvement of students in taking lessons had begun to increase. Students were already active in learning activities. Students had already experienced learning based on scaffolding and breakout room features used in learning activities and b) increasing students' enthusiasm in taking online lessons.

The final stage was reflection. Reflection was an evaluation stage of the planning and implementation of learning that had been implemented. Reflection was done to determine the advantages and disadvantages of planning and executing the study. During the learning process, several obstacles were found, namely: 1) the geographic location of students was not the same so that it was constrained by the network, 2) some students still did not understand the use of zoom media, 3) less conducive learning caused by the students' enthusiasm in discussion sessions, and 4) some students were still late to follow learning.

The success rate of scaffolding with the Breaking Rooms feature on Zoom Meeting in Online Indonesian MPK learning was very good. The mean score of the pre-test (pre-cycle)
was proven by the highest cycle score (post-test). The obtained average score was 38.55 for the pre-cycle, 67.58 for cycle 1, and 95.10 for cycle 2. The effectiveness test of the Scaffolding Application with the Breaking Rooms Features on Zoom Meeting in the online Indonesian MPK learning was done by giving questions in the form of pre-test questions and the highest post-test questions to determine the comparison of the obtained scores by students before and after implementing the application of scaffolding with the breaking room feature on Zoom Meeting in MPK Indonesian online learning. To see the changes, the result of students’ tests could be presented in the following table.

(1) Table of the Result of Online Indonesian MPK learning Test with the application of scaffolding and breakout room on Zoom Meeting

<table>
<thead>
<tr>
<th>Score</th>
<th>(f)</th>
<th>fx</th>
<th>%</th>
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<tbody>
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<td>100</td>
<td>2%</td>
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<tr>
<td>55</td>
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<td>65</td>
<td>15</td>
<td>975</td>
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<td>70</td>
<td>28</td>
<td>1960</td>
<td>28%</td>
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<td>4%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td>6758</td>
<td>100%</td>
</tr>
<tr>
<td>AVERAGE</td>
<td></td>
<td>67.58</td>
<td></td>
</tr>
</tbody>
</table>

(2) Table of the Result of Online Indonesian MPK learning Test with the application of scaffolding and breakout room on Zoom Meeting

<table>
<thead>
<tr>
<th>Score</th>
<th>(f)</th>
<th>fx</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>9</td>
<td>765</td>
<td>9%</td>
</tr>
<tr>
<td>90</td>
<td>20</td>
<td>1800</td>
<td>20%</td>
</tr>
<tr>
<td>95</td>
<td>31</td>
<td>2945</td>
<td>31%</td>
</tr>
<tr>
<td>100</td>
<td>40</td>
<td>4000</td>
<td>40%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td>9510</td>
<td>100%</td>
</tr>
<tr>
<td>AVERAGE</td>
<td></td>
<td>95.1</td>
<td></td>
</tr>
</tbody>
</table>

The results of students’ responses were shown in the following diagram.

After implementing the scaffolding with the breaking room features on zoom meeting in the Online Indonesian MPK learning involving 100 students as respondents, based on questionnaires and interviews given to students as a population, the following responses were obtained.

Diagram 01. Students’ responses to network constraints in Online Indonesian MPK learning
The statements related to network constraints in Online Indonesian MPK learning experienced by students stated that 46.7% in agree category, 40% in disagree category, and 13.3% in the strongly agree category. This shows that the reality in the field, network constraints often interfere with online learning, especially in Indonesian language MPK learning. Interviews with students randomly stated that the geographical location and electronic means used caused difficulties in participating in online learning activities.

Diagram 02. Students’ focus in participating the Indonesian MPK learning before using Breakout room on Zoom Meeting

The lack of students’ focus in online learning stated that 68.9% in the agreed-on category, 20% in disagree category, and 12.1% in the strongly agree category. It showed that the students did not focus on online learning before using the breakout room on Zoom Meeting. The interviews with random students stated that the sizeable virtual meeting room online and contained many participants caused the students’ focus to decrease.

Diagram 03. The need for mentoring discussion activities (scaffolding) during the Online Indonesian MPK learning
The statement regarding scaffolding in Indonesian MPK learning stated that 79.6% in agree category and 20.4% in the strongly agree category. It showed that the students needed a frame in online education, especially Indonesian MPK. The application of scaffolding could increase students' motivation and creativity because of the external encouragement provided by educators. Students had a better understanding of the material in the discussions assisted by mentoring.

Diagram 04. The effectiveness of breakout rooms in mentoring discussions (scaffolding)

The statement related to giving the opportunity in small group discussions with the breaking room feature in the Indonesian MPK learning stated that 80% agree on category and 20% strongly agree on the type. It showed that the students in actual situations needed to discuss with small groups in online learning, especially Indonesian MPK. With the distribution of virtual rooms to small groups during education, students would be more active in expressing their opinions. Exchanging opinions was critical in learning because it could improve students' critical thinking and speaking skills.

Discussion

The pre-cycle or pre-test scores of students were initially low, but now it tended to increase slowly. The activities of students participating in the learning process also increased from being passive to being active. Students also began to actively express their opinions so that the quality of student learning outcomes was very satisfying. Based on cycles I and II data, scaffolding with the breaking rooms features on Zoom Meeting in Online Indonesian MPK learning improved student's learning outcomes. The advantages of scaffolding in Indonesian MPK were as follows: increasing students’ motivation and interest in learning,
turning on online learning activities, helping students to focus more on achieving goals, reducing student laziness, and controlling student activities. The support for students in completing the learning process could be in the form of student activeness in the learning process, learning strategies, diversity of learning models, experiential guidance framings, learning facilities, and the learning climate of students.

Based on the data collection analysis, it showed that there was an enhancement. The mean score of pre-cycle was 70%, cycle I was 79.5%, and cycle II was 95.1%.

![The Average of Pre-test, Cycle 1 and Cycle 2](image)

Based on the chart above, it could be concluded that the pre-cycle or pre-test scores of students, which were initially low, tended to increase slowly. The students' activities in participating in the learning process also increased from being passive to being active. Students also began to actively express their opinions so that the quality of student learning outcomes was very satisfying. Based on cycles I and II data, scaffolding with the breaking rooms features on Zoom Meeting in Online Indonesian MPK learning improved student's learning outcomes. The advantages of framing in Indonesian MPK were increasing students' motivation and interest in learning, turning on online learning activities, helping students to more focus on achieving goals, reducing students' laziness, and controlling students' activities. The support for students in completing the learning process could be in the form of students' activeness in the learning process, learning strategies, diversity of learning models, experiential guidance from learners, learning facilities, and the learning climate of students.

The educators were not required to have all knowledge, but they should have sufficient knowledge based on what focus more provide learning support to the students, where to get it, and how to interpret it. The educators were expected to act based on deep thinking, work independently and collaboratively with one another, and be ready to contribute a critical consideration. They were expected to become people with broad knowledge and deep understanding. The breaking room feature on zoom in the learning process helped the educator's group of students and provided motivation based on the scaffolding principle. The educators had full authority in overseeing the course of the discussion, and the students had the opportunity to express their opinions. The silent students had an excellent opportunity to deliver their thought in a smaller space. The use of the breaking room feature on zoom gave the students and educators a benefit in undergoing the learning process and getting maximum results. Based on the development of the tests, the student also showed good responses in the implementation of scaffolding activities with the breaking room feature on zoom in the Online
Indonesian MPK learning. This positive response further confirmed a need for updates to the online learning process to increase the students’ enthusiasm for learning.

4 Conclusions

Based on the results of data analysis, it can be concluded as follows: The application of scaffolding with the breaking rooms feature on Zoom Meeting in Online Indonesian MPK learning undergoes two cycles of action using the John Elliot model, which consists of a planning stage consisting of planning things that will be prepared in the learning process, an implementation which is the core part of the activation process for students, observation consisting of re-observing patterns before and after the implementation of the action, and reflection consisting of the evaluation results of the actions both good results and constraints. The success rate of scaffolding implementation with the Breaking Rooms features on Zoom Meeting in Online Indonesian MPK learning is excellent. It can be seen from a mean score of pre-test (pre-cycle) with the highest cycle score (post-test). The obtained average score was 38.55 for the pre-cycle, 67.58 for cycle 1, and 95.10 for cycle 2. Students’ responses to the effectiveness of the application of scaffolding with the Breaking Rooms features on Zoom Meeting in Online Indonesian MPK learning is 79.6% in agree category and 20.4% in strongly agree on category. It shows that students agree with the breaking room feature on the zoom because it provides discussion space and intense external motivation from educators.

There are some suggestions for some parties. For educators as teaching staff, it is expected that the educators use scaffolding to strengthen the learning, especially Indonesian MPK, to make students have creative ideas in education. Educators must take advantage of the context around students by collecting data and motivating students to maximize their potential. In addition, educators must take advantage of the various features available in learning media, such as the Zoom Meeting. By utilizing the breaking room feature on Zoom Meeting to the fullest, educators can create a fun online learning atmosphere for students and be well controlled through mentoring. Students should also follow the directions or instructions of educators to achieve learning success based on the learning objectives. It is hoped that other researchers can improve the application of scaffolding with the breaking rooms feature on Zoom Meeting in Online Indonesian MPK learning. In addition, the result of the study can be used as a reference, guideline, and comparison material to add to the following research.

References


Kirkpatrick’s Evaluation and Importance Performance Analysis of Tax Instructor Functional Distance Training

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Abstract. This study evaluates Tax Instructor Functional Distance Learning implementation Class II of 2021 conducted by Yogyakarta Financial Education and Learning Center to find out how it is organized. The research method is qualitative method which is evaluating the implementation of the class. The evaluation is using Kirkpatrick learning model at level 1 and level 2 and Importance Performance Analysis (IPA). Level 1 Kirkpatrick’s evaluation showed that the learning implementation performance was conducted very well. IPA analysis shows that all learning participants' perceptions of learning teachers are good and the lecture material is included in quadrant III, which indicates that it is good. Most of participant satisfied with this learning. Level 2 Kirkpatrick’s evaluation shows that the learning results are promising. Participants who pass have the score ‘good’ and ‘very good’. So the result is the Basic Tax Instructor Functional Distance Learning Class II of the 2021 year, conducted by the Yogyakarta FinancialEducation and Learning Center online from 8 to 17 February 2021 has been well organized, regarding the teachers and the learning metrics. Training participants have also provided excellent evaluation results. However, the long training time until the evening needs to be reconsidered. Smooth internet signal is also still an obstacle in this training. If the situation allows, it is recommended that this training be carried out face-to-face.

Keywords: covid-19, distance learning, evaluation, Importance Performance Analysis, Kirkpatrick.

1 Introduction

Indonesian tax collection has its characteristics and features; among others, implementing tax obligations lies with the Taxpayer's community. The government plays an active role in running administrative control of tax collection, including guidance, research, supervision, and application of administrative sanctions. Taxpayers' community development can be done through various efforts, including providing information on taxation knowledge, either through mass media or direct communication in the community. Although the government (Directorate General of Tax/DGT) has extension duties, there are no Functional Tax Extension Officers. In other hand, things that still hinder the implementation of the role of the Tax Auditor, among others, is the refusal of the Taxpayer [1]. This can happen as a result of taxpayers not understanding the tax rules.

The Regulation of the Minister of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia Number 49 of 2020 concerning the Functional Position of a Tax Extension Officer revokes the Regulation of the Minister of State for Administrative Reform
Because it is not by legal developments. In the preamble, it is stated that the purpose of determining the Functional Tax Instructor position is for career development and enhancing the professionalism of Civil Servants who have the scope, duties, responsibilities, and authority in carrying out extension duties in the taxation sector, as well as to improve organizational performance. Meanwhile, to achieve the target of state revenue from the taxation sector, real efforts are needed to increase voluntary compliance by taxpayers and increase public trust [2]. This is one of the duties of a tax instructor.

Functional Tax Instructor Officers are civil servants who the authorized official gives complete duties, responsibilities, authority, and rights to conduct tax education. Competency Standards for Tax Instructor Functional Positions are the knowledge, skills, and behavior required to perform a Tax Instructor Functional Position. To improve competence and professionalism, the Tax Trainer must be included in learning according to the learning needs analysis and performance appraisal results. Financial Education and Learning Agency (FETA) has the task of implementing education, knowledge, and competency certification in state finance, one of which is learning and accreditation for Tax Extension Officers through Tax Education Functional Learning. For a good teaching it needs a dynamic movement, always changing both in organizing activities and teaching methods which consist of creating an atmosphere, technique, style, content, and things that are not too far from students and planning teaching and learning systematically [3].

The Covid-19 pandemic period requires that Tax Educator Functional learning be done by adjusting new habits conducted remotely via online media. E-learning is a growing phenomenon that provides unique opportunities to tackle challenges. Participants agreed that E-learning is more economical, has better content, and a more flexible work schedule. However, the project remains facing challenges in unmet learning needs, irregular governance, inadequate hardware and software, an unsupported environment, and a lack of incentive mechanisms [4].

Based on the Terms of Reference for the Basic Tax Instructor Functional Program, it is stated that the purpose of Distance Learning is to increase the knowledge and skills of the Directorate General of Taxation's Functional Tax Instructor candidates in conducting counseling and printing taxation instructors to have knowledge competencies skills and behavior by the competency standards of the position required for a person assigned as a tax instructor. Learning evaluation can be done using Kirkpatrick's evaluation model. Kirkpatrick's model is used to evaluate the implementation of training or In-Service Learning and Countenance Stake to evaluate the overall program [5]. Donald Kirkpatrick's (KP) model is one of the most widely recognized models for the evaluation of educational programs covering four levels (reaction, learning, behavior, and outcome) [6]. Level 1: Reaction, measures how the trainees react to the implementation of the teaching; Level 2: Learning, measures how far they learn or capture new knowledge and insights; Level 3: Behavior, which is how far the attitudes and behavior of the participants have developed after receiving learning. And Level 4: Result, which measures the final result of the teaching. Lee et al. 1 was used the IPA method to understand the importance adolescents attach to health and whether this was reflected in their healthcare performance. IPA involves the following procedures: (1) determining what attributes to measure, (2) separating the critical size and performance size, (3) positioning the file vertical and horizontal axes on the grid, and (4) analyze its performance-importance network [7].

Essential Tax Instructor Functional Distance Learning is done at the Tax Learning Center based in Jakarta and several Financial Education and Learning Centers in Indonesia. This study will evaluate the implementation of Basic Tax Extension Functional Distance Learning Class II of TA 2021, held at the Yogyakarta Financial Education and Learning Center from 8 to 17 February 2021. This research is using Kirckpatrik evaluation models level-1 and level-2 and use
the Importance Performance Analysis (IPA). Level-1 evaluation: is conducted about the Implementation and Evaluation of Teachers by participants, while level-2: is in the form of Evaluation of Learning Results. The Kirkpatrick Model is an established and recognized approach which provides structure and does not take much time to manage [8].

2 Literature Review

There are three complementary terms related to evaluation, which are: 1) evaluation is an effort to determine the value or amount carefully, responsibly, uses strategy, and can be accounted for; 2) measurement refers to the activity of comparing something with a specific unit of measure, it is quantitative, and 3) assessment is a noun of value. Suhasini Arikunto and Cepi Safruddin Abdul Jabar concluded that evaluation is an activity to collect information about working used to determine the suitable alternative in making a decision [9]. Refer to S. Eko Putro Widoyoko; some terms are often used and related to evaluation, namely tests. The four of them are often confused with each other, even though they have different meanings. The test is the narrowest part of evaluation as a measuring tool for obtaining information on learning outcomes and training that requires answers or responses [10]. The purpose of learning evaluation is to determine the effectiveness and efficiency of the learning system, which includes: 1) learning strategies, 2) curriculum programs, 3) learning, and 4) providing data that helps in decision making [11].

Learning evaluation needs to be done by paying attention to learning principles using qualitative methods or a mix of methods better to understand the implementation of learning [12]. Learning evaluation is essential to determine whether the learning system effectively develops a learning system [13]. Pusdiklat needs to conduct assessments to determine the impact of learning on participants' performance and educational institutions using an evaluation model [14]. Kirkpatrick introduced a four-level evaluation model, which is: 1) Level-1: Reaction to measure customer satisfaction; 2) Level-2: Learning to measure the transfer of learning; 3) Level-3: Behavior to measure the extent to which knowledge and skills are applied in work; and 4) Level-4: Results to measure the final result that occurs after participants joined the learning [15]. The evaluation in this study used Kirkpatrick's four-level evaluation model, but only at level-1 and level-2. Learning evaluation using the Kirkpatrick model can determine the effect of graduate work performance on increasing income and position as input to learning institutions [16]. The development of Kirkpatrick's evaluation model can measure and analyze the reaction, learning, behavior, and outcome variables [17]. It is suggested that an evaluation using the Kirkpatrick model can demonstrate the effectiveness of the training evaluation [18].

Learning evaluation is also determined by participant satisfaction which can be analyzed using the Importance Performance Analysis quadrant. According to Martilla, the way to use Importance Performance Analysis is: 1) determining the attributes to be measured; 2) separating the size of importance and the measure of performance; 3) positioning the vertical and horizontal axes; 4) Determine the central value; 5) analyze the performance-interest results; and 6) formulating a strategy based on the results of the analysis [19]. According to Martilla & James, the Importance Performance Analysis quadrant was adapted in the Regulation of the Head of BPPK Number PER-5/PP/2017 concerning Guidelines for Learning Evaluation in the Ministry of Finance as Figure 1. The result of IPA divided on four Quadrant, there are Quadrant 1, Quadrant 2, Quadrant 3, and Quadrant 4 as follow.
Online learning is one of the solutions offered so that knowledge can be done during the Covid-19 pandemic period [20]. There are many benefits of online education, one of them is not constrained by distance and time, but it is necessary to fulfill the infrastructure aspects in providing access points [21]. The implementation of remote learning in the Bangka Regency using the zoom application can facilitate the absorption of learning materials and successfully achieve learning objectives [22]. The performance of online education is quite effective in increasing participant understanding. To be more effective, it needs to be improved into blended learning, applications, facilitators, time implementation, and the need to adapt traditional learning elements [23]. Parallel online learning with developments in information and communication technology, especially computers and the internet, its success is influenced by the infrastructure, content, and information provided, and the readiness of system users, including management and staff [24].

### 3 Research Methods

This research is qualitative method which according to Lofland & Lofland, the main data sources are words and actions, the rest are additional data such as documents [25]. The research subject is Basic Tax Instructor Functional Distance Learning for TA 2021 from 8 to 17 February 2021 at the Yogyakarta Financial Education and Learning Center. The design of this study uses the Kirkpatrick Level-1: Reaction learning evaluation model to measure the satisfaction of learning participants towards the learning implementation and teaching instructors, which are analyzed using the Importance Performance Analysis quadrant, and Level-2: Learning to measure the learning process in the transfer of learning. The data collection instrument is a questionnaire using a Likert scale with an expectation rating scale: 1: Not Important; 2: Less Important; 3: Quite Important; 4: Important; and 5: Very Important, while the reality rating scale is: 1: Not Good; 2: Not so good; 3: Good Enough; 4: Good; and 5: Very good. In addition, the questionnaire also provides open answers. The answers to the questionnaire were then tabulated to be analyzed using the Importance Performance Analysis quadrant. To deepen the evaluation
results through questionnaires, data collection was also carried out face-to-face at the end of the training. The collected data were analyzed logico-inductively, a thought process that used logic to understand patterns and trends in data through three stages: coding, describing the main characteristics and interpreting the data [26]. The results of data analysis are presented qualitatively-descriptively.

4 Results and Discussion

Learning Participant Profile

The number of participants was 28 people, consisting of 14 men and 14 women. The gender distribution of participants was balanced; each female and male participants were 14 people or 50%. The profile of learning participants based on their age is as shown in Figure 2.

![Figure 2. Profile of Learning Participants by Age](image)

Based on Figure 2, it is known that the dominant participant's age is 36-40 years old, with 10 participants (36%) and 46-50 years old is 7 participants (25%). It means that most of the learning participants are senior employees. Based on administrative data in the office, known that the distribution of places where the learning participants took part in the learning was spreaded in the following areas: 1) Yogyakarta Special Region: Bantul 2 people; 2) Central Java: Semarang 4 people, Jepara 2 people, Cilacap 2 people, Kebumen 2 people, Sukoharjo 2 people, and 1 each at the Regional Office of DJP Central Java II, that are Demak, Blora, Karanganyar, Klaten, Kudus, Magelang, Pekalongan, Purbalingga, Purwokerto, Purworejo, Salatiga, Surakarta, and Tegal. The dominance of the distribution of participants comes from the Central Java region. Remote learning allows participants from the various areas to follow without leaving their city because the teaching was held at the Covid-19 pandemic.
Level-1 Evaluation: Learning Delivery

The analysis results are based on a questionnaire with eight questions of Interest Expectations, and Perceptions / Reality of the Learning are shown in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Expectations of Interests</th>
<th>Perception / reality</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Suitability of learning materials with the expectation/needs of participants</td>
<td>4.32</td>
<td>4.72</td>
<td>0.40</td>
</tr>
<tr>
<td>2</td>
<td>Teaching materials are easy to be understood</td>
<td>4.44</td>
<td>4.64</td>
<td>0.20</td>
</tr>
<tr>
<td>3</td>
<td>The suitability of learning methods with distance Learning material</td>
<td>4.32</td>
<td>4.52</td>
<td>0.20</td>
</tr>
<tr>
<td>4</td>
<td>Sufficient time for conducting Distance Learning with the amount of material provided</td>
<td>4.40</td>
<td>4.36</td>
<td>-0.04</td>
</tr>
<tr>
<td>5</td>
<td>The readiness of the organizers in serving the participants during the Distance Learning process</td>
<td>4.24</td>
<td>4.76</td>
<td>0.52</td>
</tr>
<tr>
<td>6</td>
<td>Sufficient time in conducting quizzes and exams</td>
<td>4.40</td>
<td>4.28</td>
<td>-0.12</td>
</tr>
<tr>
<td>7</td>
<td>The Distance Learning Facility is accessible</td>
<td>4.44</td>
<td>4.48</td>
<td>0.04</td>
</tr>
<tr>
<td>8</td>
<td>The Distance Learning Facility is easy to use</td>
<td>4.44</td>
<td>4.60</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>4.38</td>
<td>4.55</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Based on Table 1, it is known that the highest gap is in the item "The readiness of the organizers" in serving participants during the Distance Learning process of 0.52; then the "suitability of the learning material" with the expectations/needs of the participants was 0.40; 'Teaching materials are easy to be understood' of 0.20; "The suitability of the learning method with distance learning material" of 0.20; 'Distance Learning Facility is easy to use' of 0.16; 'Distance Learning Facility accessible' of 0.04, and the item with the smallest gap is "sufficient time for holding distance learning with the amount of material" given is -0.04; 'The time sufficiency in doing quiz or exam assignments" is -0.12.

Among the eight evaluation items, the item 'time sufficiency in conducting distance learning with the amount of material provided and the item 'time sufficiency in assigning quizzes or exams' should be revised and become material for evaluation and improvements in the following learning due to gaps between participants' expectations and realization still much.

The combination of expectations and implementation of learning for participants is workers in Figure 3.
Based on Figure 3, it is known that the expectations and realities regarding the implementation of the learning are very diverse. Gap items number 2, 4, 7, and 8 included the category of quadrant I. Gap items number 1, 3, and 5 had the type of quadrant III. Point number 6 is the only item that places the gap position in quadrant II.

To find out more about the learning participants’ perceptions of implementing learning based on measurements with a questionnaire on a Likert scale, open questions, and group interviews were also provided in class at the end of the teaching with the results as shown in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Suggestion</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>None</td>
<td>8</td>
<td>29%</td>
</tr>
<tr>
<td>2</td>
<td>Learning time should be adjusted</td>
<td>7</td>
<td>25%</td>
</tr>
<tr>
<td>3</td>
<td>Well done</td>
<td>6</td>
<td>21%</td>
</tr>
<tr>
<td>4</td>
<td>Be improved and maintained</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>5</td>
<td>Adding teaching materials</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>6</td>
<td>The material is good</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>7</td>
<td>Should be conducted face-to-face</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>8</td>
<td>Network issue</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>28</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on Table 2, participant suggestion needs to be considered to improve learning delivery. Even though 8 participants did not answer and 6 participants answered that it was good, the input that needed attention was that the learning time should be adjusted because there were several complaints from the learning participants, such as being online all day long, which was quite tiring to the point of giving assignments late at night (outside working hours). However, in reality, the learning has indeed been conducted according to the schedule, including
having an independent task at night. Ministry of Finance employee working hours are 07.30-17.00. While the learning schedule is as shown in Table 3.

<table>
<thead>
<tr>
<th>Day</th>
<th>Face to face</th>
<th>Individual Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day-1</td>
<td>08.00-17.45</td>
<td>19.30-21.45</td>
</tr>
<tr>
<td>Day-2</td>
<td>08.00-17.00</td>
<td></td>
</tr>
<tr>
<td>Day-3</td>
<td>08.00-17.00</td>
<td>19.30-21.45</td>
</tr>
<tr>
<td>Day-4</td>
<td>08.00-17.45</td>
<td>19.30-21.00</td>
</tr>
<tr>
<td>Day-5</td>
<td>08.00-17.45</td>
<td>-</td>
</tr>
<tr>
<td>Day-6</td>
<td>08.00-17.00</td>
<td>-</td>
</tr>
<tr>
<td>Day-7</td>
<td>08.00-16.15</td>
<td>-</td>
</tr>
</tbody>
</table>

Based on Table 3, it is known that the face-to-face learning schedule is suitable with the working hours of Ministry of Finance employees. Among seven days of learning, there are three days of individual tasks at night for two hours and fifteen minutes and one hour and forty-five minutes. Actually, in this learning, there is the task of making broadcast material used in the final exam, where it is not enough to do this during the scheduled individual task hours, meaning that the participants still need to do their almost every night assignments. Given the diverse ages of the participants and the tasks to be done, it is better to evaluate the learning hours at night. One alternative is that the particular job is done asynchronously before face-to-face learning is done synchronously.

The input on 'be improved and maintained, and 'the material is good' is expected. The learning will not reduce the quality and quantity of all supporting factors for the next semester. Input on adding teaching materials is intended to download teaching materials to learn teaching materials anywhere and anytime independently without having to join the learning. Other information such as network issues because there are participants who experience problems with the internet network. This suggestion/input is in line with suggestions/input regarding the learning held face-to-face. The teaching will not make it difficult for participants who experience internet network problems.

**Level-1 Evaluation: Learning Teacher**

The analysis results based on a questionnaire with eight questions of expectation and reality for the two teachers and two Lecturers are shown in Table 4.

<table>
<thead>
<tr>
<th>No</th>
<th>Subjects</th>
<th>Expectation</th>
<th>Perception</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management of Implementation of Tax Counseling Activities-Teacher 1</td>
<td>4.40</td>
<td>4.84</td>
<td>0.44</td>
</tr>
<tr>
<td>2</td>
<td>Management of Implementation of Tax Counseling Activities-Teacher 2</td>
<td>4.40</td>
<td>4.84</td>
<td>0.44</td>
</tr>
<tr>
<td>3</td>
<td>Lecture I: Latest Policies related to Counseling</td>
<td>4.24</td>
<td>4.40</td>
<td>0.16</td>
</tr>
<tr>
<td>4</td>
<td>Tax Service Administration-Teacher 1</td>
<td>4.36</td>
<td>4.80</td>
<td>0.44</td>
</tr>
<tr>
<td>5</td>
<td>Tax Service Administration-Teacher 2</td>
<td>4.32</td>
<td>4.76</td>
<td>0.44</td>
</tr>
<tr>
<td>6</td>
<td>Methods and Techniques of Taxation Counseling-Teacher 1</td>
<td>4.40</td>
<td>4.84</td>
<td>0.44</td>
</tr>
<tr>
<td>7</td>
<td>Methods and Techniques of Taxation Counseling-Teacher 2</td>
<td>4.40</td>
<td>4.84</td>
<td>0.44</td>
</tr>
<tr>
<td>8</td>
<td>Communication Skills-Teacher 1</td>
<td>4.40</td>
<td>4.84</td>
<td>0.44</td>
</tr>
<tr>
<td>9</td>
<td>Communication Skills-Teacher 2</td>
<td>4.36</td>
<td>4.80</td>
<td>0.44</td>
</tr>
</tbody>
</table>
Based on Table 4, it is known that the highest difference between expectations and reality for learning teachers is 0.44 (positive) in five (all) learning courses, which are: Management of Implementation of Taxation Counseling Activities, Tax Service Administration, Taxation Instructor Methods and Techniques, Communication Skills, and Introduction to Contact Center Management, both for teacher one and teacher two. The two lecture materials have low expectations and realities gap of 0.16 respectively, which are Lecture I: Recent Policies related to Counseling and Lecture II: Administration System and Credit Score Provisions for Tax Instructor Functional. The lecture material should not be the object of evaluation because the lecture is conducted by a minimum echelon III official invited because his position is under the lecture material, meaning that he is not a teacher. Still, it would be more appropriate to call him a speaker because of his authority, no need to evaluate the speaker. If the participants gave the lecture with not too high value, it is understandable because the official was invited to give a seminar not to teach. Suppose it has to be evaluated not with the same instrument as the teacher evaluation. In that case, a unique tool must be made, for example, the novelty of the lecture content and the relationship between the lecture content and the learning objectives.

The gap of expectation and realities of learning implementation according to participants is as shown in Figure 4.

![Figure 4 A Gap Analysis of Expectations and Realities for the Learning Teachers](image)

<table>
<thead>
<tr>
<th>No</th>
<th>Subjects</th>
<th>Expectation</th>
<th>Perception</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Lecture II: Administration System and Credit Score Provisions for Functional Tax Instructors</td>
<td>4.24</td>
<td>4.40</td>
<td>0.16</td>
</tr>
<tr>
<td>11</td>
<td>Introduction to Contact Center Management-Teacher 1</td>
<td>4.36</td>
<td>4.80</td>
<td>0.44</td>
</tr>
<tr>
<td>12</td>
<td>Introduction to Contact Center Management-Teacher 1</td>
<td>4.36</td>
<td>4.80</td>
<td>0.44</td>
</tr>
<tr>
<td>13</td>
<td>Average</td>
<td>4.35</td>
<td>4.75</td>
<td>0.39</td>
</tr>
</tbody>
</table>
Based on Figure 4, it is known that the expectations and realities of the learning instructors on each evaluation item are included in quadrant I, which means that all learning participants' perceptions of learning teachers are good and learning teachers are always expected to maintain expectations and reality. However, for the second group, the lecture material is included in quadrant III, which indicates that it is good; it does not need to be a priority. It is increased for evaluation of the two lecture materials.

To find out more about the learning participants' perceptions of learning teachers based on measurements according to a questionnaire with a Likert scale, open questions, and group interviews were also provided in class at the end of the learning with the results as shown in Table 5.

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
<th>Amount</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Well done</td>
<td>10</td>
<td>36%</td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>5</td>
<td>18%</td>
</tr>
<tr>
<td>3</td>
<td>Be improved and maintained to be better</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>Need to adjust learning time</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>5</td>
<td>Add teaching materials or learning materials</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>6</td>
<td>We need to adjust the explanation of the material</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>7</td>
<td>Increase discussion and adapt the practice</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>8</td>
<td>The delivery of the material is not clear</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>9</td>
<td>Need more than two teachers</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>28</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on Table 5, although most participant input has answered satisfied with this learning, the teaching is good. It is hoped that it can be improved and maintained so that the learning can be even better. Online distance learning requires teacher creativity to participate, such as adding to the discussion related to teaching materials and adapting the practice to the actual conditions. The suggestion regarding the timing of the learning should need to be adjusted again; even though the learning schedule is appropriate, the learning organizer also allows to change the implementation time according to the applicable regulations so that the learning participants are not burdened with long hours per day so that it is pretty tiring. In addition, 5 participants did not provide input to the teacher, so they were categorized as no input.

Level-2 Evaluation: Learning Result

Level-2 evaluation is calculated from the results of the final value of the learning to measure the learning process in the transfer of knowledge by weighting 40% of the activity value during education and 60% of the final exam score. The results of learning are good, which can be seen from the value of the learning results. Among 28 participants, 26 participants attended the teaching. Of the 26 participants who attended, 25 participants passed the learning, and one did not give the instruction. Ten participants, or 36%, passed with perfect scores, and 15 participants or 54% passed with good scores. One participant did not give because he did not complete the quiz assignment. Thus, the graduation rate of this learning reaches 96% with a minimum predicate of good.
5 Conclusion

The Basic Tax Instructor Functional Distance Learning Class II of the 2021 year, conducted by the Yogyakarta Financial Education and Learning Center online from 8 to 17 February 2021 has been well organized, regarding the teachers and the learning metrics. Training participants have also provided excellent evaluation results. However, the long training time until the evening needs to be reconsidered. Smooth internet signal is also still an obstacle in this training. If the situation allows, it is recommended that this training be carried out face-to-face.

References


A. Fatmawati dkk, “Kirkpatrick Model Development For Employee Performance Measurement Based On Key Performance Indicator (Studi Kasus Pada Departemen Sewing Pt Korina Semarang),” J. Manage., vol. 6, no. 1, hal. 1, 2020.


R. A. P. I. S. E. Nugroho, “Faktor - Faktor Yang Mempengaruhi Kesuksesan Pembelajaran Daring Dalam Revolusi Industri 4.0,” in Sainteks 2019, 2019, hal. 56–60.


Poverty Analysis and Factors Which Affects Indonesia

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Abstract. Poverty is one of the problems that humans always face. Poverty is as old as humanity itself, and the implications of the problem can involve all aspects of human life. This study aims to determine and analyze the effect of people's business credit (KUR), Provincial Minimum Wages (UMP), and PMDN investment on Poverty in Indonesia. The data used in this study are secondary in the 2016-2020 period. The method used is multiple linear regression with a panel data approach with Eviews. The regression output with the fixed-effect model shows that the KUR, UMP, and PMDN variables hurt the poverty level in Indonesia. The UMP variable significantly affects the poverty level, while the KUR and PMDN variables have no significant effect on the poverty level. This finding implies that the government can provide business capital, increase wages and provide vast opportunities for investors, which will reduce Poverty in Indonesia.

Keywords: People's Business Credit, Provincial Minimum Wage, PMDN, and Poverty

1 Introduction

Poverty is a problem in almost all countries in the world, especially in developing countries. Poverty has a multidimensional nature which means that humans have various needs. So Poverty can be viewed from primary aspects such as inferior because of assets, knowledge, skills, and secondary elements, namely in the form of poor social networks, financial resources, and information [1]. BPS data [2], in the period 2010 to September 2020, the poverty rate in Indonesia has decreased, both in terms of numbers and percentages, except in September 2013, March 2015, March 2020, and September 2020. the portion of poor people in September 2020 increased to 10.19 percent, an increase of 0.41 percent in March 2020, and a rise of 0.97 percent in September 2019. The number of poor people in September 2020 amounted to 27.55 million people, an increase of 1.13 million people against March 2020 and an increase of 2.76 million people against September 2019.

The complex nature of the poverty problem demands integrated policies and strategies for overcoming, for example, through programs to expand productive employment opportunities, human empowerment, and easy access to various existing socio-economic options. Due to various government limitations, poverty alleviation programs or policies oriented to poverty problems require a priority scale. Poverty has been exposed and is a matter of debate. Poverty has been defined differently and reflects a spectrum of ideological orientations. Even a quantitative approach to defining Poverty has been debated extensively by several researchers interested in this issue [3].

Reducing the level of Poverty that occurs in society is one of the main objectives of public policies carried out by each region and nationally. Government public policies are essential in
overcoming Poverty, namely fiscal or budget policies. One aspect of budget policy is partiality, namely taking sides with all levels of society, including the poor. The pro-poor government budget is an essential instrument for policymakers to overcome the problem of Poverty [4].

The government implements various poverty reduction programs by providing subsidies to the community as a government tool in the context of income retribution for equalization; however, at the implementation stage, this is very doubtful if it is related to the facts that occur in the life of Indonesian people which are still very far from the prosperous category. UMKM has a substantial contribution to the national economy. UMKM is dominated by micro-business actors, amounting to 98.68%, with a workforce absorption of around 89%. Meanwhile, the contribution of micro-enterprises to GDP is only about 37.8%. Microbusinesses also have fast transaction turnover, use domestic products, and are in contact with the primary needs of the community. To that end, the Government adopted several policies, including subsidizing loan interest, restructuring credit, providing working capital guarantees, and tax incentives. Interest subsidies are provided to strengthen the capital of UMKM through People's Business Credit (KUR).

KUR is the Government's step in encouraging the expansion of access to formal financial services for the adult population in Indonesia. Through these programs, it is hoped that the poverty rate will further decline and economic growth will be more evenly distributed, as stated [5], [6], [7]. Some of the efforts being made by the Indonesian Government are to move the real sector through the UMKM sector with the KUR program policy, which will ultimately result in reducing the poverty rate.

Another effort to understand Poverty in Indonesia is through the production approach. The production approach can be reflected in the minimum wage policy, which gives each region the freedom to determine the size of the UMP/UMR. Unlike previous years, at the end of 2020, the Government announced not to increase the 2021 minimum wage increase.

In several empirical studies, there are several studies against minimum wage policies, including [8] states that the minimum wage will depress the distribution of income and generate debate whether labor absorption will be subject to high labor costs, reduced profits, and reduced labor or increase the price of output which in turn burdens the poor. Several researchers stated the same thing ([9], [10], [11], and [12]). In addition, the low level of public capital formation is alleged to be one of the Causes of Poverty. Capital is interpreted as an investment, as quoted by Nurkse [13]: that, "The transfer of some of the existing resources in society to increase the supply of goods in such a way as to expand output in the future," then [14], states that "the change in time capital is an investment". The effect of investment on growth and welfare is the empirical finding of several researchers, such as [15], [16], [17], [18]. The discussion of investment to Poverty and yields mixed conclusions [19] dan [20]. So it is interesting to see the effect of the KUR subsidy policy, minimum wages, and pro-poor investment in a province on the quality of poverty management in Indonesia.

2 Literature Review

Poverty becomes an effect relationship, and a causal relationship forms a paradigm circle of Poverty. This poverty paradigm circle illustrates that Poverty is caused itself, "The vicious circle of Poverty." This Poverty paradigm circle is a picture of infinite causality so that can be explained as follows; low domestic people's income due to low productivity results in increased Poverty, causes the household saving rate to below, cause the level of domestic investment to
down, domestic capital flowing to below in an area resulting in a region lack of money. Results in a decrease in domestic productivity to be low, low domestic productivity resulting in low domestic income, and so on, thus forming a circle of poverty paradigm. This Poverty paradigm circle is a picture of infinite causality so that can be explained as follows; low domestic people's income due to low productivity results in increased Poverty, causes the household saving rate to below, cause the level of domestic investment to down, domestic capital flowing to below in an area resulting in a region lack of money. Results in a decrease in domestic productivity to be low, low domestic productivity resulting in low domestic income, and so on, thus forming a circle of poverty paradigm.

Ragnar Nurkse (1953) in [21] argues that an emerging country is poor because it is deficient (an emerging country is poor because it is imperfect); Poverty in a country has no end, meaning that an emerging country is because it has nothing, and by having nothing causes a state suffering from Poverty. Argues that an emerging country is poor because it is deficient (an emerging country is poor because it is imperfect); Poverty in a country has no end, meaning that an emerging country is because it has nothing, and having nothing causes a state suffering from Poverty.

Not all Poverty means that people or groups considered flawed are the people who suffer the most on the earth's surface. Poverty is then divided into several types [22], namely; Relative Poverty is a condition of Poverty due to the influence of development policies that have not reached all levels of society, which causes inequality in income distribution. Absolute Poverty is a condition that is determined based on the inability to fulfill the minimum basic needs such as food, clothing, and health necessary to live and work. Structural Poverty is Poverty caused by unfavorable life structure or structure conditions and causes Poverty and perpetuates Poverty in society. Cultural Poverty is a condition of Poverty caused by the customs and culture of a particular area that is shackled and closely attached to the poverty indicator.

The Government's role in poverty alleviation is urgently needed, Government's role, namely allocation, distribution, and stabilization. This role is a condition that must be fulfilled if the development goal, namely poverty alleviation, is to be resolved. The budget issued through spending for poverty alleviation becomes a stimulus in reducing Poverty and several other development issues. [23], emphasizes the role of the funding for poverty alleviation. The findings of this study explain the negative relationship between budgetary income and the number of poor people. This means that the higher the amount of the income budget, the lower the poverty level. Of course, the funding in question is allocated to create poverty alleviation programs, both short and long-term. What Hasibuan discovered was corroborated by [24]. Alawi found that budget allocations for community empowerment programs have a negative correlation with the severity of Poverty. This means that the higher the budget allocation for community empowerment programs, the lower the severity of Poverty. (Erwan, 2010) in [25], which further explains that a subsidy is a provision (contribution) in the form of money or finance provided by the government or a public body.

At the beginning of the implementation of the KUR Program, it was part of a pro-poverty policy by encouraging the expansion of access to capital informal financial institutions. In this program, the government made various policy changes by the direction of the procedure for empowering micro and small businesses. These multiple changes touched different aspects of basic policies, including changes to the KUR distribution scheme, expanding the coverage of KUR program recipients, expanding the channeling institutions of the KUR Program. Efforts to broaden were also carried out by encouraging the active role of local governments to make various facilitation efforts to optimize the distribution of KUR [26]. These multiple efforts, of course, resulted in changes and dynamics in distributing the KUR Program [27] found that an
increase in the minimum wage increased welfare loss; in addition, it was also found that the minimum wage reduces equity for people with high and low education. Previous 
states that the minimum wage will depress the distribution of income and generate debate whether labor absorption will be subject to high labor costs, reduced profits, reduced labor, or increased output price. Investment is defined as spending to buy capital goods and production equipment to produce goods and services in the future [28]. Keynes also used this definition [29] added that a large stock of physical capital resulting from high investment ratios would lead to high GRDP. Increased investment also tends to lead to high income.

3 Research Methods

The method in this research is using panel data regression. Panel data is a combination of time series and cross-section data. The data used is secondary data from BPS. The object of this research is Poverty, KUR, UMP, PMDN against Poverty in Indonesia in 2016-2020. The following is the definition of the research variables:

1. Poverty is a measure of the average expenditure gap of each poor person against the poverty line. The higher the index value, the farther the population's average expenditure is from the poverty line (Poverty Depth Index = P1), measured in percent.
2. KUR is the amount of people's business credit realized in the province, measured in rupiah.
3. UMP is, according to the Ministerial Regulation Manpower and Transmigration No. 7 of 2013, namely, the lowest monthly wage consisting of the basic salary including a fixed allowance which the governor determines as a safety net, measured in rupiah.
4. Investment is the amount of private investment in a province measured by domestic investment, measured in rupiah.

Panel data multiple linear regression is a combination of time series data and cross-section. The following is the research equation formula:

\[ KEMt = \beta_0 + \beta_1 KUR_t + \beta_2 UMP_t + \beta_3 PMDN_t + \epsilon_t \]

Where:

- \( KEM \) = Poverty that is P1 (Persen)
- \( KUR \) = KUR t realized (Rupiah)
- \( UMP \) = Provincial Minimum Wage (Rupiah)
- \( Investment \) = PMDN (Rupiah)
- \( \beta_0 \) = Constanta
- \( \beta_1, \beta_2, \beta_3 \) = regression coefficient
- \( \epsilon \) = error term

There are units and quantities of independent variables in this study, so a natural logarithmic model is created. Natural logarithms aim to avoid heteroscedasticity and can determine the coefficient that shows elasticity. From these considerations, the equation in this study becomes:

\[ lnYt = \beta_0 + \beta_1 lnKUR_t + \beta_2 lnUMP + \beta_3 lnPMDN_t + \epsilon_t \]
Model estimation technique has three techniques: the OLS (Common Effect) method, the Fixed Effect model, and the Random Effect model. Then using a better design, done with the Hausman Test [30]

4 Results and Discussion

The regression analysis results were carried out using the fixed-effect model and had passed the classical assumptions. It can be described further about the effect of each independent variable on the dependent. The following Table 1 shows a summary of the regression output used in this study.

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Koefesien</th>
<th>TStatistik</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KUR</td>
<td>-0,030</td>
<td>-0,547</td>
<td>0,585</td>
</tr>
<tr>
<td>UMP</td>
<td>-0,449</td>
<td>-2,020</td>
<td>0,045</td>
</tr>
<tr>
<td>PMDN</td>
<td>-0,032</td>
<td>-1,366</td>
<td>0,174</td>
</tr>
</tbody>
</table>

R-Square = 0,982  
Adjusted R-Squared = 0,977

With the regression result formula

\[ Y = 10,355 - 0.030KUR - 0.449UMP - 0.032PMDN \]

The value of the KUR regression coefficient is -0.030, which means that KUR hurts Poverty, meaning that if the KUR increases, it will reduce Poverty. The variable which significantly affects Poverty is slang. Less than 0.1 with a confidence level of 90%, so KUR is an insignificant variable on Poverty. As stated [5], [6], [7] that KUR is a government step in encouraging the expansion of access to formal financial services for the adult population in Indonesia. Through these programs, it is hoped that the poverty rate will further decline and economic growth will be more evenly distributed; some of the efforts being made by the Indonesian government are to move the real sector through the UMKM sector with the KUR program policy, which will ultimately result in reducing the poverty rate.

At the beginning of the implementation of the KUR Program, it was part of a pro-poverty policy by encouraging the expansion of access to capital informal financial institutions. In this program, there have been various policy changes made by the GovernmentGovernment by the direction of the policy for empowering micro and small businesses. These multiple changes touched different aspects of basic procedures, including changes to the KUR distribution scheme, expanding the coverage of KUR program recipients, expanding the channeling institutions of the KUR Program. Efforts to broaden were also carried out by encouraging the active role of local governments to make various facilitation efforts to optimize the distribution of KUR [26]. These multiple efforts, of course, resulted in changes and dynamics in distributing the KUR Program.

The UMP regression coefficient value is -0.449, which means that the UMP hurt Poverty, meaning that it will reduce the poverty rate if the UMP increases. The variable which significantly affects Poverty is slang. Less than 0.1 with a confidence level of 90%, so the UMP is a variable that significantly affects Poverty. Contrary to [8], who states that the minimum
wage will depress the distribution of income and generate debate whether labor absorption will be subject to high labor costs, reduced profits, and reduced labor or increase the price of output, which burdens burdens the poor. Several researchers stated the same thing ([9], [10], [11], and [12]).

The PMDN regression coefficient value is -0.032, which means that PMDN hurt Poverty, meaning that if the PMDN increases, it will reduce Poverty. The variable which significantly affects Poverty is slang. Less than 0.1 with a 90% confidence level, PMDN is an insignificant variable on Poverty. By the low level of community capital formation, which is believed to be one of the causes of Poverty, this capital is interpreted as an investment, as quoted by Nurkse. [13] : "The transfer of some of the existing resources in society to increase the supply of goods in such a way as to expand output in the future," then [14], states that "the change in time capital is an investment. The adjusted R-squared value shows that 97.7% of the independent variables can explain the dependent variable, and outside the model, explain the remaining 2.3%.

5 Conclusion

This study concludes that the variables KUR and PMDN do not significantly affect the level of Poverty. At the same time, the UMP has a significant adverse effect on the level of Poverty in Indonesia. This result implies that the provincial government also needs to increase people's income through the capital provided and domestic investment, namely by creating job opportunities and giving easy procedures for investors. The provision of money will create business opportunities and will Reduce Poverty. Making policies related to the ease of credit procedures to make it easier for small businesses to get capital will encourage an increase in the economy to reduce Poverty.

References

The Legalization Process of Persons of Indonesian Descents (PIDS) in Mindanao and Their Reasons to Remain in Mindanao after Nationality Awarding

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Abstract. This research aims to identify the effects of legalization process for the Persons of Indonesian Descent living in Mindanao, Philippines and to investigate the reasons of the Registered Indonesian Nationals (RINs) staying in Mindanao after the nationality awarding. In the 1870s, PIDs' ancestors crossed the sea using a traditional boat to reach the Philippines from the North Sulawesi province to Balut Island close to Sarangani Province in Mindanao. However, after both countries gain their independence, specific laws were applied regarding the legal documents and caused the children born with stateless status. The interview happened in 2016 and 2019 shows the legalization process has given various good impacts to the lives of PIDs. However, after they became a RINs, some of them continue their life in foreign land due to unrecognized relatives living in Indonesia and better income opportunity in Mindanao areas.

Keywords: Legalization, statelessness, stateless person, Persons of Indonesian Descents (PIDs), Registered Indonesian Nationals (RINs).

1 Introduction

The issue of statelessness in current times is still ongoing. Many people are still struggling to get their nationality in some parts of the world to have the rights of a country. This issue even has been understood as one big challenge for the international community [1]. Referring to The World's Stateless book, stateless is “Someone who is not considered as a national by any state under the operation of its law” [2]. People with stateless status could not obtain or enjoy any rights or duties or protection from a particular state. A group of people commonly abused them to fulfill their means. The majority of stateless persons are at high risk of discrimination, human rights abuses, and even persecution. Most stateless people will become internally displaced persons (IDPs), asylum seekers, and refugees [2]. One of the reasons people have become stateless is because of the war in their previous country.

Many of them then sailed a boat or risked their lives to cross the border to obtain asylum from developed countries. This situation has occurred in some countries, such as Palestine, Syria, Myanmar (Rohingya), and other countries in conflict. They are trying to get protection from the nearest states or countries to have a better future. However, someone can also become stateless in a country where they were born and lived for their entire lives. An example of this is the Indonesian diaspora living in the southern part of the Philippines or Mindanao [3].
What are PIDs?

Person of Indonesian Descent (PIDs) is a phrase used to recognize the Indonesian diaspora living in the southern part of the Philippines. These people were threatened to become stateless because they do not have legal documents to prove their belongings. There are few perspectives on the historical background of the arrival of the PIDs in Mindanao. However, these people have been living without legal documents for four generations to this day [4], and it has been a challenging and demanding life for them to live in. This phenomenon has begun to rise since the PIDs' ancestors migrated from northern Sulawesi (mostly from Sangir and Marore Island) to some parts of the Philippines, such as Balut Island Sarangani, around the 1870s [5]. As the former Immigration Attaché of the Indonesian Consulate in Davao City, Agus Abdul Majid, stated, the migration between these two countries occurred quickly during that time due to the close border.

Traditionally, they had migrated from Indonesia, sailed a boat across the ocean, and arrived at Balut Island, Glan, and other places. Migration is not only done by the PIDs' ancestors [6]. The Filipinos who stayed in Glan, Sarangani province, often did the same thing. In the beginning, ancestral migration from these PIDs aims to have better trading activities. They used to sell products from their hometown to Mindanao, and they are going to bring another thing from Mindanao to be sold in their hometown. The Filipinos from Mindanao also visited North Sulawesi and did the same thing as them, and the cultural exchange took place as a result of this activity [5].

By that time, these people did not feel any insecurities about their nationality because these countries were under colonization. Unfortunately, between 1945 and 1946, Indonesia gained independence from Japan, and the Philippines gained independence from the United States. The problem of statelessness for the Sangers started when both countries need to create adjustments for their countries, including the Sangers [7]. These people need to decide whether they want to be Indonesian or Filipino. However, regarding the citizenship law of the Republic of Indonesia 1958, number 62 and renewed by the law of 2006, number 12 chapter 3 article 19 verse 2 stated
that any person who would like to register as an Indonesian citizen or descent need to stay at least five years in sequence or ten years non-sequential [8]. However, this law seemed to solve the Sangers or the Indonesian descendants since they were unwilling to come back to Indonesia and stay for that long time [9].

The Cooperation among UNHCR, Indonesian Government and Philippines Government

In 1995, the first Joint Commission among the Indonesian Government and the Philippines government was launched, and the second Joint Commission was held in 1998. As part of the Joint Commissions deal, both governments have decided to create an Alien Certificate of Registration (ACR) for these PIDs as their identity card. To gain the ACR, the PIDs need to pay around 410.00 Philippines Peso for those above 14 years old, 210.00 for those below 14 years old, and 160 for the annual extending fee [4]. The benefit of having this ACR for these PIDs, they gain the residence permit to stay in the Philippines legally, the ability to travel freely, the ability to legalize their work contract for those who worked in the companies or factories, and efficiently manage the permissions for their business license to the local government offices, pursuing studies and application for travel documents [4]. However, some PIDs could still not get the ACR and live with illegal status because they lived in poverty that they cannot afford to pay for the ACR registration and the transport to come to the immigration office. With such conditions, the PIDs force to work as cheap labor in fishery factories, coconut plantations, or house assistants to support their families [9]. Most of them worked in the fishery factories using their ACR as their only legal document [10]. However, these workers sometimes were used by the owner of factories to catch the fish near Indonesia's sea border. When the armed Indonesian Navy arrests them for illegal fishing, the factory owner will not take any responsibility in this case [11].

Looking at the matter that these people have faced, the United Nations High Commissioner for Refugees (UNHCR) held a meeting with the Indonesian Government and 8 Philippines government to find a solution for the PIDs and end the statelessness status. Since 2011, these three actors have been working to end Mindanao's statelessness, especially for the Indonesian descendants who lived without supporting documents their entire life. After the joint meeting, they came out with a solution, a pilot project to award the PIDs with the nationality they desired to have, whether Indonesian or Filipino [9]. The Philippines' Department of Justice – Refugees and Stateless Persons Unit (DOJ-RSPPU) took the lead during the project and the Bureau of Immigration, Public Attorney's Office, Indonesian Consulate, and UNHCR Philippines. Each agency has its specific roles and jobs to support Persons of Indonesian Descent [12]. By 2016, before the nationality awarding process began, around 8745 persons of Indonesian descent registered from different areas of Mindanao [7].

This research will use the legalization concept and support push and pull factor theory to collect the final results of how the legalization process affects PIDs' lives. The reasons for RINs remain residing in Mindanao areas after nationality awarding. The methodology proposed by the writer is data collection by using an online interview with the related people, officials, organizations, and other related stakeholders, and then some numbers of the online survey might be needed as well to collect different input from the RINs. After all those data collection processes, the data will be analyzed to gain the final results.
2 Research Methods

The mission started with the registration system. During the registration system, the persons of Indonesian descent will follow some steps that are obligate to be followed by Indonesian descent. After getting the registration systems results and following all the steps, the actors will find the permanent solution for Indonesian descent. The permanent results will be based on the options chosen by the persons of Indonesian descent at the registration.

The Registration System

The registration is done by a joint team consisting of Indonesian Consulate representatives in Davao City, the Department of Justice, Bureau of Immigration, Public Attorney's Office, UNHCR, and NGOs (Pasali). Before the implementation of the registration process, the field team of UNHCR and Pasali will stage the community preparation to have a meeting with the LGU (Local Government Unit) to prepare for the registration place and spread the invitation to the PIDs with the help of the Liaison Officer (LO) of Consulate General in Davao City [13].

Step 1: Orientation

Every person of Indonesian descent who comes (both carry the invitation or not) to the registration place will be placed in groups to attend a brief orientation about the necessary documents and details of activities in the registration process to follow all the stages of registration well [9].

Step 2: Reception

At this stage, each person of Indonesian descent will be given a serial number and booklet/information regarding citizens' rights and obligations. At this stage, they also will be given some facilitations that might be helpful for them, especially for the special assistance (such as interpreters, children and the elderly, persons with disabilities) [9].

Step 3: Data Verification

At this stage, each PID must show their documents to the joint team's representatives, whatever they have (passports, birth certificates, identity cards, voter cards, or others.). Each paper will be checked for authenticity by the verifiers from the Joint Team representatives and short interviews related to the documents [9].

Step 4: Registration

At this stage, every person of Indonesian descents' data, family (father, mother, wife/husband, and children), their origins, and occupation will be input into PIDs' registration system. At this stage, the joint team was also taking the biometric data (photograph and fingerprints) and scanning the documents that own by the persons of Indonesian descent into the database of the registration system of PIDs [9].

Step 5: Counseling

At this stage, the person of Indonesian descents is allowed to consult with the Lawyer from the Public Attorney's Office and with the Indonesian Consulate representatives in Davao City to understand their citizenship status under the Act and the rules applied in Indonesia or the
Philippines, to gain a complete understanding of citizenship countries' rights and responsibilities (both Indonesia and the Philippines) [9].

After the registration processes, the most crucial plan is the solution mission for Indonesian descendants. In this preparation for the permanent solution mission, the Philippines government has done some meetings with some agencies related to the internal of Philippines government, and also a bilateral meeting between the Philippines Department of Justice and the delegates of Indonesia's Ministry of Laws and Human Rights to establish the joint policy which will be permanent to determine the clarity of the nationality status of the PIDs [14].

The Permanent Solutions for PIDs

The permanent solutions and the follow-up actions for the persons of Indonesian descents offered by the actors can be described as follows:

<table>
<thead>
<tr>
<th>Status</th>
<th>Options</th>
<th>Follow-up Actions</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>WNI (Indonesian)</td>
<td>Stay in Mindanao</td>
<td>Nationality Clarity</td>
<td>The ministry of Laws and Human Rights Republic of Indonesia &amp; Indonesian Consulate in Davao City</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passports granting, Regarding the PNBP, the passport needs to get the exemption.</td>
<td>Indonesian Consulate in Davao City/The immigration of the ministry of Finance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The clarity of Philippines immigration permission</td>
<td>Philippines Bureau of Immigration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Residing Visa</td>
<td>DOJ/Bureau of Immigration</td>
</tr>
<tr>
<td>WNI (Indonesian)</td>
<td>Return to Indonesia</td>
<td>Confirmation granting of the Indonesian nationality</td>
<td>The ministry of laws and Human rights of Republic Indonesia &amp; Indonesian Consulate in Davao City</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPLP Granting, Regarding the PNBP SPLP need to give exemption.</td>
<td>Indonesian Consulate in Davao City/The immigration of the ministry of Finance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Returning process/repatriation</td>
<td>Indonesian Consulate in Davao City/Central government</td>
</tr>
</tbody>
</table>
Living place and the source of livelihood in Indonesia

The ministry of village, PDT and transmigration, BNPP North Sulawesi

WNF (Philippines) Settlement in Mindanao

The withdrawing of the Indonesian nationality and all the documents related to republic of Indonesia

Indonesian Consulate in Davao City/ The ministry of laws and Human rights of Republic Indonesia

The confirmation of Philippines nationality

Philippines government

<table>
<thead>
<tr>
<th>Source: [9]</th>
</tr>
</thead>
</table>

### Table 1. The Permanent Solutions and Follow up Actions

After all the nationality awarding processes for the Persons of Indonesian Descendants in the Southern part of Mindanao, the Philippines, they are currently known as Registered Indonesian Nationals (RINs). However, there are only a few numbers of RINs that return home to Indonesia [15]. Most of them who chose to be Indonesian prefer to stay and continue their life in Southern Mindanao. When the writer was visiting southern Mindanao back in 2016, these RINs that the writer met mentioned their willingness to go home to Indonesia since some never had any chance to see their hometown since they were born. They would like to return and spend their lives in the place they can call their 'home'. However, they could not return to Indonesia due to a lack of legal documents such as passports and identity cards or other evidence that proves they belong to Indonesia or the Philippines. Nevertheless, there are around 2435 Registered Indonesian Nationals still residing in some areas of Mindanao [7].

### 3 Results and Discussion

#### The Impact of Legalization Process on the PIDs Life

Before the joint mission among UNHCR, the Indonesian Government, and the Philippines government to end the statelessness, the life of the People of Indonesian Descent was very concerning. One of the issues is when the persons of Indonesian descent in Mindanao sometimes also become an object for some actions of state or regional actors during the election time, such as a state or regional actor letting the persons of Indonesian descent participate in the election to win in local elections. Most of these actors treat the persons of Indonesian descents invariably depends on how dominant the persons of Indonesian descents respond to them [16]. The positive impacts that someone could get from having a nationality include gaining much support and easy access to the Government's facilities. Then, good quality of education, health facilities, and access to a job field. The important thing is that someone will get his right to be protected by the country's law [15].

After the legalization process ended, 2435 out of 8745 people of Indonesian descent chose to remain living in Mindanao [7]. They decided to stay in Mindanao because they married the locals and have built their family there, having better income instead of working in Indonesia, have no relation did to their relatives in Indonesia. It is hard to start to build a new life in a place
they have never been before. Nevertheless, they still choose to be Indonesian because that is the only thing they have from their ancestors and to show love to the place where they came from [15].

4 Conclusion

The Persons of Indonesian descent were identified after the Independence Day of Indonesia and the Philippines. Most of them came from the North Sulawesi province in Indonesia. They sailed the traditional boat and risked their lives to go to Balut island, which is the nearest place in the Philippines’ territory from Indonesia. Since their arrival, inter-marriage between the PIDs and residents happened. Their kids were threatened to be stateless since the parents did not have any legal documents that show their nationality. To stop them from being stateless, UNHCR, the Indonesian Government, and the Philippines government are working together to award these people with race which they are desire to have. The Philippines’ Government will manage those who choose to be Filipino. The PIDs who decided to be Indonesian (RINs) will be under the Indonesian consulate’s supervision, and gradually they will return to Indonesia. Nevertheless, not all these RINs wish to return to Indonesia; 2435 of the RINs chose to stay in the Mindanao areas. From the previous visit to Glan and General Santos City, where most of the RINs reside, the common reasons are because their families are currently living in Mindanao, and they have a better job with a better income than Indonesia.

References

[12] F. Tanggol, “Philippine and Indonesian Governments work together to end


Strategy to Increase Work Productivity Among Millennial Generation

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Abstract. Millennial generation workers generally have different characteristics, where they tend to prefer flexibility and use digital technology in their work. Companies must have a strategy to increase workers' productivity from the millennial generation so that their superiority in using technology can provide benefits for increasing company productivity. This study aims to evaluate and analyze the work culture of the millennial generation and formulate a strategy to increase the work productivity of the millennial generation so that it can increase the nation's competitiveness. The data analysis used in this study is a qualitative method. Primary data collection was carried out through in-depth interviews with respondents from the company's management and workers, the majority of whom came from the millennial generation. The results show that companies implement several strategies to increase the productivity of the millennial generation, including providing a platform for them to express their aspirations; companies must be able to bridge communication and coordination between the millennial generation and previous generations so that harmonious relationships can be created, the application of discipline and transfer programs knowledge in the internal company.

Keywords: Work Productivity, Millennial Generation, Productive Work Culture

1 Introduction

Millennial Generation and the WorkForce in Indonesia

Indonesia will enter the era of demographic bonus, marked by a decrease in the dependency ratio, which will reach its lowest point in the 2019-2024 period when the dependency ratio comes around 45.4%. [1]. This condition will have an indirect impact on increasing labor supply, saving, and human capital and followed by reduced costs for meeting the needs of the population of unproductive age so that there are opportunities to achieve more significant economic benefits by diverting existing resources to increase growth the economy and welfare of the people. According to the Indonesian National Family Planning Agency (Badan Keluarga Berencana Nasional / BKKBN), Indonesia will have a demographic bonus between 2020-2030; at that time, the age of the workforce 15-64 years old reaches 70%, while the remaining 30% is an unproductive population. (Indonesian Ministry of Women's Empowerment and Child Protection & Indonesian Central Bureau of Statistics, 2018).

The demographic bonus will not be separated from the millennial generation, wherein in 2017, the proportion of the millennial generation will reach 33.75% of the total Indonesian
population [1]. Millennials are the largest workforce in Indonesia. The development of the millennial generation in the force in Indonesia, according to data obtained from the Thematic Gender Statistics, shows that around 50.36% of the total population of productive age are millennials. [2]. Based on the Central Statistics Agency data in 2016, the entire workforce in Indonesia is 120,647,697, of which 46,847,228 or 38.83% belong to the millennial generation [3]. In 2020, the millennial generation was projected to be the generation that dominates the world of work [4].

The entry of the millennial generation into the Indonesian labor market will undoubtedly bring about a transformation from an economic, political, social, and cultural perspective. Along with the new era in the industrial revolution 4.0, the millennial generation is expected to become a productive and competitive workforce to face significant changes. Digitalization has penetrated all aspects of life and has brought changes in people's lifestyles. The millennial generation is expected to be prepared and able to respond to any changes, seize opportunities, and optimize the moments created due to the faster circulation of information and technology. [5]. The millennial generation will take control of the wheels of economic development and become a significant capital for nation-building so that they are expected to have superior potential compared to previous generations.

Differences in Generational Values in the World of Work

Standard and widely used criteria for distinguishing generations are the years of birth and events occurring globally [6]. There are 6 generation groups based on the year of delivery, as shown in table 1.

<table>
<thead>
<tr>
<th>Year of Birth</th>
<th>Generation Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925 - 1946</td>
<td>Veteran Generation</td>
</tr>
<tr>
<td>1946 - 1960</td>
<td>Baby boom generation</td>
</tr>
<tr>
<td>1960 - 1980</td>
<td>X Generation</td>
</tr>
<tr>
<td>1980 - 1995</td>
<td>Y Generation</td>
</tr>
<tr>
<td>1995 - 2010</td>
<td>Z Generation</td>
</tr>
<tr>
<td>2010 +</td>
<td>Alfa Generation</td>
</tr>
</tbody>
</table>

Source : (A. Bencsik, C. G. abriella Horváth, and T. Juhász, 2016) [7]

Generational values are studied in two categories by an individual character: year formation, style, views on money, leisure, technology, and views on work, including career, recognition and rewards, leadership, and authority. [8]. Each generation has different characteristics of work behavior [9]. In the world of work, baby boomers are hardworking, optimistic, and loyal, appreciate teamwork, and see work from a process-oriented perspective. Generation X was born between 1965 – 1980. In the workplace, this generation is skeptical of authority and favors independent leaders. This generation can collaborate and be separate, more generous, skilled in management, financially intelligent, independent, not intimidated by police, and innovative [10]. Generation X values more autonomy and independence and views work from an action-oriented perspective [11]. Generation Y is known as a generation with high expectations of work and achievement-oriented [12].

Generation X and Generation Y have a completely different view of the world of work.
than the traditional baby boomers [13]. Generations of baby boomers, X and Y, differ in terms of demands, expectations, values, and ways of working. In addition, it can also be seen that for generations X and Y, goal orientation and work environment affect satisfaction and intention to remain part of the organization. At the same time, baby boomers derive pleasure from relationship compatibility [9]. Work values are more influenced by generational experience than age and maturity [14]. Generations X and Y are more independent, while baby boomers enjoy power and position as decision-making authority [9].

Differences between the baby boomer generations, X and Y, were also found in values related to compliance, work-life balance, and influence. Differences in generational values in the workplace are unavoidable. Still, they need to be appropriately managed to synergize and trigger creativity and innovation in working with multiple generations to achieve company goals [15]. It is a challenge for companies that currently have employees from these three generations in managing and directing the three generations to remain committed and show performance as desired by the company. [16].

**Portrait of the Millennial Generation in the World of Work**

Millennials are born between 1980-2000 and are the only generation who passed the second millennium [17]. The millennial generation is also often referred to as the Y generation. There are many popular terms about this generation; connected or digital generation atau gen, identical to courageous, innovative, creative, and modern characters [18]. Generation Y is a generation that has experienced changes in economic and technological conditions [19]. As the millennial generation, Generation Y is more tolerant of race, religion, culture, sexual orientation, and financial status than the previous generation [20]. Because Generation Y has grown and developed in a more diverse society, they have shown a willingness to embrace and accept cultural differences [21].

Generation Y is a group that gradually dominates the workforce and has a work result orientation and is called the internet generation with fast-moving, impatient, creative, and demanding characters [22]. Millennials have different work patterns from previous generations, such as "Generation X" or "Baby Boomers." In the workforce, 90% of Generation Y wants a job that offers flexible work schedules, demands creativity, and allows them to impact the world [23]. Millennials prefer to work flexibly to achieve a "work-life balance" [24]. Millennial workers who can balance work and life will have better job satisfaction than those who are not [25]. The characteristics of the millennial generation in the world of work can be seen in Figure 1.
The proportion of the millennial generation that continues to increase from year to year allows in 2020 to reach 46% of the millennial generation, which dominates the world of work [27]. Based on research discussed at WEF, 43% of those called hard workers are millennials, while the other 57% percents are Generation X and Baby Boomers; millennials use technology, especially in their work and careers [26]. Generation Y grew up in the era of technology; they became proficient in accessing information quickly using technology [28], which became a fundamental reason for organizations to understand the nature, preferences, and behavior of generations [29]. Generation Y’s career growth is more progressive than the baby boomers and generation X [30].

Currently, the Millennial Generation is often in the spotlight in Human Resources (HR) management because they tend to have lower organizational commitment than the previous generation [31]. It is time for the company’s HR management to realize and pay attention to the generational differences in their work environment, so it is necessary to determine the appropriate intervention for each generation. [32]. HR management must consider choosing a different approach to increase organizational commitment to each generation, especially the Millennial generation.

There have been many studies related to the characteristics of millennial workers and the values they hold in the world of work. This study aims to deepen what efforts have been made by company management to increase productivity in companies where most workers come from the millennial generation. The sample taken in this study is focused on companies that have won productivity awards and companies that already have productivity improvement units. By taking samples from companies that have proven to be successful in increasing their productivity, it is hoped that a recommendation can be obtained for other companies, what efforts can be made to increase work productivity among millennial workers.
2 Research Methods

The method used in this study is a sampling method with a descriptive qualitative data analysis approach. This sampling method aims to get an overview of the values believed by the company's management in increasing its productivity through increasing the work productivity of its employees, most of whom come from the millennial generation.

The samples taken in the study used a purposive sampling technique. The sampling criteria are companies that have won awards in productivity from the government through staffing and companies that already have a productivity improvement unit. Companies taken include small, medium, and large companies and spread across five provinces in Indonesia. The total number of companies taken as samples is eight companies. Primary data collection was obtained through in-depth interviews and Focus group discussion (FGD). Respondents in this study are the company management and company employees.

Another uniqueness in this study is that researchers want to examine the factors that influence the company's success in handling employees from millennial circles to achieve achievements in increasing productivity by using qualitative analysis. At the same time, some previous studies have examined the factors that affect workers' performance in the millennial generation in a company using quantitative analysis.

3 Result and Discussion

Democracy and Flexibility at Work

Companies that employ most of their employees from the millennial circle adopt the organizational culture to uphold "World place democracy." Democracy is applied to every element of the company, they have the same voice, and they do not separate the rights of permanent and non-permanent workers. The company implements a democratic system because it realizes that what workers like among millennials is openness. A strong organizational culture, one of which is a democratic culture, will further improve the performance of millennial generation workers to be better and willing to work with colleagues, become a solid team at work so that the company's goals can be achieved [33].

One of the democratic systems implemented by one of the companies sampled is in the financial and accounting aspects. Companies in the remuneration system do not measure based on working hours but rather measure units of results; branches of results are first broken down into several phases. For example, there is a management phase, a mentoring phase. Several managers appointed by the company will monitor each step of the project, namely labor management, finance, project management, and administration. Each stage has a large output resulting from performance and is given a weight to determine each employee's remuneration. This system is suitable to be applied considering the characteristics of millennial workers who prefer flexibility in their work. Companies with millennial employees need to provide flexibility, flexibility, and comfort to reduce pressure at work and increase employee involvement in various activities, both formal and non-formal [34].

Another strategy used by the company in dealing with millennial workers who tend to choose flexibility in their work is to use their professional management system in the sense that employees work based on output so that personal interaction is not too significant, the company asks employees after the project is finished if you want to stay on the platform
company. The only permanent employees are project managers; the company does not entrust management to freelancers. The project manager is tasked with monitoring each employee connected through the platform, reminding the deadlines of the work that must be fulfilled; everything is done online to create flexibility and sustainable management. The unique characteristics of the millennial generation and the need for flexibility in working are a challenge for companies, so companies that cannot offer flexibility and space for creativity make it difficult for millennials to be involved in a company [35]. If someone wants to work with an unspecified working time, then he will be hired by the project. If he wants to become a permanent employee or join the team, he must follow the rules of the specified working hours.

To regulate the working hours of the millennial generation, the most crucial thing to apply is discipline. The company thinks that having to do overtime work is not good. Overtime conditions occur because of wrong planning; overtime mirrors failure in planning. There are only two choices, that is Work hard or Work Smart. If you need to work hard, it's better to replace labor with machines, but if work bright is a different matter, you need quality, effective, and efficient human resources in carrying out the work. The company enforces working hours discipline for all employees, but this does not apply to startup founders. There are no weekends and no working days for startup founders because all days are fun for them. However, what needs to be encouraged within the company is the need for work arrangements on weekdays and holidays on holidays. By carrying out work during working hours, regular work will be longer and produce more results compared to marathon work but, in the end, must be rested when workers become sickly; the concept of life is balanced must constantly be reminded of millennial workers. When company leaders can give Millennial Generation employees the freedom to achieve a balanced work-life and personal life, relationship satisfaction with superiors will also increase [14].

The millennial workforce is also doing job crafting by creating programs that can integrate work and personal life to improve their performance [36]. Job crafting has three dimensions: task crafting, relational crafting, and cognitive crafting [37]. Bakker added one more size to job crafting, optimizing job demand and completing tasks more efficiently [38].

**Facilitation for Expressing Aspiration**

The company provides the broadest possible platform for millennial generation employees to express their aspirations, innovations, and desires to increase their productivity. Among the efforts made by the company's management is to provide rewards for employees who provide creative and innovative ideas. The company also facilitates millennial generation employees to express their wishes and complaints openly through meeting regularly held events or other media. The conflict resolution factor in the quality of work-life that can be improved is submitting complaints so that leaders can develop negotiating practices in conflict management [29]. Generation Y prefers to deal in solving problems [39]. If the company is deemed unable to provide the right platform for their creative ideas, millennial generation employees will feel dissatisfied and raise turnover intentions [40], [41].

**The Company's Efforts To Bridge Across Generations in the Workplace**

Millennial Generation employees are faced with various challenges and demands in the workplace. The first demand is the demand to adapt to senior employees from the previous generation and have different characteristics. The method used by the company to be able to
bridge the millennial generation with the baby boomer generation and generation X is to provide an understanding of strategies to be able to communicate and cooperate effectively with each generation. The perception of millennial employees’ communication is positively associated with job engagement and organizational commitment; they are generally willing to learn and interact with the age above them [42]. Millennials generally seek support from superiors and prefer open information about the organization’s direction [43]. For the baby boomer generation and generation X, education is given to consider the millennial generation to be respected and vice versa. Another way that the company does is to approach it by categorizing generations so that between ages can respect each other and coordinate well.

In the science of team building, there are four stages related to team-building efforts: acquaintance stage, conflict stage, normalization stage, and perform. Millennials who have just joined usually only reach the acquaintance stage; at this stage, millennial generation workers and their superiors have different topics of conversation. Millennial workers prefer to talk about the present while their friends don’t, so conflicts usually arise that must be overcome immediately. The millennial generation has a relaxed, friendly, and egalitarian communication style and avoids the dominant communication style full of control. But at the same time, they want guidance and role models. “Ngemong” is the key and way out for the previous generation to communicate effectively with the millennial generation [44]. The frequency needs to be equalized, and it is necessary to explain to millennial workers that they are not playing games. Must sit together, not sit individually, but after the conflict, will come to a period of mutual understanding, which is called the normalization stage. At this stage, parents understand the will of the young, and the young understand the old’s choice. The last one just entered the stage of performing. Without getting to this stage, there is no productivity; time will run out in a prolonged period of conflict.

The advantage of a company whose 70% of employees are under 30 years old is the millennial generation, which means that companies can have extraordinarily productive assets with a record of having a strategy in handling them. Companies must be able to condition workers from the millennial generation not to threaten other workers from the baby boomers and generation X. Still, they must be prepared to manage the millennial generation. Millennials are necessary, but not everything; millennials do not necessarily have an advantage over previous generations; there is no such thing as a miracle, but they must be directed. They may benefit from gadgets and are aware of technology and wide-open horizons, but they lose parental guidance. There are still many millennial children in Indonesia who can be said to have no parents. Often they imitate things from abroad. For example, they should not just imitate startups abroad but need to be adjusted to the conditions in Indonesia. When Indonesia faces the Demographic Bonus, the Millennial generation in Indonesia can become a problem if it is not directed. In Indonesia, the millennial generation in terms of psychology is still categorized as immature. Most of them have been exposed to the global world when they were in junior high school.

The Company’s Efforts in Guiding Millennial Generation Workers

How to foster millennial children to increase company productivity using the stick and carrot system to manage change and challenges. There are two methods which are complex and soft. From the hard side, company regulations must be firm, including the millennial generation. The company did not apply flexible hours in the early stages but first formed discipline in working hours and resting hours. If you violate, the punishment is explicit. If the employee does
not accept, then the problem is in recruitment; the company must be selective in finding employees willing to be regulated and honest to avoid violations.

The second characteristic is a soft system; there needs to be a knowledge transfer program. Many of the knowledge in the company is the knowledge that is not taught in schools because at school time is very limited. If the company can provide opportunities and facilitate Millennial Generation employees in carrying out career development, Millennial Generation employees will choose to stay in the organization [45]. The company assigns senior employees to train millennial junior workers, such as on-job training or, more precisely, job mentoring, which includes two functions: teaching hard skills and soft skills.

Millennial workers usually have poor soft skills. They should find their weakness in terms of soft skills. In the previous era, it was usually the family environment such as uncle and aunt's parents. Still, nowadays, this does not happen because children, parents, and families are busy with their worlds. Millennials grow up without guidance, and as a result, they do not have adequate soft skills when entering the world of work. Even though they have soft skills, they use a get loss method which means that soft skills are found on the road. Companies can't rely on discovering soft skills like this; companies need to think and ensure how this millennial generation employee can grow.

The most appropriate and essential training for millennial workers is related to discipline. When discipline is established, others will also be awakened. To improve the low work ethic among the millennial generation, it is necessary to develop and improve work ethic through clarity of existing work rules or procedures, accompanied by firm action for those who violate and providing development and training related to work ethic [27]. In addition, the company offers training related to good work ethics, for example, the importance of working hard to achieve success, whether personal or company goals. Here, the leader (supervisor or manager) role model is vital in creating an ethical climate in the organization [46]. Employees who are millennials have high learning agility; the company takes advantage of the potential of the millennial generation, where this generation has a strong desire to grow, learn, is ready for change, and wants flexibility and challenges. With attention to mentoring and coaching from the company's management where employees work, the millennial generation learning agility can help organizations prepare organizations of talents to lead the future [47].

**Millennial Generation Employee Recruitment System**

Companies must provide a clear view to prospective millennial workers during the recruitment process. Companies must explain the conditions and capabilities of the company and what millennial job candidates can expect. At the same time, the company explores from prospective employees what they expect and what the future will be like. Some companies are looking for millennials who have a desire to develop their business. For prospective workers who do not want to make a company listed, they will be placed at number one; many companies prioritize millennials who want to create a company or have created a company. This is related to one of the advantages of the millennial generation, which is the entrepreneurial spirit. Millennial leadership needs to encourage innovation, creativity, and the entrepreneurial spirit of the new age. All channels of invention, creativity, and entrepreneurship must be well designed and concrete [48].

Millennials, in general, when they are looking for work, first look for vacancies from the internet, then look in newspaper advertisements, then look on the company website, lastly from friends. Meanwhile, in that company, if there are vacancies they look for from friends first, then to HRD, post the last advertisement, so that excellent job vacancies are rarely advertised.
The millennial generation needs to be directed and given career consultations on getting an excellent job by not changing jobs and building good relationships with superiors. The question is, what if the company is deemed not to make its employees grow? That means prospective workers have to choose from the beginning whether the company to be selected allows them to grow or not. Often future workers decide to work in the company without careful consideration, just based on reviews rather than being unemployed. The company is also like that, often accepting half-hearted workers to stay in the company without a significant contribution. So when a company does recruitment, it must be honest with prospective employees; if a small company has to say small, see if the prospective employee can help the company become big. But if the company that will recruit employees is large, they will prefer people who are motivated to get achievements to help the company become even more significant.

Errors often occur during recruitment, either by the company or by the applicant. Many companies are also dishonest with applicants. It is necessary to educate companies to be transparent from the start. Still, some companies care and are concerned that they don't want just to hire & fire and pay attention to their company's growth by paying attention to a sound recruitment system.

5 Conclusion

In dealing with workers who come from the millennial generation, companies must have a special strategy so that they can explore their potential to be able to increase their work productivity. Companies must apply discipline rules to millennial workers without any offers, because they still need to shape themselves, they still need time to learn and build discipline within themselves. Companies must also be selective in the recruitment process if they want to increase productivity. To facilitate the quality improvement of millennial workers, companies must have a knowledge transfer program for the development of millennial workers so that they can use their potential optimally. Another facility that must be provided by the company is to provide a platform for the millennial generation to express their aspirations so that they can explore their innovative and creative ideas. To be able to create a conducive work environment, the company must bridge communication and coordination between the millennial generation and previous generations so that a harmonious relationship can be created.

References


Effect of Good Corporate Governance and Investor Protection on Real Activity Manipulation (RAM) in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)

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Abstract. This research aims to investigate the Good Corporate Governance and Investor Protection to Real Activity Manipulation. This research data are 1,202 manufacturing financial statements listed on the stock exchange in 2017 in three ASEAN countries (Indonesia, Malaysia, and Singapore) obtained from the OSIRIS database, which was selected by a purposive sampling technique. The data analysis technique used is the multiple linear regression analysis tests. This study shows that the Audit Committee, Managerial Ownership, and Board of Commissioners Composition have no significant effect on Real Activity Manipulation. In contrast, Board of Commissioners Size and Investor Protection have an impact on Real Activity Manipulation.

Keywords: Audit Committee, Managerial Ownership, Board of Commissioners Composition, Board of Commissioners Size, Investor Protection, Real Activity Manipulation.

1. Introduction

Company management is required to describe the actual performance, even the best financial condition of the company. It is related to efforts to maintain the company's position in the industry and management awards. In the end, the company's management unwittingly manipulated financial reporting through earnings management practices so that the company's performance looks good [1]. Managers' opportunistic behavior to practice earnings management is done by choosing specific accounting methods or policies to increase profits or reduce profits [2]. According to Graham et al. [3], top management is more willing to engage in real earnings management practices rather than accrual management practices to meet earnings targets. Roychowdhury [4] states that the phenomenon of earnings management carried out by companies in addition to accrual-based earnings management is also the practice of real activities.

According to Roychowdhury [4], the shift from accrual to real earnings management is motivated by a number of factors. To begin, accrual earnings management is more likely to attract auditors and regulators' attention than accurate decision-making. Second, managers who rely solely on accrual earnings management will be exposed if the year-end gap between manipulated earnings and the desired profit target exceeds the amount that can be controlled through accrual earnings management after the fiscal period ends [4][5].
Earnings management through real activity manipulation is earnings management that starts from normal operating practices, motivated by the desire of managers to trick stakeholders into believing that some financial statement objectives have been achieved through normal functional activities. Real earnings management may have a higher long-term cost to stakeholders than accrual earnings management, as real earnings management has a detrimental effect on cash flow and firm value over time [4][6].

Good corporate governance promotes healthy competition and a favorable business climate. As a result, it is critical for businesses in Indonesia to practice good corporate governance in order to foster long-term economic growth and stability. The implementation of Good Corporate Governance is also estimated to boost the government's efforts to compel companies to adhere to Good Corporate Governance [5]. The purpose of implementing Good Corporate Governance principles is to achieve effective and efficient company performance through management alignment. Harmonization of company management is expected to reduce earnings management practices. Exemplary corporate governance implementation requires several tools as indicators of whether or not Good Corporate Governance has been achieved. Good Corporate Governance in this study includes Managerial Ownership, Composition of the Board of Commissioners, Size of the Board of Commissioners, and the Audit Committee.

In addition, Good Corporate Governance is needed for Investor Protection to protect investors' rights in a country against errors and fraud that occur in a company that goes public. Investor protection is a significant determinant of earning management activities. Investor protection is the right regarding accounting statements and regulations, which provide investors with the information they need to test other rights [7]. This insight shows that the pervasiveness of earnings management increases in private control gains and decreases in investor protection. Based on the description stated above, this study analyzes the effect of Good Corporate Governance and investor protection on Real Activity Manipulation.

2. Literature Review
2.1. Agency Theory

Agency theory emerged driven by several research results by Jensen and Meckling [8], which discussed agency relationships using the analysis of a contract between agents and principals, so they are famous for being the originators of agency theory. According to Jensen and Meckling [8], agency relationships exist when one or more additional individuals are referred to as agents. The principle delivers a service and empowers the agent to act on the principal's behalf. The agency theory can be used to justify management's practice of revealing accounting and non-accounting information to principals, shareholders, creditors, potential investors, and other interested parties. The principal-agent relationship frequently involves a conflict of interest, which results in information asymmetry.

Asymmetry in information occurs when management is more adept at controlling information than owners and shareholders are. Individuals act to maximize their own self-interest, according to agency theory. The agent's information asymmetry will encourage the agent to conceal some information that is not known to the principal. So that in this kind of situation, the principal is often at a disadvantage [9]. Eisenhardt [10] explains that the purpose of agency theory is to resolve the problem of conflict between agents (management) and principals (owners).
2.2. Real Activity Manipulation

Real activity manipulation is part of earnings management practice. Real activity manipulation is a deviation through regular operational procedures, motivated by managers who want to lie to stakeholders to believe the financial statements provided and show the causes of changes in the company's operating activities [4].

According to a survey conducted by Graham et al. [3], financial executives expressed a greater desire to manipulate earnings via real activity manipulation than through accrual manipulation. Managers use this method for at least two reasons. To begin, accrual manipulation is more likely to influence auditors or regulatory security than it is to influence accurate pricing and production decisions. Second, accrual manipulation carries a higher risk. Manipulation of real-world activities has the potential to diminish the value of a business. It may occur as a result of actions taken in the current year to increase profits having a negative effect on future cash flows.

Measurement of real activity manipulation in the Roychowdhury [4] model focuses on three calculation components, as follows:

a. Abnormal cash flow operation
Abnormal cash flow operation is the manipulation of profits by the company through operating cash flows. The company will have a lower cash flow than the average level. The estimated residual value of operating cash flows is the value of abnormal operating cash flows.

b. Abnormal production cost
Abnormal production cost is earnings management activities carried out by manipulating the company's production costs. The company will have higher production costs than its average level. The residual value of production costs is abnormal production costs.

c. Abnormal discretionary expenses
Abnormal discretionary expenses are profit manipulation activities through research and development costs, advertising costs, sales, administration, and general costs. The residual value obtained from discretionary costs is the value of abnormal discretionary expenses.

2.3. Good Corporate Governance

Corporate governance is a mechanism that can be used to ensure that financial suppliers or owners of company capital obtain returns from activities carried out by managers. In other words, how the company's financial suppliers exercise control over managers. Additionally, corporate governance provides a structure for establishing a company's goals and determining performance monitoring techniques. Implementing a corporate governance mechanism is expected to reduce managers' desire to manipulate reported performance in order to ensure that it accurately reflects the company's economic condition [2].

The Study Team of the Ministry of Finance of the Republic of Indonesia [11] has conducted a comprehensive study of Good Corporate Governance guidelines in three member countries of The ASEAN Capital Market Forum (ACMF), namely: Indonesia, Malaysia, and Singapore. Several aspects discussed in the study and relevant to this research are as follows:

a. Methods of Applying Guidelines and Sanctions
The implementation of Good Corporate Governance guidelines by listed companies such as stock exchanges in Malaysia, Singapore, Thailand, and the Philippines is to comply and
explain (companies are expected to apply all aspects of the guidelines). Meanwhile, in Indonesia, the implementation of Good Corporate Governance guidelines is not regulated by either the stock exchange or capital market authorities, so there is no obligation for companies to implement these guidelines (voluntarily). However, if the company does not implement the GCG aspect, the policies explain this matter.

b. Independent Commissioner

In general, the composition of independent commissioners belonging to ACMF member countries is one-third of the total number of commissioners, or at least three people. However, only the Philippines determines the number of independent commissioners to be less, namely at least two people or 20% of the total number of the Board of Commissioners.

c. Directors

The board of directors' composition is generally not quantified in the Good Corporate Governance Guidelines. However, the number of board members must be proportionate to the complexity of the business, taking decision-making effectiveness into account. In a country with a single board system (in which the board of directors and the board of commissioners have the same functions), the composition of the board of directors includes the board of commissioners as a unit. Meanwhile, in countries that use a two-board system (separating the functions of the board of directors and the board of commissioners), the composition of the board of directors and the board of commissioners are separated, with the composition or number of directors covering only the management function of the company.

Countries use the one board system (Malaysia and Singapore) separation of roles and responsibilities by separating the roles and functions of the board chairman (generally as independent commissioners) and the Chief Executive Director. Separation to achieve a balance of power, increase accountability and provide greater capacity for independent decision-making. Both positions are required to be held by two different individuals.

d. Establishment of the Committee by the Commissioner

The existence of independent commissioners on the board of commissioners and the committees formed is essential. Generally, the guidelines will only regulate the minimum quantity, composition, capability, and integrity requirements that must be met. The design of audit committee members required by Indonesia, Malaysia, Singapore, and the Philippines is a minimum of three people. At the same time, Thailand does not determine the minimum number of audit committees. In the audit committee chairman, Malaysia does not explicitly require that the audit committee chairman is an independent commissioner. Unlike Malaysia, the other four countries require otherwise. Generally, the educational background necessary for audit committee members is accounting or finance. Some of the committees recommended in the GCG guidelines from the three countries are the nomination committee and the remuneration committee. Two additional committees are recommended in Indonesia, namely the risk policy committee and the corporate governance policy committee.

2.4. Investor Protection

Investor protection is a right regarding accounting statements and regulations, which provide investors with the information they need to test other rights [7]. Many capitals or financial market developments create better external financing opportunities for companies because the legal system protects investors by giving them disciplinary rights.
Different laws and regulations regarding investor protection can come from various sources, including corporate, security, bankruptcy, takeover, legal competition, and capital market regulations and accounting standards. The implementation of the law is a crucial part of this content. In some countries, rules and regulations are partly part of market regulation, part courts, partly to their market participation. Therefore, all outside investors, whether small or large, all need the protection of investor rights [12].

Investor protection is calculated through five dimensions adapted from House et al. [13]. The five dimensions are:

a. Board independence
   The board of directors has a vital role as an independent supervisor of management activities and a protector of stakeholders' wealth. The separate part of the board of directors can reduce interest problems that arise from differences in interests between shareholders and company management through monitoring management behavior.

b. Enforcement of securities law
   Enforcement of legal protection can prevent profit manipulation by internal parties in increasing profits on company shares.

c. Protection of minority shareholder rights
   Countries with lax protection for minority shareholders provide an important impetus for managers to make financial fraud. According to La Porta et al. [12], countries with strong investor protection will increase minority share rights and resolve conflicting interests between internal and external parties.

d. Enforcement of accounting and auditing standards
   The application of accounting and auditing standards correctly provides a narrow space for management and auditors to make mistakes in financial statements. High-quality accounting standards reduce analytical errors in reports.

e. Judicial independence
   A country may have a well-functioning legal system but weak enforcement of accounting regulations. However, it would be difficult to imagine a situation where the legal system is flawed, but enforcement of accounting regulations is substantial.

The five dimensions have a value range of 1 to 7, where the number 7 indicates the high value of the investor protection dimension in that country. The value of the investor protection dimension is sourced from the World Economic Forum (WEF), which is then aggregated to obtain the value of investor protection for each country [13].

2.5. The Effect of Audit Committee on Real Activity Management

The audit committee has performed admirably in assisting the board of commissioners in carrying out its duties and functions and acting independently in carrying out its responsibilities to prevent the company from improving its earnings management practices [5]. The board of commissioners establishes the audit committee to oversee the company's management. The audit committee's existence is critical to the management of the company because it is one of the control systems that connects the shareholders and board of commissioners to the management [2].

H1: Audit Committee effect on Real Activity Management in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)
2.6. The Effect of Managerial Ownership on Real Activity Management

According to Boediono [14], a certain percentage of management ownership tends to influence earnings management actions. According to this study, the higher the managerial ownership structure, the more likely management will act in the shareholders' best interests. Kusumawati et al. [2] provide empirical evidence that managerial Ownership can limit managers to perform earnings management. Organizational objectives are in line with shareholder goals, so the supervision of the company will be more effective and make managers more careful in carrying out earnings management practices.

H2: Managerial Ownership effect on Real Activity Management in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)

2.7. The Effect of Board of Commissioners Composition on Real Activity Management

The growing number of independent board members in a company necessitates greater transparency in financial reporting. This means that the greater the proportion of independent commissioners in a business, the more earnings management can be reduced [2]. The board of directors' composition is one of the characteristics that correlates with the content of earnings information. The composition of the board of commissioners, through its supervisory function, can influence management in preparing financial reports, resulting in a high-quality earnings report [5]. Hidayanti et al. [5] investigated the relationship between corporate governance practices and earnings management. The findings indicated that the proportion of independent commissioners had a beneficial effect on the company's earnings management.

H3: Board of Commissioners Composition effect on Real Activity Management in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)

2.8. The Effect of Board of Commissioners Size on Real Activity Management

Chtorou et al. [15] discovered that the size of the board of commissioners has a significant negative effect on earnings management, as measured by the modified Jones model. This indicates that the fewer commissioners on the board, the more earnings management acts, as fewer commissioners allow management to dominate the organization in carrying out its role. Kusumawati et al. [2] demonstrate empirically that the size of the board of commissioners has an effect on company's earnings management practices. A positive sign indicates that an effect has occurred. This indicates that an increasing number of members of the board of commissioners have maintained their current earnings management practices.

H4: Board of Commissioners size effect on Real Activity Management in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)
2.9. The Effect of Investor Protection on Real Activity Management

Conflicts of interest between shareholders/investors and company managers often occur in the business world. External parties, in this case, namely investors, have the interest to benefit from the profits obtained by the company through the distribution of dividends. A reasonable profit also shows the company's condition is in good condition. On the other hand, the company's internal parties, in this case, are company managers who have an interest in showing good company performance for a purpose or even personal benefit. The presentation of financial statements is one of the company's performance measurement tools in a period given to internal parties. Managers are required to present optimal profits to provide good reports to shareholders and attract new investors. Therefore, many managers manipulate earnings to present good company financial statements.

Leuz et al. [7] found that countries with strong legal protections reduce the incentive for managers to perform earnings management through accrual manipulation. Therefore, the researcher assumes that managers prefer to manipulate earnings through actual activity manipulation rather than accrual manipulation with strong investor protection. Accrual manipulation is easier to detect, while real activity manipulation can be a subjective activity, and the auditor may have limited ability to ensure manager decisions related to real activities.

H5: Investor protection effect on natural activity management in Three ASEAN Countries (Indonesia, Malaysia, and Singapore)

3. Research Methods
3.1. Research Design

This study uses a quantitative approach based on secondary data obtained through an official database, then analyzed using statistical calculations. This research was conducted by taking secondary data obtained through financial reports and investor protection index through the World Economic Forum website and other relevant sources.
3.2. Population and Sample

The population used in this study are companies in member countries of The ASEAN Capital Market Forum (ACMF) listed in the OSIRIS database. The countries of Indonesia, Malaysia, and Singapore were then selected as samples. The three countries have almost similar Good Corporate Governance policies.

Sampling was carried out in this study with the non-probability sampling method, the purposive sampling method. Purposive sampling or sampling-based on specific considerations involves selecting subjects who are in the most advantageous place or in the best position to provide the necessary information [16].

The considerations used in this study are as follows:

a. The sample is companies in Indonesia, Malaysia, and Singapore, because these three countries have almost similar good corporate governance guidelines compared to the other two countries. The purpose of the three-country sampling is also to ensure equality of the sample in performing statistical tests.

b. Not included in the type of banking industry, financial institutions, and State-Owned Enterprises (regulated industries)

c. financial reporting period in 2017

d. Complete financial report information

3.3. Operational Definition and Measurement of Research Variables

3.3.1. Real Activity Manipulation

Real activity manipulation is part of earnings management practice. Real activity manipulation is a deviation through everyday operational practices, motivated by managers who want to lie to stakeholders to believe the financial statements provided and show the causes of changes in the company's operating activities [4].

The value of actual activity manipulation is obtained from the equation that has been developed by Roychowdhury [4]. In calculating the real activity manipulation, the classical assumption analysis was not carried out first in the regression test. It is because the researcher will only take the standardized value obtained from the equation. This study will use three main components in the calculation of real activity manipulation as follows:

a. Abnormal cash flow operation (Abn_CFO)

   \[ \text{CFO}_t / \text{A}_{t-1} = \alpha_0 + \alpha_1 \left(1 / \text{A}_{t-1}\right) + \beta_1 \left(\text{S}_t / \text{A}_{t-1}\right) + \beta_2 \left(\Delta \text{S}_t / \text{A}_{t-1}\right) + \epsilon_t \]

b. Abnormal production cost (Abn_Prod)

   \[ \text{PROD}_t / \text{A}_{t-1} = \alpha_0 + \alpha_1 \left(1 / \text{A}_{t-1}\right) + \beta_1 \left(\text{S}_t / \text{A}_{t-1}\right) + \beta_2 \left(\Delta \text{S}_t / \text{A}_{t-1}\right) + \beta_3 \left(\Delta \text{S}_{t-1} / \text{A}_{t-1}\right) + \epsilon_t \]

c. Abnormal discretionary expenses (Abn_Disexp)

   \[ \text{DISEXP}_t / \text{A}_{t-1} = \alpha_0 + \alpha_1 \left(1 / \text{A}_{t-1}\right) + \beta_1 \left(\text{S}_{t-1} / \text{A}_{t-1}\right) + \epsilon_t \]

Chi et al. [17] stated that real activity manipulation is a standardized amount obtained from the three components' regression equation. The following is the calculation formula for real activity manipulation:

\[ -\text{standardized Abn_CFO} + \text{standardized Abn_Prod} - \text{standardized Abn_Disexp} \]
3.3.2. Good Corporate Governance (GCG)

Corporate governance is a mechanism that can reassure investors that they will earn a profit on their investment. Corporate governance is concerned with the extent to which investors believe managers will benefit them and the extent to which investors exercise control over managers.

Good Corporate Governance indicators are as follows:

a. Audit Committee
The board of commissioners forms the audit committee to carry out the task of supervising the management of the company. The existence of the audit committee is one of the controls in the company that connects the shareholders and the board of commissioners to the management. The Audit Committee is measured based on the company's percentage of the independent audit board [2] [5].

b. Managerial Ownership
Boediono [14] provides empirical evidence that the motivations of managers as shareholders and those not as shareholders are different. Share ownership owned by a manager will influence decision-making in determining accounting policies and methods to be applied in the company. Managerial Ownership is measured based on the percentage of shares owned.

c. Board of Commissioners Composition
Through its supervisory function, the composition of the board of commissioners is one of the characteristics associated with the information content of earnings. The board of commissioners' composition is quantified by the percentage of the board owned by the company [5].

d. Board of Commissioners Size
The size of the Board of Commissioners is determined by the number of board members in the company. This amount is disclosed and presented in the company's financial statements' notes [5].

3.3.3. Investor Protection

Investor protection is the right regarding accounting statements and regulations, which provide investors with the information they need to test other rights [7]. Investor protection is calculated through 5 dimensions: board independence, enforcement of securities law, protection of minority shareholder rights, enforcement of accounting and auditing standards, and judicial autonomy [13].
4. Results and Discussion

4.1. Research Result

This study uses annual report data from 2,866 companies listed on the Stock Exchange in three ASEAN countries: Indonesia, Malaysia, and Singapore. The data was obtained through the OSIRIS database with the 2017 financial reporting period. The company data in this study were only companies outside of banking companies and financial institutions. However, from this number, 1,012 data did not meet the research criteria and 652 outliers. Based on these results, 1,202 company financial statement data can be processed further (see table 1).

<table>
<thead>
<tr>
<th>Description</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>2.866</td>
</tr>
<tr>
<td>Data that does not meet the criteria</td>
<td>(1,012)</td>
</tr>
<tr>
<td><strong>Outlier Data</strong></td>
<td>(652)</td>
</tr>
<tr>
<td>Data used in research</td>
<td><strong>1.202</strong></td>
</tr>
</tbody>
</table>

Source: Primary data processed

The distribution of company data in this study can be described in Figure 2 below.

Based on Figure 2, there are 365 (30%) company data from Indonesia, 477 (40%) company data from Malaysia, and 360 (40%) data from Singapore. Figure 2 also explains that most of the data is obtained from Malaysia because Malaysia has more companies outside banking and other financial institutions than the other two countries.
Before further analysis, the data in this study will go through the classical assumption test as a prerequisite for performing multiple regression analysis and testing the hypothesis of this study using multiple regression.

Table 2. Multiple Regression Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Coefficients (B)</th>
<th>t count</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.447</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit Committee</td>
<td>-0.020</td>
<td>0.020</td>
<td>0.483</td>
</tr>
<tr>
<td>Managerial Ownership</td>
<td>-0.021</td>
<td>-0.021</td>
<td>0.470</td>
</tr>
<tr>
<td>Composition BoC</td>
<td>-0.005</td>
<td>-0.005</td>
<td>0.927</td>
</tr>
<tr>
<td>Size BoC</td>
<td>-0.127</td>
<td>0.127</td>
<td>0.025</td>
</tr>
<tr>
<td>Investor Protection</td>
<td>-0.085</td>
<td>-0.085</td>
<td>0.038</td>
</tr>
<tr>
<td>R</td>
<td>=</td>
<td>0.102</td>
<td></td>
</tr>
<tr>
<td>R Square</td>
<td>=</td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td>F count</td>
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</tr>
<tr>
<td>Sig. F</td>
<td>=</td>
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<td></td>
</tr>
<tr>
<td>Alpha (a)</td>
<td>=</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>=</td>
<td>1.202</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data processed

Table 2 describes the test results between the independent variables (audit committee, managerial ownership, composition of the board of commissioners, size of the board of commissioners, and investor protection) to the dependent variable (actual activity manipulation).

4.2. Discussion

4.2.1. Audit Committee on Real Activity Management

The effect of the audit committee on real activity management can be seen in Table 2, which shows a significance value of 0.483. This value means that the audit committee does not affect the real activity management variable. Research by Hidayanti et al. [5] shows that the audit committee does not affect real activity management. There is no effect because establishing an audit committee by the company is mandatory against existing rules. The audit committee's role in carrying out its duties and functions has not been maximized. This analysis supports Susanto and Pradipta's findings [18]. The Audit Committee is an external party to the company that lacks information related to actual activities in the company.

4.2.2. Managerial Ownership on Real Activity Management

The effect of managerial ownership on real activity management can be seen in Table 2, which shows a significance value of 0.470. This value means that managerial ownership does not affect the real activity management variable. The greater managerial ownership does not change opportunistic attitudes and behavior towards the practice of real activity manipulation. The administrative ownership structure, which is insignificant in number, can be said that the management cannot move freely in determining policies and making decisions like shareholders. The results of this study are different from Agustia [19] and Susanto et al. [18].
Managers who own shares in their companies tend to take policies to manage earnings related to the wishes of investors. For example, increasing profits generate investor interest and raises the company's stock price.

4.2.3. Board of Commissioners Composition on Real Activity Management

The effect board of commissioners' composition on real activity management can be seen in Table 2, which shows a significance value of 0.927. This value means that the board of commissioners' piece does not affect the real activity management variable. The study results are consistent with the research of Hidayant [5], and Susanto et al. [18] showed no effect board of commissioners composition on actual activity manipulation. The number of commissioners has no effect on the real earnings management action. The findings of this study contradict those of Kusumawati et al. [2] and Jao et al. [20], which indicated that the composition of the board of directors has a detrimental effect on real activity manipulation.

4.2.4. Board of Commissioners size on Real Activity Management

The effect of board of commissioners size on real activity management can be seen in Table 2, which shows a significance value of 0.025. This value means that the size of the board of commissioners affects the real activity management variable. The study results indicate that the number of existing boards of commissioners affects the behavior of managers towards actual activity manipulation control activities in the company. The size of the board of commissioners is a determining factor for the company's management. This study is inconsistent with the research of Kusumawati et al.[2] and Boediono [14].

4.2.5. Investor Protection on Real Activity Management

The effect of investor protection on real activity management can be seen in Table 2, which shows a significance value of 0.038. This value means that investor protection affects the real activity management variable. Research shows that Investor protection involves real activity manipulation. Investor protection is seen from 5 dimensions, namely the board of directors' independence, enforcement of legal safety, security of minority shares, enforcement of accounting & auditing standards, and judicial autonomy [13]. The board of directors plays an independent supervisory role and minimizes conflict of interest between shareholders and management. Enforcement of legal protection can prevent profit manipulation. Protection of minority shares can reduce problems of external and internal interests. Applying quality accounting standards can eliminate fraud for management to commit fraud an independent legal system to enforce good law.
5. Conclusion

The result of this study, as follows. Audit committee has no effect on the real activity management, managerial ownership has no effect on the real activity management and board of commissioners composition has no effect on the real activity management. Size of the board of commissioners affects the real activity management and investor protection affects the real activity management.

Some suggestions can be given based on the results of the analysis of this study. The culture of Good Corporate Governance in each country is different. The differences in GCG can be used for the development of further research for other countries. Several countries have significantly upgraded their investor protection systems in order to facilitate the implementation to IFRS. Variables at the company level frequently vary in a systematic manner across countries. For instance, government ownership, family shareholders, and institutional ownership.

References


Relationship Between Education History, Income, Employment Status with Quality of Life in Elderly

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Abstract. Elderly need social and economic support. To improve the quality of life of the elderly, socioeconomic demands can be satisfied. This study aims to analyze the relationship of education history, income, employment status with the quality of life in the elderly. The method used study cross-sectional and analysis bivariate was used to test Chi-Square. The participants in the study were over 60 years old (n=145). A self-identity questionnaire was used to collect information on education, income, and employment status during the interview. The WHOQOL-BREF questionnaire was used to assess the quality of life in the elderly. The results show a significant (p = 0.020) relationship between income and elderly quality of life. There was no significant relationship between elderly quality of life and educational history (p=0.327) or employment status (p=0.495). Because the income obtained was less than the minimum wage of Rp. 1.829.500, made elderly's quality of life decreased

Keywords: elderly, employment status, income, quality of life

1 Introduction

According to the 2019 Elderly Population Statistics, Indonesia has 25.64 million elderly persons or 9.6% of the population. With 13.36 percent of the population, Central Java is the province with the most elderly people. The elderly make 16.59% of the population of Sragen Regency, putting Indonesia's elderly population at 9.6% [1]. The elderly suffer from disabilities, and their infirmity lowers their quality of life [2]. Physical, psychological, environmental, and social ties all affect senior people's quality of life, according to the World Health Organization [3]. Elderly need social and economic support [4]. To improve the elderly's quality of life, socioeconomic needs must be satisfied [5].

Education is important to people's lives and can be beneficial [6]. How easy it was to handle information and apply new knowledge is determined by the type of education received [7]. The elderly have a low degree of education, and there are numerous elderly persons [8]. With a high level of education, people will learn to make the best decisions for themselves. Even said, a lack of schooling did not always prevent people from learning from other sources, such as television, newspapers, radio, and other people's experiences that might be used as references for elderly[9].

Salary, rent, interest, profit, and other forms of income were all examples of income [6]. Elderly with sufficient income are less likely to have financial difficulties and are better able to
meet their daily demands[10]. It will be difficult for the elderly with low income to achieve their fundamental necessities[8].

Based to the Governor of Central Java's Decree on November 20 No. 561/61 of 2020 about Minimum Wages in 35 Regencies and Cities in Central Java, Sragen Regency chose the third-lowest minimum salary[11]. Due to a decline in physical, mental, and social abilities, the elderly are unable to carry out their full range of activities as they formerly did when they were younger[12]. The purpose of this research is to look into the relationship between the elderly's education, income, employment status, and quality of life.

2 Research Methods

This study was conducted in March-April 2021 and is an analytic observational study with a cross-sectional design. The participants in this study were senior adults aged 60 and up living in the Sragen region of Central Java, with a total of 145 people selected using a purposive random sampling technique. Subjects were chosen based on inclusion criteria, such as living with elderly families, being willing to participate in the study as a sample, being over 60 years old, and being able to hear, read, and write. Being sick or hospitalized, having a stroke, or being sick during the trial were all exclusion criteria. Cluster sampling was used to determine the locations of health centers in both urban and rural areas.

The data was gathered using an interview method and a questionnaire on subject characteristics and the WHOQOL-BREF quality of life. Data on education background, income, and employment status were included in the subject characteristics questionnaire. No school, elementary school, junior high school, high school, and college are all included in the educational history data. More than the IDR 1.829.500 Regency Minimum Wage and less than the IDR 1.829.500 Regency Minimum Wage are included in the income data. Working and unemployed individuals are included in the employment status data. The WHOQOL-BREF quality of life questionnaire includes 26 items in four areas, with a satisfaction measure (Likert scale) ranging from 1 to 5. The questionnaire's responses are then interpreted into a standardized calculation table, which can be classified as good or unsatisfactory quality of life based on a 60-point cut off.

Ms. Excel and SPSS software 18 were used to analyze educational history, income, and work status. Data on characteristics like education history, income, nutritional condition, and elderly quality of life were included in the bivariate analysis. The chi-square bivariate analysis was used with a confidence level of =0,05.

3 Results and Discussion

Table 1 shows the association between education, income, and employment status and the elderly's quality of life using bivariate analysis and chi-square. According to the findings, the elderly who did not attend school had a low quality of life of 6.9%, and the elderly who only attended primary school had a poor quality of life of 9.0%. Based on statistical test results with a p-value more than 0,05, it may be stated that there is no link between educational background and elderly people's quality of life.
Table 1. Results of an analysis relationship between education history, income, employment status, and quality of life in elderly

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<td>Senior High School</td>
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The elderly with a regency minimum wage of less than Rp 1.829.500 had a poor quality of life, accounting for 46.2% of the population. There was a relationship between income and the quality of life of the aged, according to statistical test analysis with a p-value of 0.05. With a risk of 2.556 times, the elderly with a low Regency Minimum Wage income of IDR 1.829.500 had a dismal quality of life. The quality of life for the elderly who did not work was dismal. There was no association between work status and the quality of life of the elderly, according to statistical test analysis (p-value > 0.05). With a risk of 0.724 times, the elderly who did not work had a low quality of life.

Education History
Based on the results of statistical tests, the chi-square p-value for education history and the quality of life in the elderly was 0.327, indicating that there was no relationship between the two. This contradicted Indrayani's research [3], which found a p-value of 0.022 for a significant link between education and quality of life elderly. In comparison to elementary school, junior high school, and no school, the elderly with a history of high school education and above had the highest health status. The elderly's health improves as their education level increases. Conversely, the lesser one's education, the poorer one's health [13]. The capacity of the elderly to receive health information might be hampered by their lack of knowledge [14].

Income
The chi-square test yielded a p-value of 0.020, indicating that there is a link between income and the elderly's quality of life. The probability of poor quality of life was 2,556 times higher in older persons with a low regency minimum income of IDR 1.829.500. This was consistent with Wikananda's research [15], which found that a low-income level of 37.8% was linked to poor quality of life. The elderly's wellbeing is good in terms of meeting their needs based on the percentage of income. Sufficient living needs were linked to increased social contacts and improved quality of life [16].
Employment Status

In this study, the Chi-square statistical test yielded a p-value of 0.495, indicating that there was no relationship between work status and elderly people's quality of life. With a risk of 0.724 times, elderly people who did not work have a low quality of life. This is consistent with Wikananda's research [15], which found that 36.5% of the elderly had a bad quality of life, and 7.9 percent had a poor quality of life because they were did not work. This is due to a decline in physical, mental, and social ability, which prevents the aged from engaging in full-fledged activities such as working.

4 Conclusion

The elderly's quality of life is significantly related to their income. In the meantime, the elderly's quality of life was unaffected by their educational history or employment status. Low income puts the elderly at danger of a low quality of life. Elderly people with low earnings may have financial difficulties and would be unable to meet their basic necessities.

References


The Effectiveness of the Quantum Method on Student Ability in Making a Creative Book

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Abstract. The aim of the study is to find out (1) the application of the quantum method in learning to write creative books in universities, (2) the form of creative books written by students after obtaining creative writing lessons using the quantum method, (3) the number of titles in each creative book that students make, (4) the ability of students to develop their respective creative book building elements, (5) the ability of students to develop the structure of their respective creative books, (6) impressions when writing creative books, and (7) the obstacles experienced by students in writing the creative book. The quantum method is very appropriate to use for learning to write. With three parameters, this method can produce 90 titles of creative books by PBSI students. The three parameters of the process are context, content, and grafting steps. Context is applied in language that can suggest students, uses multi-media, and varies classroom management. The content is adjusted to the essential competencies and achievement indicators. The TANDUR steps are: Cultivate students' understanding and interest, Experience, Name, Demonstrate, Repeat, and Celebrate. Of the 90 titles of creative books by students, they consist of 63 titles of poetry anthologies, 16 titles of short stories collections, four titles of collections of personal experiences, three titles novels, one identification of a group of fairy tales, 1 title of a bookmaking shadow puppet, 1 title of a face painting book, and 1 title of a collection of love letters. In one semester, every student who writes an anthology of poetry, if on average, can register between 51-60 titles of poetry. On average, he writes short stories such as there are five titles, the average person experience is 15 titles, the average novel is 12 stories, 51 love letters, ten fairy tales, four chapters of shadow puppets, and face painting there are six chapters. Overall, students have been able to develop creative works based on their building elements. Students can structure the book well. By the quantum method, 25% of students are imaginative in writing creative books, 22% of students are more creative, 16% of students like to pourput ideas into written form, 16% of students have a sense of pride, 4.4% of students can increase their income. Constraints felt by 25% of students find it difficult to develop ideas that are stopped in the middle of the road, 22% of students find it difficult to relate the theme and flow of content, 16% of students do not understand how to make a good book, and 16% of students often deviate from the article.

Keywords: the effectiveness of the quantum method, the ability of students to make creative books

1 Introduction

One of the efforts to improve the quality of writing learning in universities is to improve the writing learning process by developing science and technology that has entered the era of the industrial revolution 4.0. To fulfill this, it is necessary to have a method that can create a...
fast, interesting/fun, and democratic learning system. The Ministry of National Education (2003:10) has formulated the basic principles of teaching and learning activities: developing logical, critical, creative thinking skills, attitudes, and being responsible for daily habits and behavior through active learning activities.

The main problems of this research are (1) how the application of the quantum method in learning to write creative books in universities is? (2) what kinds of creative books are written by students after learning to write creatively using the quantum method? (3) how many titles in each creative book do students make? (4) how is the student's ability to develop the elements of each creative book builder? (5) how are the students' abilities in developing the structure of their respective creative books? (6) what are the impressions when writing a creative book? And (7) what are the obstacles faced by students in writing the creative book?

Learning with Quantum Method

The term quantum is taken from quantum learning or accelerated learning (dePorter and Hernacki, 2003: 14), accelerated learning or learning quickly (Rose and Nicholl, 2003: 8), and know anything speedily or how to learn quickly (Linksman, 2004). Another term closely related to the quantum method is suggestology or suggestopedia (dePorter and Hernacki, 2003: 14). Suggestion means giving an impression, prompting, opinion, recommendation, advice, or request that comes up for consideration (Echols and Shadily, 1992: 567). In addition, a proposal also means encouragement or influence that can move people's hearts (Depdikbud, 1996: 969). Lozanov, a Bulgarian educator, has conducted experimental research with the suggestology learning model. In conclusion, it is said that suggestion has proven effective in schools and for all types of people of all ages. Proposals can and do affect learning situations and outcomes.

The basis for the development of the quantum method is the opinion of Rose and Nicholl (2003: 125), who explain right that obtaining information quickly, it can be done through various methods visual, auditory, and kinesthetic learning. Linksman (2004: xii) also says that every human people have a speed of learning with different learning styles, such as visual, auditory, notile, and kinesthetic.

In another section, it is explained that learning according to the modern approach is learning that is not only concerned with results, but also processes (Nunan, 1991: 86; Cleary and Michael, 1994: 346; Tompkins, 1994: 7). With the process approach, students are not only dependent on the role of the teacher, but more than that, students are responsible for their learning outcomes. With a process approach, the teacher plays a role in creating a safe and comfortable atmosphere. The class atmosphere in question is physical and intellectual (Temple, Ruth, and Nancy, 1988: 215). In this atmosphere, students may make mistakes without feeling afraid, and students think helped by the teacher to achieve goals. As Tompkins (1990:8) puts it, the failure of the student learning experience is often caused by the teacher's belief that students are unable to learn and there is no enthusiasm for the teacher to help students in carrying out learning activities.

Another modern view of learning is a social activity (Temple et al., 1988: 211; Nunan, 1991: 87; Cox and Zarrillo, 1993: 211). This shows that students can work together with
others in the learning process so that language learning activities will look more realistic. Halliday also said by Halliday (in Cox and Zarrillo, 1993: 211) that children are part of a social community, and children build meaning in a social context.

Based on some of the opinions above, it can be said that the notion of quantum is accelerated learning or fast learning by giving encouragement that can move the hearts of students by utilizing the ability of their respective senses in improving the process and learning outcomes repeatedly and collaboratively.

**Parameters of Learning with Quantum Method**

Three main things that can be used as parameters for implementing the quantum method are context, content, and learning steps (Sukirno, 2010: 64). Context has three forms, that is language, media, and learning environment. The language referred to here is languages used by the teacher to arouse students' enthusiasm for learning Indonesian language activities. dePorter et al. (2002: 17) explains how to create an exciting atmosphere, that is (i) the teacher must use language that can develop learning intentions, (ii) the teacher's language must be able to create a fabric of sympathy and mutual understanding, (iii) the teacher's language can create a cheerful and fantastic atmosphere, (iv) the teacher's language can create a sense of belonging, and (v) teacher behavior can be used as an example for students. All of this is realized by using language that is easy to understand, objective, active, intellectual, friendly, engaging, full of humor, and many words are suggestive.

The media used in this learning is media that can help facilitate the learning process. Three media can be used, that is viewing media, listening media, and listening-view media. Three media are used to help students with different learning styles. The learning environment created through the quantum method is a learning environment that is safe, comfortable, supports the learning process, is relaxed, and has exhilarating. To realize such an environment, two environments must be created, that is physical and atmosphere. The physical environment is created by utilizing physical activity for learning in limb movements, making changes to the appropriate learning place, learning by using various games and competitions. The atmosphere environment creates a comfortable atmosphere, sufficient lighting, the availability of adequate learning media in which there are elements of moving images, dialogue, music, events, and pleasing to the eye.

Learning content creative writing is learning material learning by the essential competencies in the curriculum. Content parameters are embodied in lesson plans and assessment systems other. The lesson plan contains core competencies, critical competencies, achievement indicators, learning objectives, subject matter, learning steps, learning methods, learning media and resources used, and assessment techniques. Learning resources come from lecturers, relevant books, various print, and electronic media, and sources from internet media.

Learning steps Creative writing with the quantum method uses six main steps known as *tandur*: growing, experience, name, demonstrate, repeat, and celebrate (Sukirno, 2016: 22). To grow is to develop students' understanding and interest in teaching materials by suggesting and explaining the schemata of teaching materials to students. Experience is that students immediately explore choosing the materials and learning styles they like. The name is
discussing the results of the identification of learning material elements in group discussions. Demonstrations are students realizing learning activities as the core of learning material in language skills actions. Repeat is to improve student learning outcomes based on suggestions from friends and lecturers to become more perfect. Celebrate is the activity of students and lecturers in determining the assessment of student work through theoretical and practical exams.

Based on the description above, it can be concluded that learning with the quantum method referred to here is the process of accelerating and optimizing student learning outcomes based on sensory abilities and working together by utilizing the use of motivational language and appropriate media and learning resources to create a comfortable learning situation for the achievement of competence with and steps.

Creative Book Writing

The term creative means (1) having the power to create or having the ability to create; (2) is (contains) creative power. Creativity means creative things. Creator means creator or originator of ideas. Creativity means the ability to create (Depdikbud: 1996: 530). So, writing a creative book is an activity of expressing ideas in writing or through writing generate creativity based on thoughts and feelings in the form of writing or essays in the form of books. Examples of creative books are essay books, collections of personal experiences, autobiographies, biographies, travel stories, collections of short stories, novels, collections of legends, collections of fairy tales, collections of drama scripts, film scenarios, poetry anthologies, collections of letters, groups of opinions, speeches, books how to paint, books on how to use goods, how to make shadow puppets, and others. Learning to write creative books is a learning process that can realize the activities of students to produce their creative books.

Creative books can be sold freely. There are also creative books that include types of monumental works that can be performed locally, nationally, or internationally, such as drama scripts, fairy tales, film screenplays, poems, and legends. Creative books can be used in schools and colleges to support teaching programs (Buckingham, 1958:1523).

Creative Book Structure

This creative book is developed into three groups: preliminary group, leading group, and complementary group. The initial group consists of a cover, preface, and table of contents. The body contains five elements, that is (a) paper size and quality, (b) writing, (c) illustrations/pictures, (d) color, and (e) meaning. Paper size and quality, as well as binding, need attention. Some of the writings on the cover of a creative book include the author's name, the title of the book, the name of the institution in charge or publisher, the person in charge/publisher, and the year of publication. The colorful and meaningful illustrations/images that clarify the material's content will increase the book's readers.

The preface at least contains an introduction to the background of the book being made, explaining the contents of the book as a whole, thank all those who helped make the book happen, the author's hopes for the readers, gratitude, and the place of month and year of writing the book. The table of contents contains the names of the contents of the textbook along with the page numbers. The table of contents includes three parts: the preliminary
Building Elements of Literary Works

Waluyo (2010: 27) explains that what builds poetry consists of inner and physical elements. The inner aspect of poetry, or often referred to as the essence of poetry, includes four things, that is theme, taste, tone, and mandate. The physical elements of poetry, sometimes also called the method of poetry, are used by poets to express the nature of poetry. The physical aspects of poetry include six things, that is appearance, diction, imagination, concrete words, figurative language, and diversification.

Sukirno (2016: 84) explains that the elements of a short story builder consist of actors, plot, setting, point of view, message, and story theme. The actors of the short story can be humans, animals, plants, and other objects personified like humans. Each actor has a character or personality that can distinguish the main actor and the auxiliary actor, the good actor and the bad actor. The main character or supporting actor can be known from his involvement in the story.

When viewed from the sequence of events, the story's plot consists of the beginning, middle, and end. More detail consists of exposition, conflict, climax, dissolution, and resolution. When viewed from the type, plots can be grouped into a forwarding or progressive schemes (events are told from the beginning, middle, and end), backward or regressive plans (described from the future, middle, only the beginning), combined, or back-and-forth plots. (events are sometimes told from the center, only to the beginning and end), and circular field (events are related from beginning to end. However, the ending goes back to the front). When viewed from the story ends, there are closed plots (the author has concluded or finished the story) and open plots (the author does not complete the end of the story, readers or listeners are welcome to complete the ending themselves).

The plot can be seen from the quality, that is, dense plot and loose plot. A thick action means that small stories cannot slip the event. Small parcels can tuck in the open property. There are two types of fields based on quantity: single plots (telling only one episode of life) and double plots (describing more than one episode of life). By its short and dense nature, short stories do not have loose plots and double plots.

Setting the story consists of setting the place, setting of time, and setting the situation. The site's setting can be the name of the country, province, district/city, vast open nature, the
name of the building, ample space, and a narrower margin. The time setting can show time, morning, afternoon, evening, night, day, week, month, year, and time. The setting of the situation is telling the case of rain, light, busy, calm, angry, safe, chaotic, sad, happy, alone, many people, and other situations.

Point of View is the position of the author in the story he writes. The point of view consists of the first person point of view (accompaniment). In this case, the author is the main actor. As for the second-person point of view (included acknowledgment), the author's position is involved in the story, but not as the main actor. In the third-person point of view (he is omniscient and limited), the author is not engaged in the story. The author is only a narrator. If the author knows all the events in the novel, such a position includes the omniscient third person. On the other hand, if the author does not know everything that happened, including the third person, it is limited.

The theme is the meaning of the story, the central idea, or the basis of the story to be fought for in the story. The article serves to serve the author's total attention to experience and its relationship to the environment at hand. Themes have several types: physical themes, moral themes, social themes, egoistic themes, and religious themes. The five pieces can be further broken down into sub-themes with a narrower scope than the central theme.

Message the short story is the moral message of the author of the short story that the author wants to convey to his readers so that at the end of the story, the reader can learn the wisdom behind the incident. Therefore, the message is simple and easy for readers to grasp.

Transition words are the use of words or phrases that connect one idea to another, whether contained between one clause and another in a sentence, one sentence with another sentence contained in a paragraph. Transition words are also used to connect one section to the next. Transition words can refer to actors, times, places, and situations.

Examples of transition words that designate actors: they, they, we, I, we. Example of transitions form indicate time: meanwhile, then, next, soon. Examples of transitions designate places: there, in between, above, in, next to. Examples of transitions that indicate situations: calm, quiet, noisy, happy, sad, raining, light, dark. Examples of transitions denoting something have been mentioned before: besides, next, then, in the meantime, in addition, besides, so. Examples of transitions show effect: therefore, consequently, thus. The example of change points to the opposite of what has already been mentioned: however, on the contrary, otherwise.

2 Research Methods

This research is a classroom action research with quantum method parameters. The subjects of this study were the sixth-semester students of PBSI, FKIP, Purworejo Muhammadiyah University, as many as 90 students. The research time is for one semester from February to July 2019. The research location is at the Indonesian Language and Literature Education Study Program, Faculty of Teacher Training and Education, the University of Muhammadiyah Purworejo for the 2018/2019 academic year. The object of this research is the ability of students to make creative books. This research focuses on the number and types of creative books created by students, the number of essay titles in each creative book, the development of the building blocks of the content of each creative book, the
development of the structure of the innovative book form, impressions, and problems when students write books. The assignment technique is to determine the ability of students to make the type of book, the development of the number of titles in the book, the story of content building elements, and the structure of the booking form, are the questionnaire technique was used to find out the impressions and obstacles experienced by students when making creative books. The instrument used in this research is the human instrument (researcher as the main instrument) assisted by a data recording card. Data analysis techniques used are structural analysis and content analysis (Bungin, 2015: 163). The presentation of the study results used informal techniques (analysis with ordinary words without using signs and symbols) (Sudaryanto, 2015: 241).

3 Results And Discussion

Before presenting the results of the data analysis, it was explained that from the beginning of the lecture, students had been informed that at the end of this lecture, students were required to make one creative book title. During one semester, students learn creative writing using the quantum method. The material presented is 12 chapters. Chapter I discusses the nature of learning to write creatively, chapter II on the nature of quantum-based learning, chapter III on the characteristics of quantum learning, chapter IV writing personal experiences, chapter V writing biographies, chapter VI writing short stories, chapter VII writing legends, chapter VIII writing fairy tales, chapter IX wrote the drama script, chapter X wrote the screenplay, chapter XI wrote the opinion, and chapter XII wrote the poem. Each chapter is presented in the learning process with the quantum method.

The main objectives of learning to write creatively with the quantum method are twofold, that is (1) to introduce students to how to learn to write creatively with the quantum method and (2) to give examples and at the same time open the knots of ideas that are in the minds of students to be appointed as the topic of creative books. It is hoped that the opening of the inducement of ideas will motivate students to develop their ideas in their creative books.

At the end of the lecture, students are assigned to make creative books according to their individual choices. In addition, students were also asked to write down the impressions and obstacles they experienced when writing the innovative book. The results of this study are described in detail in the description below.

3.1 Creative Books Written by Students After Getting Learning to Write Creative with Quantum Method

Based on the results of data analysis, it is known that from 90 students, 63 students make poetry anthology books, a collection of short stories as many as 16 students, a group of personal experiences by four students, novels by three students, fairy tales by one student, shadow puppets by one student, face painting by one student, and a collection of love letters by one student. The data was obtained from Class VI A, who wrote a collection of poetry as many as 22 students, a group of short stories by four students, a collection of personal experiences of 2 students, and the skills of making shadow puppets by one student. Class VI B produced 16 poetry anthologies, ten short stories anthologies, one novel, one fairy tale, and
one face painting title. Class VI C made eight collections of poetry, two books, and two collections of short stories. Class VI D produced 14 collections of poetry, two personal experiences, and one collection of short stories.

The size of the book is almost the same, that is half a folio with a length of 21 cm, a width of 15 cm. The difference lies in the thickness of the book and the number of pages. The thinnest is 52 pages, while the thickest is 218 pages. All books are neatly bound, and books are marketed using white HVS paper and paper head as the book's cover. The color of the book cover is various. There are blue, yellow, black, red, green, brown, purple, and variations/mixes.

### 3.2 Number of Titles in Each Student's Creative Work Book

The researchers describe the number of titles in each group of types of books as follows. Books A collection of 63 poetry titles. Poetry anthologies are among the most liked by students, of the sixty-three collections of poems that contain at least 33 poetry titles, the most holding 108 poetry titles. Two students wrote poetry between 33-40 tags, 20 students wrote poetry between 41-50 titles. Twenty-one students write poetry between 51-60 titles. Nine students wrote poetry between 61-70 titles. Three students write between 71-80 poetry titles. There is no poetry writing between 81-90 tags and seven students who write poetry between 91-108 titles. Based on these figures, it can be said that the average student can register between 51-60 tags of poetry in one semester.

Furthermore, 16 students wrote short stories anthologies. Of the 16 students who wrote the most straightforward stories, one student wrote 13 short stories. There are at least five students who write short stories, that is, five short stories each. Hierarchically, there was one student who wrote 13 short stories. Six students wrote ten short stories. Those who wrote nine short stories were two students, two students wrote eight short stories, and five students wrote five short stories. So the average ability of students to write short stories is five titles in one semester.

Of the 16 short stories, one pack contains ten short stories, and the ten short stories have been selected as the best short stories at the district, provincial and national levels. The collection of short stories is entitled *Ruang Kontemplasi*, written by Putu Aspira Suite.

Four students wrote personal experiences. Of the four students who wrote 20 titles of personal experience, one student wrote 16 titles of personal experience, one student wrote 14 titles of personal experience, and one student wrote 12 titles of personal experience. From these data, it can be said that the average student's ability in writing personal experiences is 15 titles in one semester.

Three students write novels. The first novel is entitled *Sang Pemilik Hatiku*. The second novel is entitled *Istiqoroh Cinta Faizah*. The third novel is entitled *Pelangi Tanpa Warna*. The first novel contains 15 story titles, the second novel has 14 story titles, while the third novel contains eight-story titles. From these data, it can be seen that in one semester, three students can make three novels with an average of 12 story titles.

The motivation for learning to write creatively with the quantum method can give birth to four other exciting writing titles, that is one collection of love letters, one slip of a group of
fairy tales, one marker of skill in making shadow puppets, and a title of tips for commercializing face painting. A collection of love letters entitled Untukmu Lelaki Bayangan contains 50 love letter titles. A group of fairy tales entitled Dewa Guntur dan 9 Dongeng Lainnya has 10 fairy tales. Furthermore, the book entitled Keterampilan Membuat Wayang Kulit includes four chapters. The book entitled Kiat Mengomersialkan Melukis Wajah contains six chapters. It's not an easy job to write a creative book. However, with a touch of the quantum method, 90 students could motivate to do creative works.

3.3 Student's Ability in Developing Elements of Creative Works

The ability of students to develop elements of creative work can be seen from the types of books made by each student. The following describes the building blocks based on the kinds of innovative books that students write.

The poetry anthology, which consists of 63 books, has been built on two elements: the mental and physical elements. The inner aspect of poetry includes four things: the theme/meaning, feeling/attitude of the poet towards the problems faced, the tone/mood of the poet towards his readers, and the message/poet's message. The physical elements of poetry made by students include six things, that is appearance/typography, diction/word choice, imagination/imagining power, concrete words, figurative language, and diversification/acceptance.

Almost all students can create poetry by paying attention to the poem's structure, such as the title of the poem, the name of the author, the verses of the poem, the lines of the poem, where and when the poem was created. In addition, students are also able to create poetry by using the two building elements mentioned above. However, the sharpness still needs to be improved in spiritual and physical characteristics. The inner element is sharpened through the physical feature related to only typography, diction, imagination, concrete words, figurative language, and rhymes. To achieve a high literary weight, there needs to be inner sensitivity and breadth of insight, and mastery of the creator's vocabulary. This can be achieved if it is done continuously by the author create. From the aspect of structure, there are still some poetry anthologies that need to be perfected.

Sixteen short anthologies written by students have been developed with a complete short story structure: the title of the short story, the name of the author of the short story, the content of the short story, and at the end where and when the short story was written. In addition, students have also developed entirely harsh story-building elements: characters and characterizations, setting, plot, theme, point of view, and message. Each short story title has raised the name of a character, and there is a place where the events occur, there is a sequence of events, a theme/main idea, a point of view, and the message. However, that does not mean that the short stories do not have weaknesses. There are still many things that need to be strengthened to obtain a short story with more literary weight.

Things that still need to be improved include the clarity of the characters and their depiction, the clarity of the background of the events, the clarity of the plot of the circumstances, the clarity of the point of view, and the clarity of the message. From the linguistic aspect, it is necessary to improve diction, depth of content, sentence structure accuracy, and spelling.

The four students who wrote personal experiences have also developed their building blocks well. Because it is unique, personal experience writing has the characteristics of a free form and method of writing. As found in the diary, telling stories the events that occur, the time, and the place where the events occur, the contents are individual or selfish, subjective,
the language is natural, ordinary, natural, simple, frank, lively, charming, refreshing, vibrant, and served live. At least, the elements of the perpetrator's name, the events that occurred, the place and time of the incident are always in it.

What still needs to be improved is the selection of diction, sentence structure, and improved spelling. Students still do not use a broad vocabulary, so they are fixated on words or terms that are repeated and less varied. The sentence structure is still found to be ineffective. The use of spelling such as capital letters and punctuation is still found not to be correct.

Of the three titles of novels written by students, in general, students have been able to develop the elements of novel building well. The main aspects of the story, additional actors, characters, depiction of characters, setting of the place, setting of time, setting of situation, cultural background, plot development, point of view, message, and themes can all be enjoyed. The development of the plot according to the sequence of events, according to its type, according to the way the story ends, seen from the quality and quantity, has also been partially found.

The drawback is that it still needs to be improved from the clarity of each of these elements so that the novel text is more complete, precise, in-depth, and has literary weight. The clarity and sharpness of the development of each of these building elements are known from the linguistic aspect. Therefore, proper diction, appropriate transition words, correct sentence structure, use of proper spelling, and correct punctuation are essential. No matter how good the content or meaning in the novel is, without being presented with appropriate and adequate language, the goodness of the novel's contents cannot be enjoyed. Therefore, the linguistic aspect is essential and determines the integrity of the story.

The development of the building elements of a fairy tale entitled *Dewa Guntur dan 9 Dongeng Lainnya* includes aspects of character and characterization, setting, plot, point of view, and values. The characters in the story are humans (father, mother, children, neighbors), animals, and spirits. Each character can be seen in the description of nature. Some are good, and some are bad. The setting is inside the house, outside the house, in the village, in oil palm plantations, in the forest, and the vast nature. The time setting is morning, afternoon, evening, and night. The background of the situation depicts a simple life, poor, rich, rainy, bright, lonely, and thunderous. I am judging from the type most of the forward grooved. Judging from the way the story ends with a closed plot, judging from the quality, it includes a solid field. By its nature, the fairy tale has an omniscient third-person point of view. The values that can be learned from these fairy tales are generally the value of moral education that targets the listener to have good morals.

Next up is the book called *Keterampilan Membuat Wayang Kulit*. This book was written by a student who happens to be a puppeteer named Danang Afriana. The book was developed starting from the title, catalog, foreword, table of contents, chapter I introduction, chapter II puppet characters and their characteristics, chapter III preparation of tools and materials, chapter IV making shadow puppets, bibliography, glossary, and author's biodata.

The next book is entitled *Kiat Mengomersialkan Melukis Wajah*. This book was written by a student who also happens to be an artist, especially in painting. His name is Chairul Ikhwan. This book was developed starting from the title, catalog, foreword, table of contents, chapter I introduction, chapter II painting tools, chapter III basic painting techniques, chapter IV painting the face of the eyes, nose, and mouth, chapter 5 painting the ear face, hair,
improvements to face painting and caricature painting, chapter 6 drawing Japanese anime/cotton and drawing doodle art quickly, chapter 7 some suggestions and tips, glossary, bibliography, and author's bio.

The last is a collection of love letters entitled *Untukmu Lelaki Bayangan*. This book was written by a student named Selviani, whose pen name is Woman Lovers of Love. Incredibly, she can write 50 exciting love letter titles. As the title suggests, the theme of this collection of love letters is the romance between a man named Shadow Man and a woman named Love Lover. Judging from the time of writing, this type of love letter flow is forward. Letters were written from September 6, 2017, to June 10, 2018. When viewed from the order of contents, one note to another is not always sequential, meaning that the contents of the following letter are not necessarily a continuation of the previous letter. However, the outpouring of a woman's heart who loves love is always addressed to the Shadow Man.

### 3.4 Student Ability in Developing Creative Book Structure

In general, students can develop the structure of their creative books well. Each book already has a book cover that includes the title of the book, the author's name, equipped with pictures/photos/illustrations, and the color of the body that reflects the contents of the book. It is also equipped with a preface, table of contents, contents of the book, and author's bio. Readers of a scientific nature are added to the bibliography and glossary. The complete structure of student workbooks can be seen in Table 1 below.

<table>
<thead>
<tr>
<th>No</th>
<th>Book Structure</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The cover of the book contains the title, author's name, pictures/illustrations/photos that match the contents</td>
<td>90</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>Offerings to people who are respected/loved</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>3</td>
<td>Preface/short comments from readers/friends of the author</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>Foreword from the author</td>
<td>88</td>
<td>98%</td>
</tr>
<tr>
<td>5</td>
<td>Table of contents and pages</td>
<td>88</td>
<td>98%</td>
</tr>
<tr>
<td>6</td>
<td>Fill in the book according to the table of contents</td>
<td>88</td>
<td>98%</td>
</tr>
<tr>
<td>7</td>
<td>Every post title starts from a new page</td>
<td>90</td>
<td>100%</td>
</tr>
<tr>
<td>8</td>
<td>Each tag has the name of the creator</td>
<td>80</td>
<td>89%</td>
</tr>
<tr>
<td>9</td>
<td>At the end of the work is written where and when it was written</td>
<td>80</td>
<td>89%</td>
</tr>
<tr>
<td>10</td>
<td>Standard fonts and font sizes</td>
<td>80</td>
<td>89%</td>
</tr>
<tr>
<td>11</td>
<td>Standard spacing size</td>
<td>75</td>
<td>83%</td>
</tr>
<tr>
<td>12</td>
<td>White paper base color</td>
<td>90</td>
<td>100%</td>
</tr>
<tr>
<td>13</td>
<td>Writing typography</td>
<td>90</td>
<td>100%</td>
</tr>
<tr>
<td>14</td>
<td>Compliance with EYD kaidah rules</td>
<td>75</td>
<td>83%</td>
</tr>
<tr>
<td>15</td>
<td>In the end, the author's complete biodata is loaded along with his photo</td>
<td>85</td>
<td>94%</td>
</tr>
<tr>
<td>16</td>
<td>Bibliography</td>
<td>2</td>
<td>2.2%</td>
</tr>
<tr>
<td>17</td>
<td>Glossary</td>
<td>2</td>
<td>2.2%</td>
</tr>
<tr>
<td>18</td>
<td>The back cover is filled with pictures and text that</td>
<td>85</td>
<td>94%</td>
</tr>
</tbody>
</table>
3.5 Student Impressions in Writing Creative Books

Based on a questionnaire filled out by 90 students who wrote various creative works, it is known that students feel 37 impressions in writing creative books. Of these, each student has an average of four images. The overall impression can be seen in Table 2 below.

<table>
<thead>
<tr>
<th>No</th>
<th>Book Structure</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It can be a place of the outpouring</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>There are many benefits in pouring ideas into written form</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>3</td>
<td>Can recall the experience experienced</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>4</td>
<td>Increase the power of imagination</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>5</td>
<td>Increase knowledge</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>6</td>
<td>Love</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>7</td>
<td>Fun</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>8</td>
<td>Add and train creativity</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>9</td>
<td>Practice solving problems</td>
<td>7</td>
<td>7.7%</td>
</tr>
<tr>
<td>10</td>
<td>Like advising yourself</td>
<td>6</td>
<td>6.6%</td>
</tr>
<tr>
<td>11</td>
<td>Can provide benefits for readers</td>
<td>7</td>
<td>7.7%</td>
</tr>
<tr>
<td>12</td>
<td>It can make you smile reading your work</td>
<td>6</td>
<td>6.6%</td>
</tr>
<tr>
<td>13</td>
<td>Can express what is felt and thought</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>14</td>
<td>Sometimes I get carried away with emotions as written</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>15</td>
<td>Gaining experience in creative writing</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>16</td>
<td>Become more confident</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>17</td>
<td>Can feel how the results of writing that are simple but full of meaning</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>18</td>
<td>Can represent all feelings and increase the power of imagination</td>
<td>7</td>
<td>7.7%</td>
</tr>
<tr>
<td>19</td>
<td>It can pour out the heart/feelings and thoughts in written form</td>
<td>14</td>
<td>15%</td>
</tr>
<tr>
<td>20</td>
<td>Remembering the hard times and struggles that have been done</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>21</td>
<td>Appreciate the things that have been felt</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>22</td>
<td>Can share stories with readers</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>23</td>
<td>Increase self-satisfaction</td>
<td>12</td>
<td>13%</td>
</tr>
<tr>
<td>24</td>
<td>Cultivate a sense of pride in being able to work</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>25</td>
<td>Train critical thinking</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>26</td>
<td>Can increase income</td>
<td>4</td>
<td>4.4%</td>
</tr>
<tr>
<td>27</td>
<td>Be more creative</td>
<td>20</td>
<td>22%</td>
</tr>
<tr>
<td>28</td>
<td>Imagination increases</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>29</td>
<td>Be diligent in using free time to write</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>30</td>
<td>It becomes easier to solve problems</td>
<td>12</td>
<td>13%</td>
</tr>
<tr>
<td>31</td>
<td>Train students to imagine</td>
<td>23</td>
<td>25%</td>
</tr>
<tr>
<td>32</td>
<td>Appreciate the time to write</td>
<td>13</td>
<td>14%</td>
</tr>
<tr>
<td>33</td>
<td>Enrich vocabulary</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>34</td>
<td>Enjoy literature</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>35</td>
<td>More challenged</td>
<td>13</td>
<td>14%</td>
</tr>
<tr>
<td>36</td>
<td>Able to express ideas</td>
<td>15</td>
<td>16%</td>
</tr>
</tbody>
</table>
Can express thoughts and feelings in writing

3.6 Constraints Experienced by Students in Writing Creative Books

Based on the questionnaires written by students, there are many obstacles experienced by students in writing creative books. This problem occurred because almost all students admitted that it was their first time writing a clever book. It can be known through their foreword or preface. To reduce these obstacles, it takes time to get used to writing books over and over again. Overall there are 36 types of barriers experienced by students, as shown in Table 3 below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Book Structure</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It's hard to find inspiration</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>2</td>
<td>It's hard to tell/tell back</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Frequently repeating words</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>4</td>
<td>It's hard to determine the title</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>5</td>
<td>It's hard to choose the right diction/word</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>6</td>
<td>It's hard to define imagination</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>7</td>
<td>Need peace</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>8</td>
<td>It's hard to put words together</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>9</td>
<td>Confused to determine/choose a title</td>
<td>7</td>
<td>7.7%</td>
</tr>
<tr>
<td>10</td>
<td>It's hard to design a book that looks interesting</td>
<td>6</td>
<td>6.6%</td>
</tr>
<tr>
<td>11</td>
<td>It takes patience and time to produce good work</td>
<td>7</td>
<td>7.7%</td>
</tr>
<tr>
<td>12</td>
<td>Stuck in ordinary words</td>
<td>6</td>
<td>6.6%</td>
</tr>
<tr>
<td>13</td>
<td>Lack of insight in choosing words</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>14</td>
<td>It's hard to choose words that match the title</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>15</td>
<td>Remembering to get a continuous writing</td>
<td>8</td>
<td>8.8%</td>
</tr>
<tr>
<td>16</td>
<td>Feeling awkward in choosing diction</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>17</td>
<td>Imagination does not appear</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>18</td>
<td>Understanding of writing book covers is still lacking</td>
<td>7</td>
<td>7.7%</td>
</tr>
<tr>
<td>19</td>
<td>Confused where to start the story</td>
<td>14</td>
<td>15%</td>
</tr>
<tr>
<td>20</td>
<td>In the middle of the story, the deck runs out</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>21</td>
<td>Confused to make exciting sentences</td>
<td>5</td>
<td>5.5%</td>
</tr>
<tr>
<td>22</td>
<td>Difficulty analyzing story material</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>23</td>
<td>Worrying about standard rules</td>
<td>12</td>
<td>13%</td>
</tr>
<tr>
<td>24</td>
<td>Often deviates from the theme</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>25</td>
<td>Must read a lot</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>26</td>
<td>Searching archives of past creative works</td>
<td>4</td>
<td>4.4%</td>
</tr>
<tr>
<td>27</td>
<td>Difficulty connecting between themes and content flow</td>
<td>20</td>
<td>22%</td>
</tr>
<tr>
<td>28</td>
<td>Difficulty making a book cover that is attractive and reflects the content</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>29</td>
<td>Difficulty developing sub-themes</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>30</td>
<td>Less creative</td>
<td>12</td>
<td>13%</td>
</tr>
<tr>
<td>31</td>
<td>It's hard to develop ideas that get stuck in the middle of the road</td>
<td>23</td>
<td>25%</td>
</tr>
<tr>
<td>32</td>
<td>It's hard to determine the title</td>
<td>13</td>
<td>14%</td>
</tr>
<tr>
<td>33</td>
<td>Lost ideas</td>
<td>10</td>
<td>11%</td>
</tr>
<tr>
<td>34</td>
<td>Indecisive in determining the storyline</td>
<td>14</td>
<td>14%</td>
</tr>
</tbody>
</table>
4 Conclusion

Based on the explanation above, it can be concluded that after Semester VI, students of PBSI, FKIP Muhammadiyah University Purworejo received creative writing lessons using the quantum method for one semester. In general, they were able to write one creative book according to their individual choices. Every creative book he has written contains a good title for a book or anthology, has been developed based on its building blocks and has been compiled based on a good book structure. Several student works have also been published, and all student books are worthy of sale to the public. What needs to be improved is the use of language and the depth of the weight of the content. In addition, students get a positive impression that raises their enthusiasm and motivation to write books. However, many obstacles hinder him because, according to his admission, this job is the first time he has experienced it. Considering these conclusions, it can be said that learning to write creative books based on the quantum method has proven to be effective.

References


The Concept Of Model Evaluation Kirkpatrick Plus Return On Training Investment (To Improve Public Services Of The Government)

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Abstract. This article is a literature review that analyzes and reviews various types of research related to the evaluation model of Kirkpatrick plus ROTI (Return On Training Investment) program at a training organized by the government. The purpose of this study is to provide an overview of the concept of evaluation of the Kirkpatrick plus ROTI model in measuring the results of the training that is tangible and intangible. Ideally, the activity of government employees that uses the state budget is measured in effectiveness and efficiency. Energy relates to the achievement of training objectives and the temporary impact of efficiency associated with the benefit of costs incurred on the benefits received. The Evaluation Model of Kirkpatrick plus RoTI offers a solution in measuring training comprehensively and accurately. This model is believed to select and provide comprehensive training information amid government efforts to reduce state budget expenditures due to the pandemic situation.

Keywords: Model four-level Kirkpatrick, Return On Investment, Return On Training Investment

1. Introduction

As a country that is spurring itself to align with developed countries, Indonesia conducts human resource development consistently and gradually through the activities of the State Apparatus Training. Based on the ministry of finance data, the budget in government efforts in encouraging bureaucracy and public services is more agile, effective, productive, and competitive by 526.2 T or when presented by 26.9% of total central government spending [1]. A lot of training and variety must be balanced with the accurate and precise evaluation so that the program is on target, contributes to the efforts to improve public services, and has a real leverage/impact for an institution [2]. Thus the budget used for the implementation of improving the competence of government employees in the form of education and training must be accountable for its effectiveness.

Every education and training program organized by every government agency must ensure that it evaluates the education and training program as a whole. Evaluation is a process of data retrieval that is systematically analyzed and then drawn a conclusion to then be used as a recommendation in decision making. The purpose of the evaluation is to describe and assess a program or activity. Program is all activities that must be carried out to achieve the organization’s goals [3]. In this case, the evaluation of the program is a field of science that
can systematically and scientifically describe and measure the effectiveness and efficiency of training through various evaluation models [4]. Energy is related to achieving goals, while efficiency is related to the precise calculation between the costs incurred and the time of implementing the Training program.

Evaluation of educational and training programs is the process of determining the extent to which the goals and objectives of a program or project have been achieved, providing the information necessary to make decisions, comparing results with standards or benchmarks to identify gaps, assessing prices, and quality [5]. So critical was the evaluation of the program until Kirkpatrick said that the training is an integral part of implementing the movement itself.

Evaluation is an activity that must be done for the overall trend to be carried out effectively (Kirkpatrick 1998).

In evaluating education and training programs conducted by an institution or institution, many models are used by evaluators such as CSE-UCLA Model, CIPP Model Evaluation, Brinkerhoff Model, Kirkpatrick model, CIRO model, Kirkpatrick Development model, and so on. Evaluation models with each other do seem varied, but the purpose and purpose are to conduct data collection activities or information and recommendations related to an object. There is no proper procedure for evaluating a program, all by the emphasis and interests, it brings [6].

In determining what type and evaluation model we will choose to evaluate a program, an evaluator will consider two things: the type of program to be assessed and the purpose or for what purpose an evaluation is done. The type of program is seen from the duration of time implemented, whether long or short. The program's objectives are seen from the level of gaps in the program towards the program's goals.

Based on evaluation models, the authors assessed Kirkpatrick plus RoTI (Return On Training Investment) evaluation model as appropriate in looking at the effectiveness and efficiency of training by measuring the return on investment issued by a training (Shelton Sandra, and George Alliger;1993). This is by the issue of the State Apparatus Training that spends a considerable amount of state budget, but the evaluation of its success is very little reported. Supposedly every program of state apparatus training aimed at developing employee competence can be calculated in monetary units to be compared with the costs incurred both from the state budget [7]. The consequence is that the use of state money to implement training must be accountable for its use. The form of accountability is seen by 1) the success of training, 2) the impact caused after implementing training, 3) the increase in public trust due to increasing services, 4) the financial return to institutional.

The purpose of the research in this writing is to provide an overview of the concept of evaluation of the Kirkpatrick plus RoTI (Return On Training Investment) model in measuring the results of the training that is pliable and intangible, especially training held by the budget derived from the state budget and paid. The following section in this paper contains a review of the related literature followed by a review section of the library, research methodology, and discussion.

2. **Theoretical Framework**

In this section, the literature review explains several important variables, namely, evaluation of Kirkpatrick models and (RoTI) Return On Training Investment.
A. Kirkpatrick evaluation model

The four-level evaluation model was first known in 1959 when Donald L. Kirkpatrick wrote four series of articles titled "Techniques for Evaluating Training Programs" published in Training and Development, the American Society for Training and Development (ASTD) journal. The articles describe a four-level evaluation formulated by Kirkpatrick based on the concept of his desertion at the University of Wisconsin, Madison. Kirkpatrick, D., L. & Kirkpatrick J., D. presents three specific reasons for evaluating training programs: to justify training budgets by showing how they contribute to the organization's goals and objectives. Determine whether a training program is continued or not and obtain information on how to improve the training program in the future. To answer these three reasons, Kirkpatrick created his four-level evaluation model consisting of level 1 (reaction), level 2 (learning), level 3 (behavior), and level 4 (result) [8].

Table 1. Four Levels of Training Evaluation Criteria

<table>
<thead>
<tr>
<th>Level</th>
<th>Criteria</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reaction</td>
<td>Satisfaction of the trainees</td>
</tr>
<tr>
<td>2</td>
<td>Learning</td>
<td>Understanding of knowledge, skills, behaviors, and work attitudes</td>
</tr>
<tr>
<td>3</td>
<td>behavior</td>
<td>Changes in behavior and attitudes in work</td>
</tr>
<tr>
<td>4</td>
<td>Result</td>
<td>Results achieved (quantitative)</td>
</tr>
</tbody>
</table>

Source: Summarized from Kirkpatrick & Kirkpatrick (2006)

Kirkpatrick's model has advantages because of its thorough, simple, and practical nature in various training situations [9]. Specific means that this model can see all sides of training simply because it has a structured logic flow and can be used to evaluate activity under various conditions.

In theory, the first basic model used by Kirkpatrick to create a four-level model is to ensure that the training budget can contribute to the goals or objectives of the organization/institution. This is relevant to the background of the problem taken and whether state apparatus training supported by the state budget can contribute tangible or intangible.

B. Return On Training Investment

The concept of return on investment made on the implementation of education is very similar to buy in the world of finance. The Theory of Human Resource Development underlies the birth of the estimated Return on Investment in Education based in the late 1950s. Human resources theory says that investing can increase productivity in the future [10].

Many mention this RoTI (Return On Training Investment) model as a fifth-level evaluation of the Kirkpatrick model. This model builds on the opinion that assessment should be based on financial calculations to provide accurate and precise information about training to organizational performance.

RoTI (The Return on Training Investment) method developed by Phillips is the last evaluation level to see the return on investment after the training is implemented. One of the uses of this method is for the company's management to see that training is not something expensive and only detrimental to the financial sector, but training is an investment. RoTI is a model used to explain and prove a practical training or not. ROTI provides a clear and accurate picture of training results by calculating and converting all benefits into monetary value. Phillips's ROI framework includes techniques used to evaluate the effectiveness of
training programs. His approach estimates training impact by obtaining information directly from program participants and then having senior management make adjustments to the estimates. Adjustments are "essential because many factors will influence performance data after training [11].

Currently, companies/organizations should inevitably carefully calculate each amount of funds used to fund the implementation of training. This calculation should be done in the context of business results and return on investment [12]. This situation will undoubtedly continue to develop in line with the intense competition between companies or ever-changing challenges that will affect the course of the organization/institution.

Calculating Return On Training Investment usually adopts the financial position or balance sheet statements, calculating the benefits and costs that accompany them. The benefits and costs are divided into organizational benefits (Inside the organization) and social categories (outside the organization). Benefits and expenses include the monetary value of all non-monetary benefits and costs to be fully measured by the organization's internal efficiency and external efficiency [13].

Based on some discussions about Return On Training Investment (RoTI) above, the author believes that every training held by government agencies/institutions can be calculated effectively and efficiently through Kirkpatrick plus ROTI method. Organizations committed to putting forth the time, money, and effort required to ensure that training results are connected to a business need and result in a monetary benefit can employ several methods for doing this [14].

There are several differences of views/schemes written by researchers related to the output of training organized by the company and managed by state institutions/institutions.

![Fig 1. Kirkpatrick Plus Return On Training Investment Evaluation Difference Scheme In Companies (A) And State Institutions (B)](image)

### 3. Research Methods

This research is a type of literature research to analyze a relevant topic related to the problem to be researched. The method of this study is a literature review. Literature review (literature review, literature research) is a study that critically examines or reviews the knowledge, ideas, or findings contained in the body of literature, as well as the provision of information to solve problems cooper problems [15].
Writing a literature review requires appropriate techniques and steps. Bootie and Beile reveal: Writing an incorrect literature review is one of many ways to introduce a paper in detail. If the literature review is flawed, the rest of the article may also be considered flawed because "the researcher cannot conduct meaningful research without first understanding the literature in the field. [16]."

The nature of this research is descriptive analysis, namely regular decomposition of data that has been obtained, then given understanding and explanation to be well understood by readers. Data sources obtained from national and international journals, books, and other reading sources that have been selected with the theme of research is the evaluation model Kirkpatrick plus RoTI (Return On Training Investment).

4. Results and Discussion

Evaluation of education and training programs should answer questions about (a) how successful education and training programs are in achieving their goals, (b) how the training program can be improved, and (c) how effective the education and training programs are. Evaluation of training programs should encourage improvement, provide information related to all components of the training, be accounted for in implementation and administration and increase the interest of the trainees. Therefore, the purpose of evaluating the most crucial training program is not to prove but to be improved.

The evaluation model of the Kirkpatrick Program plus Return On Training Investment provides a complete picture for those involved in the management of training programs. This is because this model will measure two aspects of training results, namely the effectiveness aspect and the efficiency aspect of a program. Aspects of effectiveness related to the extent to which the training objectives can be achieved, of course, accompanied by the resulting outcome. At the same time, the efficiency aspect relates to the utilization of the training budget in achieving the objectives of training. Effectiveness will be measured by the Kirkpatrick program evaluation model through its four levels, while efficiency will be measured by return on training investment calculation.

One of the weaknesses in training managers is that they cannot precisely measure whether the impact/changes caused by training participants result from the training that followed. Because many factors affect the activity of participants when returning to their place of origin, such as health, work situation, stress level, etc. So we can not be sure the amount of contribution diktat to the organization's purpose, while the costs incurred are not small. The Return On Training investment calculations tries to offer where there must be a clear and tangible contribution return from the Training program implemented.

The evaluation model of Kirkpatrick Training plus ROTI program also provides a clear comparison between training programs implemented. The training program manager knows which training programs should be revised and even eliminated. This is in line with budget savings by the state due to the pandemic situation.

Thus the evaluation model of Kirkpatrick Training plus ROTI program, in general, can be applied to training organized by state ministries/ institutions. Several stages are passed according to the evaluation of this model, namely [17];

1. Level 1: Reaction, which measures the reaction of employee satisfaction to the implementation of training. Measurement of this level can use a valid and reliable instrument can be a questioner/questionnaire.
2. Level 2: Learning, which is measuring the extent to which employees understand the material delivered in three competency domains: Knowledge, Skill, and Attitude. This level measurement can use a valid and reliable instrument in the form of tests to measure all three abilities.

3. Level 3: Behavior, measuring the extent to which employees implement the understanding of competencies obtained in the work environment. This level measurement can use valid and reliable instruments using observation sheets and interview guidelines.

4. Level 4: Result, which measures how much impact the implementation of competency development programs on performance or the expected final result. This level measurement can use valid and reliable instruments using interview guidelines, document archival.

5. Level 5: calculate RoTI by means; a) isolate the factors of the influence of training to be believed how much the development program contributes to changes in the performance of an employee, b) convert data into the financial form.

The criteria that can be used in the calculation of RoTI by point 5 above as follows [18];

a. isolate the factors of the influence of training so that it can be believed how much the development program contributes to changes in an employee's performance. Factors that can affect a person's performance, among others, the mental and physical abilities of individuals, the availability of clear, transparent, objective work standards, and prepared based on standard work standards; feedback/information that can be obtained quickly, often, precisely, accurately and objectively; conducive working situations and conditions, incentives / fair payroll system, the implementation of a good reward and punishment system and others.

b. Convert data into the financial form. 1) Need assessment, if the competency development program is preceded by a need assessment activity that requires high costs; 2) Design and Development, the costs incurred to design and build competency development programs are usually calculated on average for 1 or 2 years; 3) Acquisition, if the competency development program is purchased from a third party: the purchase of licenses, materials, certificate fees, etc.; 4) Delivery, this cost component includes: teacher salaries, program materials, business trips, and facilities used; 5) Evaluation, costs incurred at the time of evaluating the program, mainly level 3 and 4 conducted after employees return to their respective workplaces, such as the cost of drafting and sending questionnaires and surveys conducted; and 6) overhead costs.

5. Conclusion

Evaluation is a systematic data retrieval process that is then analyzed to produce a value against a particular program. The goal is to consider whether a program is revised, continued, or eliminated.

Evaluation of the program is critical because the amount of budget of the training program of state employees is enormous. Thus it must be balanced by the success rate of the program. The efficiency and effectiveness of the Training program are measured its success to avoid the use of budgets are not on target, amid the state of power that is being depressed because of the covid pandemic situation.

The evaluation model of the Kirkpatrick Program plus Return On Training Investment provides a complete picture for those involved in the management of training programs. This
is because this model measures two aspects of training, namely the effectiveness aspect and the efficiency aspect of a program.

This article only analyzes the concept of the Kirkpatrick program evaluation model plus Return On Training Investment in general. Further research is needed to describe the calculation of Return On Training Investment in detail in the Training program that uses the government budget so that the objectives of training programs to government employees can encourage bureaucracy and public services that are more agile, effective, productive, and competitive.

References

Integrated Learning Components of Cloud System-Based Office Administration in Vocational High Schools

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Abstract. The role of organizations, businesses, and governments in achieving their goals is primarily determined by implementing activities through an office. Office workers in Indonesia who come from Vocational High Schools and Universities were majoring in Office Governance Automation. Along with the development of technological processes, it also impacts more effective office processes through office automation. However, the result of a very dynamic world of technological adaptation still cannot be followed by preparing an appropriate workforce in the office world. Based on this context, the research team initiated the development of an office administration simulation system based on cloud integrated learning which is present as an innovation that directly answers the needs in the field based on simulator applications to improve the quality of office vocational education, especially by using integrated learning technology that can answer the needs of the world of work.

Keywords: Cloud, Integrated, Office, Vocational.

1 Introduction

The role of the organization, business, and government in achieving its goals [1] is determined mainly by the part and function of services and the implementation of activities through an office [2]. This office has the role of planning, analysis, development, policy formulation, and accountability [3, p.]. Given the importance of the part of the office world for the sustainability of an organization, business, and government [4], the role of office workers is vital. Office workers in Indonesia who come from Vocational High Schools and Universities were majoring in Office Administration Automation (OTKP) [5].

Along with technological processes, it also impacts more effective office processes through office automation [6]. Still, the result of a dynamic world of adapting technology and information in organizations, businesses, and government [7] still cannot be followed by proper workforce preparation. Suitable for the office world [8]. This was proven directly by the research team, which took data in several cities in East Java, 76% of Office subject teachers stated that current learning was not following industry needs, and 86% indicated that they needed new media following the latest principles of recent press. There is.

This is on the unemployment rate that occurs in vocational school graduates, which is proven as a contributor to the highest unemployment rate reaching 11.24% because what is learned is still unable to answer the challenges of the world of work [9]. Solutions that already exist in the development of SMK media in the office sector [10]; [11] [12] in some essential competencies such as archives, documents, and digital simulations that are still not standardized
and have shortcomings that are not by the needs of the industrial world, these shortcomings include [13]: (1) Some of the solutions offered are offline-based; (2) Does not describe a simulation of the world of work; (3) Requires many computers for simulation; and (4) Vulnerable to the hijacking of local server data.

Based on this context, the research team initiated the development of an office administration simulation system based on cloud integrated learning which is present as an innovation that directly answers the needs in the field based on simulator applications to improve the quality of office vocational education, especially by using integrated learning technology that can answer the needs of the world of work.

The purpose of this research is to develop an office administration simulation system based on cloud integrated learning. The system developed has various features, such as collaborative integration of different office practicum subjects that have been standardized in one system and have been incorporated between subjects, so that they can learn from case studies of each integrated practicum subject, there is a collection of learning-based materials: management system, and evaluation. There is a forum feature between students and teachers to carry out communication on the same system.

2 Literature Review

2.1 Simulation Learning in Office Administration Learning

The simulation-based practical learning method is a method used in learning activities [20] that provides opportunities for students to imitate a work process that leads to daily activities [21] and is related to tasks that are the responsibility of the world of work later [21], 22]. Implementing the simulation learning method is quite familiar in the office sector [23] because the practice-based subjects and curriculum are very supportive for conducting simulations by the needs of the world of work later [24].

Previous research on simulation-based office administration learning, one of which was research conducted by Muhimul in 2013 [25], in this study discussed the handling of incoming and outgoing mail with the simulation method in class XI students majoring in office administration at SMK Masehi PSAK Ambarawa. This study indicates an increase in student learning outcomes with an average effect of 79.2 with a student learning activity cycle rate of 78.3%. Furthermore, research conducted by Handayani, 2016 [26] was performed on a simulation of press conference subjects in Office Administration. Another similar study on the simulation method of office administration learning is Faisal's research, 2017 on handling office letters or documents at SMK Kristen 1 Surakarta; with the study results, the final average value of 79.74 with a percentage of 84.21% student activity [27].

2.2 Digital Learning in Office Administration

Learning media is a form of intermediary used to convey learning in ideas, ideals, and opinions [28] by bringing messages or information to achieve learning objectives [29]. Along with the development of technology and data, learning media are also affected by the renewability to transform through digital learning media that now exist [30]. Digital learning media is quite massively developed in Indonesia, especially during the Covid-19 pandemic era.
because it has various advantages such as being accessible anywhere and anytime, faster, and accommodating the complexity of learning on a large scale.

The development of office administration digital learning media has also been widely carried out, such as research by Wirawan et al. 2017 in the form of digital archival learning media to improve student learning outcomes at SMKN 3 Surakarta, with experimental results reaching 80.59 when compared to the control class 77.97. Another study by Rumangkan et al. in 2020 about the influence of android-based digital media with the lecture method on the learning interest of Office Administration students at SMKN 2 Tondano with the results showing a reasonably strong relationship between android digital learning media and lectures. Another study by Utami et al. 2016 on the development of interactive multimedia for class X office administration procedures, with research results in media feasibility from media experts and material with excellent categories.

2.3 Integrated Learning Cloud-Based Education

Cloud-based integrated learning is a new thing in the world of education that combines the factors that support learning media in the digital era, namely integrated learning and cloud-based learning or cloud computing. Cloud integrated learning was first published by El-Attar, et al. in 2019 with the title “Integrated Learning Approaches based on Cloud Computing for Personalizing e-Learning Environment” to improve e-learning services on a broad scale and effectively the world. Education.

This type of learning media was chosen in the practicum field because it supports a digital-based simulation environment with cloud computing to adjust the content, unique materials, and practicum experience, and focuses on reusability, interoperability, adaptation, and personalization to overcome the passive role of students in their transfer into interactive media. Several cloud-based integrated learning has been implemented, such as by Ruangvanich et al. in 2019 regarding sustainable learning models in higher education institutions. Another study was by Al-Sammarraie et al. in 2018 about cloud collaborative learning with a blended-learning environment collaboration.

3 Research Methods

The method used in this research is Design Thinking Process. This research and development aim to produce a product, namely a website based on integrated learning for integrated subjects for office practicum. To create a problem solving technology-based, it requires a way of developing guidelines for realizing a solution. Based on the development research procedure that has been described by, there are five procedural steps of-based research design thinking. The procedural stages of this development research are explained as follows:

3.1. Empathize

At this stage, the researcher will identify the problems to be overcome, which will produce products to overcome these problems. When you have determined the target user to be addressed, an analysis of the user's experience, situation, and emotional state are needed. Placing
developers on the side of users can understand user conditions through customer discovery, observation, and others.

3.2. Define
After the user of the requirement, the development design needs to draw an idea from the user's point of view that forms the basis for technology-based product development. This is done by dividing the list of user requirements and solving problems with technology according to needs. To produce a final product that is suitable to overcome the issues faced, it is necessary to have a process of collecting data and supporting information to be used as material for product development planning. The data collected by researchers in this study is in the form of journal literature related to the conditions of problems in the world of education in Indonesia in office administration associated with the development of human resources on the latest office technology.

3.3. Ideate
Through needs analysis, developers describe solutions through idea development. This includes team evaluation with development to cultivate creativity. Based on data and information obtained from journals and literature for the development process of education, which requires media development to absorb material optimally. From this information, this product will be designed or created using several computer programming languages such as front-end web developers.

3.4. Prototype
By developing the resulting ideas, the manufacture of-based products prototype for testing, it is necessary to produce actual products and possible scenarios use based on minimum viable product [43]. In the development of this media that is sustainable, then the result with the incremental method model is a very suitable choice [44].

![Incremental Model](image)

**Figure 1.** Incremental Model

According to [45], the incremental model is a regular and iterative sequence process and software development. Based on actions in a linear sequence can result in consequences in working software that can be used. In the incremental models, it is earliest often called the core product. Core Product is the need of the user. Sometimes the many conditions make not all can be conveyed in the initial development. Based on this, the core product can be used as a
development plan for the increment next by modifying the product to meet user needs. The stages of development incremental process are as follows [46]:

1. Communication: at this stage, a needs analysis is carried out on software development and formation needs.
2. Planning: At this stage, you will make an initial draft of the task, the time required, the technical job, and the needed resources;
3. Modeling: Formation of design in making software and design for software;
4. Construction: In this stage, the programming performs testing to test the suitability of the user and determine the evaluation to be improved
5. Deployment: At this stage, the developer provides documentation on the features that have been built and receives feedback from the software that has been formed.

A trial product has been created, used in an experiment, and an evaluation of product usage is obtained, and an evaluation program for improvements to existing products is obtained.

3.5. Test Product/Trial Test Product

The test is carried out based on knowing the efficiency, effectiveness, and products made. In this trial, there are five main designs, including: (1) trial design, (2) subjects, (3) types of data, (4) instruments, and (5) data analysis.

A. Trial Design

Carry out trial activities to determine the effectiveness, efficiency, and feasibility of the product. From the test results, it is used for the process of product revision and improvement.

B. Trial Subjects

The subjects used for this research are Media and Material Experts consisting of media and design experts on application development and office management experts.

C. Types of Data

Data obtained from this study are quantitative data. Quantitative data were obtained through a questionnaire using a Likert scale, difficulty, and the results of trials on experts.

4 Results and Discussion

4.1 Media Development Results

Based on the results of the development that has been carried out through the method that has been used, namely design thinking, which is a digital office simulation with a cloud cloning platform, it has been successfully created with various features, such as features that simulate the world of digital offices that later it can help the process of adjusting human resources in the office world, especially during this covid-19 pandemic.

As for the existing flow in this application system, the first is to start the media by going to the homepage and selecting the user level, then selecting the virtual office area and entering the virtual office and selecting the office entry date and playing roles and case studies and having a function and carrying out the part. And virtual, then there are virtual office work features, namely features that simulate the office world digitally, which can later help the
process of adjusting human resources in the office world, especially during this covid-19 pandemic. The following is a description of the features that have been described through the flow accompanied by a face-to-face description of each element as follows:

A. Homepage

![Figure 2. Display The Homepage](image)

The homepage is a feature to introduce the existing media and instructions on this system.

B. Selection of Levels

![Figure 3. Selection of Levels](image)

These levels are used to separate degrees or groups of office simulation learning, both at the vocational high school level and those already at the industrial level, to match the needs of the field.

C. Selection of Virtual Office Areas

![Figure 4. Selection of Virtual Offices](image)
After this, it is selecting virtual office areas is the separation into areas that can be accessed according to the office area that uses this training. This is used to separate the characteristics of offices in each region to suit their needs. Needs.

D. Selection of Virtual Office Dates

After selecting a location, users enter the virtual office and choose the appropriate date because each date will have different challenges according to the curriculum development.

E. Running an Office Simulation

Next, role-playing and case studies are used here, using the method life-based learning, which implements existing roles in the office that can be selected by the user or employee who is conducting training and completing case studies following the chosen part so that later it can be seen the increase in the ability of the simulation employees that has been carried out.

Next is the virtual office feature wherein. This feature there are the same features, but it has been integrated with the office system that can be directly monitored by superiors who are following the original office features so that the industry can now use this service as a dashboard of their own when the company wants to use the virtual system that has been provided so that this feature can help the office industry in providing a platform for its employees in one complete standardized platform.

4.2 Discussion of Trial Result

a. Usability Testing Product Testing Phase

In the development of technology-based learning products, usability testing products must be carried out (Riihiaho, 2017) to find out the fluency of users after understanding the guide so that it can be seen that the feasibility of using media has been very well tested by novice users who are just learning the use of technology, for the assessment process, uses a scale on product usability testing with the following details [47]:

- 0-0.5 = Very Poor
- 0.5-1 = Enough
- 1.5-2 = Not fluent
- 1.5-2.0 = Doubtful
- 2.0-2.5 = Smooth
- 2.5-3.0 = Very smooth
The results of the usability testing of this product are as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects assessed</th>
<th>Total Score</th>
<th>Average</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>page display Login</td>
<td>21</td>
<td>3</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>2</td>
<td>display dashboard Initial</td>
<td>20</td>
<td>2.9</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>3</td>
<td>User addition display</td>
<td>20</td>
<td>2.9</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>4</td>
<td>View user account</td>
<td>21</td>
<td>3.0</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>5</td>
<td>view dashboard Advanced</td>
<td>21</td>
<td>3.0</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>6</td>
<td>Add file view</td>
<td>19</td>
<td>2.7</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>7</td>
<td>View archive view</td>
<td>20</td>
<td>2.9</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>8</td>
<td>Advanced file search view</td>
<td>21</td>
<td>3.0</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>9</td>
<td>File borrowing view</td>
<td>19</td>
<td>2.7</td>
<td>Very Smooth</td>
</tr>
<tr>
<td>10</td>
<td>Display of archive borrowing data</td>
<td>19</td>
<td>2.7</td>
<td>Very Smooth</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>201</strong></td>
<td><strong>28.7</strong></td>
<td></td>
</tr>
</tbody>
</table>

Based on table 1, the results of the usability testing of the product contained ten indicators. The total score on this aspect by users is 28.7, with ten hands through which the average rating from users is 2.9. The product gets very smooth criteria through the table of usability testing results, which means that development has been carried out according to user needs.

b. Test Results Post-Test Design Only
1. Experimental Procedure This
   
   The test uses a quasi-experimental method. Quasi-experimental is a method that provides treatments, outcome measures, and experimental units but does not use random placement [48]. This test was designed using a post-test design only, using 1 group given treatment and given a post-test.

   The first test is to determine the sample used for research and form a group into a test class. The next stage is the experimental group learning with disruptive learning media. The final stage is given a post-test to determine the increase in students' knowledge and skills.

2. Implementation of post-test design only
   
   The post-test implementation process is carried out online or online by creating a post-test instrument derived from the syllabus of digital archival subjects on the competence of office governance automation expertise. The tests carried out were divided into two groups, totaling ten students, with five people in the experimental class and five people in the control class.

   The implementation of the post-test design the only test was carried out to determine the effectiveness of the application of disruptive learning media on the knowledge and skills of
users, in this case, prospective teachers or students of the S1 Study Program of the Office Administration Education State University of Malang.

3. Research Results

Tests were carried out using the experimental method, which was carried out in two groups: experimental and control. Each research subject is described in the following table:

<table>
<thead>
<tr>
<th>Number</th>
<th>Group</th>
<th>Total of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experiment</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Control</td>
<td>5</td>
</tr>
</tbody>
</table>

In the group with practical information, learning is given through digital archive simulator media based on disruptive media, and the control group using conventional media in the form of books digital archival learning. In this test, the researcher obtained post-test data from students who were divided into two groups. This test helps measure the effectiveness of the developed product on learning outcomes on the essential competencies of digital archives.

4. Assumption Test

Based on the description of this study to determine the results of the parametric statistical t-test. Before carrying out the test, an assumption test is carried out, which includes normality and homogeneity, which will estimate the data test results in actual conditions.

a. Normality

Test This test aims to determine the distribution of variables in normal conditions or not. This test uses the chi-square formula in calculations using SPSS 22 [49]. Parameters are used to determine whether data is standard or not. If $\text{sig} > 0.05$, then the information is standard, but if it is in a position $< 0.05$, it can be abnormal. The results of the calculation of the normality of the data on the results of digital learning archives for undergraduate students of Office Administration Education are as follows:

![Chi-Square Test Results](image)

**Figure 7.** Chi-Square Data Normality Test Results in The results of the data normality

Test of the research variables showed a Pearson chi-square number of 0.405, which means $\text{sig} > 0.05$ so that the data belonged to a normal distribution.

b. Homogeneity Test

After testing the normality of the data, the assumption test stage is a homogeneity test to show statistical data equality in the initial conditions of the two groups. This test also aims to
find out about the variants of the groups compared in the comparative trial, which will be identical or not. Homogeneity test using homogeneity of variances method with ANOVA in SPSS 22 software with sig > 0.05 comparison [50]. The test results are as follows:

### Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.156</td>
<td>1</td>
<td>8</td>
<td>0.166</td>
</tr>
</tbody>
</table>

**Figure 8.** Data Homogeneity Test

From the following figure, the results of the data homogeneity test are known to reach 0.166 where the levene value is >0.05, so it can be concluded that this test has the same or homogeneous variance.

c. Hypothesis Testing

The t-test was used for parametric testing at the hypothesis testing stage, using the independent sample t-test by using the calculation process through SPSS 22. The results of the independent sample t-test analysis of the post-test results using website-based disruptive learning media and students who only use conventional methods aim to know whether there is a significant difference in the post-test scores of which uses disruptive media methods with traditional methods [51]. The conclusion of the research on hypothesis testing can be declared significant when the p-value < 0.05. The following is a summary of the post-test t-test from students who are part of the experimental class and control class.

**Table 3. Summary of Post-test Test Results**

<table>
<thead>
<tr>
<th>Class</th>
<th>Average</th>
<th>t-test</th>
<th>Sig.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment Class</td>
<td>96</td>
<td>10.606</td>
<td>0.166</td>
<td>0.001</td>
</tr>
<tr>
<td>Control Class</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, it is known that the t-test value is 10.606 with p = 0.001 with a significance of 1%. This shows that t is significant (p < 0.01). Based on this, students' learning outcomes between the two control and experimental groups differed significantly [52]. So the ability to understand digital archives in terms of cognitive and psychomotor between the control and practical classes there is a difference.

From this test, the post-test summary has an average experimental class of 96 with a standard deviation of 5.47 and an average of 66 for the control class with a standard deviation of 11.40. Based on this, it can be concluded that the average cognitive and psychomotor understanding of digital archives using disruptive digital archive media is 33, which means it is better than conventional methods.
5 Conclusion

Based on the description in this research paper, the purpose of this research has been achieved, namely the development of a cloud-based office administration simulation system with several standardized collaboration features. And in accordance with the hypothesis tested in this study is the effect of differences in learning outcomes on the use of this media for the better.

Reference


AA Faisal, "Application of the Simulation Method as an Effort to Improve Student Activity and Learning Outcomes in the Subject of Handling Letters or Office Documents in Class XI AP 2 Christian Vocational School 1 Surakarta Academic Year 2-17/2018," 2018.


Islamic Journalism reporting of the 2019 Indonesian presidential election

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Abstract. This research analyzed 50 keywords using the aid of NVIVO, sampled from two Indonesian media sites practicing Islamic journalism, to study the relationship between the focus of reporting on the 2019 Indonesian presidential election and its politically oriented journalistic roles. One of the media, voa-islam.com, has been involved in polarizing voters by their faith using an ‘us and them’ frame. Through content analysis, this research has quantified the political function of the media in question to be rooted in the promotion of one candidate more closely related with hardline Islamic groups; over the other. On the other hand, the more mainstream media, Republika, has proven itself more impartial and objective, although still denominating issues to an Islamic perspective for its Muslim majority audience. Consequent ly, this research suggests that there needs to be greater policing of journalistic frames applied in the media.

Keywords: Communication; Journalism; Media Studies; Politics; Religious Studies

1 Introduction

The involvement of religion in Indonesian democracy has only grown insignificance. As such, identity politics based on religion has resulted in the media becoming the new political frontier [1]. With Islam being the most politically charged religion in Indonesia, Islamic journalism can be incredibly dangerous when used to gain political gain. As such, this research ventures to draw correlations between Islamic journalism's focus of reporting on the 2019 presidential election, a key event in the country's development, and this brand of journalism's intended political function. Notably, Islamic journalism now exists in a sphere of media that has been revolutionized by the internet, as it has allowed the flow of information to no longer be passively one-way. Instead, information now actively ebbs and flows from many-to-many in a two-way interaction.

As such, the availability of the Internet as means to spread information has infinitely multiplied the available space for new journalism practices to emerge [2]. Democracy now enjoys and suffers from the concept of citizen journalism, as anyone with an internet connection can become a journalist [3]. This decentralization of journalism has given rise to identity-based journalism and questionable post-truth reporting [4]. Although not inherently problematic, identity-journalism can hinder democracy, as subjectivity is justified under the vigil of a more significant set of beliefs. When the media and religion become increasingly intertwined, ensuring objective journalism becomes difficult; this can harm democracy.
Contrary to traditional secular arguments, the interlinkage between religion and democracy is inevitable and critical for social stability, where democracy is defined as a societal system operating in a different plane from religion [5]. As put forth by Inglehart (2000), democracy hinges on the grassroots value framework of its citizens [6]. As part of a society's cultural constituent, different faiths will reflect and influence the nature of democracy differently, as apparent in Indonesia.

In reflection of its multifaith populace, the electoral system in Indonesia involves numerous parties openly involving religion, particularly Islam, in their campaigns [7]. Although the electoral system has benefited from nationwide suffrage and large turn-up, democracy still has its problem. The nation now faces the formation of religion-based militant organizations in swaying the political pendulum [8]. The media is not innocent in this matter. The usage of conflict-oriented frames is evident in attacks thrown against incumbent President Joko Widodo, as critics are commonly found in online discourses [9]. This is further evidenced by the electoral campaigning conduct of choice on social media; identity politics through aggressive personal remarks [10].

With that in mind, this research limits itself to focus on Islamic journalism reporting on the 2019 presidential election, as it was punctuated by narratives rooted in Islamic perspectives, polarizing Indonesian voters by their faith [11]. With that in mind, this research defines Islamic journalism simply as a brand of journalism that is guided not by West-oriented journalistic values. Instead, Islamic journalism is a school of thought in journalism that practices journalistic principles and produces journalistic content based on the Qur'an and the Sunnah [12].

After conducting the data collection and analysis process, this research has surmised that Islam, as the overwhelmingly majority religion, will continue to be an essential part of identity politics and a decisive influence in elections.

2 Literature Review

2.1 Contextualizing Indonesia

Instead of producing objective journalism coverage, contemporary Indonesian media have instead objectified political development as another media commodity [13]. Indonesian media oligarchs influence reporting framing as they exercise the media's inherent political power [14]. On a more individual level, the socio-cultural backgrounds and framework of value, such as religion, despite the journalist's best efforts, still have the potential to skew reporting [15]. Additionally, conflicting legal regulations have hampered any real progress to police the Indonesian media [16], allowing for polarization of political reporting in the country. In the context of the presidential elections, intensification of conflict by the media can become petty [17]. Backdropped by building tension within the majority Muslim and the state, the media's relationship with religion shows desecularization and resacralization [18]. These forms of religious mediatization have put faith back into the public's attention at the cost of its reliance on the media for relevance. In evidence, the social phenomenon of religious stardom sees religious leaders cultivate public awareness to take full advantage of their popularity in the media [19]. Consequently, the current political landscape is no longer dominated by the state, as the state's powers have been fractionated and are now governed by the different forces of political power in the country [20].
2.2 The 2019 Presidential Election and Islamic Journalism

The idea that the public is politically well informed is paramount to any democratic landscape. However, most country citizens do not have a clear understanding of the political conditions [21]. At the same time, the media fulfills the individual's need for political orientation as politics occurs beyond an individual's proximity [22], where said individuals are likely only to consume news aligned with their views and strengthen their beliefs socio-political reality [23]. Therefore, the little political knowledge that the citizens consume, based on the media's reporting, contributes over proportionally to their perception of socio-political reality.

On top of their perceived socio-political reality, most Indonesian Muslim populations believe that they should only be led by individuals who share their faith [24]. A previous study conducted by Fossati [25] surmised that most of the research's Muslim respondents agree that Islam should be seen as the first among equals. As such, faith-based coverage through Islamic journalism, geared to appeal to the nation's Muslim population's desires and perceived socio-political reality, becomes a powerful electoral asset. The 2019 presidential election indicated numerous religious frictions between the contesting parties, candidates Joko 'Jokowi' Widodo and Prabowo Subianto. Notably, the rise of right-wing Muslim conservatives as political power was in line with Prabowo's first electoral run in 2014 [26]. Upon his election win in 2014, Jokowi's policies starved power away from Muslim hardliners in favor of more liberal alternatives. In response, during the 2019 election, hardline Islamic groups rallied behind Prabowo against their shared political enemy. In reflection of this, Jokowi's approval rating declines along the secular-Islamic spectrum [25].

Despite its illustrious history [27] and universal transcendental values [28], modern Islamic journalism becomes an increasingly crucial tool in Indonesian identity politics [29]. In understanding further the intended political purpose of Islamic journalism, Galtung's (1981) violence-oriented frame [30] becomes relevant. It argues that reporting will focus on adopting a 'zero-sum game' perspective, boiling electoral contests down into two black and white parties, where one party's loss can be equated to the other party's gain. In practice, contesting parties and the media will generally act on any situation as a zero-sum situation [31]. Furthermore, the inherent us against them mindset is further punctuated by repeated slander of the opposition's action reactively, denominated by a populism belief of the perceived morally right majority [32]. As such, the reporting done by Islamic journalism becomes a necessary point of analysis.

RQ1: What are the focus points of Islamic journalism reporting on the 2019 Indonesian presidential election?

2.3 Theoretical Framework

This research employed Hanitzsch and Vos' 'Journalistic Role Model' [33] as the theoretical framework. The journalistic role model helps to provide a more relevant framework to distinguish between journalistic roles with functions or intention and consider the institutional context in which it exists. The model has been explicitly designed to counter the over-representation of journalistic theories focusing on Western journalism. The journalism role model is designed to be more globally representative in capturing the relationship between journalism, democracy, and societal-political life.

In achieving this, Hanitzsch and Vos outlined six journalistic functions: informational-instructive, advocative-radical, analytical-deliberative, developmental-educative, critical-monitorial, and collaborative-facilitative. Furthermore, Hanitzsch and Vos outlined three specific journalistic roles for each position, discussed later in table 1, as part of the methodology codebook.
The informational-instructive function and its specific roles center on the journalistic part of informing the public for political decisions. The advocative-radical focuses on how journalists position themselves as political actors relevant to the political conflict and how they would facilitate subjective ideologies that enact on them. The analytical-deliberative also places journalists to be active political actors, but instead, concerns itself on how they promote and intervene in political discussions among the masses. The developmental educative emphasizes the involvement of journalists in the promotion of a particular brand of social change through calls to action. The critical monitorial focuses on the fundamental value of the fourth estate, critically keeping political powers in check for the public's good. Lastly, the collaborative-facilitative covers the development journalism aspect, seeing journalists as partners to the state to bring about perceived social progress and protecting the government.

**RQ2**: What are the most common political functions and roles present during Islamic journalism during reporting on the 2019 Indonesian presidential election?

**RQ3**: How does Islamic journalism's focus on reporting on the 2019 Indonesian presidential election relate to its politically oriented journalistic roles compared to the mainstream media?

### 3 Research Methods

The research utilized content analysis of articles published by Islamic journalism news site voa-islam.com. Established in 2009, voa-islam.com has garnered public attention through provocative headlines [34] and was formed to be a reaction against the marginalization of Muslims [35]. Articles from voa-islam.com were then compared to the mainstream Islamic media, Republika. Notably, Republika is the first media to be acknowledged as an Islamic newspaper and is still considered one to the day [27].

Regarding articles from voa-islam.com, the researchers used a purposive sampling method to produce the most relevant sample [36]. Specifically, the criteria considered articles reported on the 2019 presidential election, published during the campaign period, from September 23, 2018, up to April 13, 2019. They included the keywords of the names of either presidential and vice-presidential candidates, their election numbers, or respective political party, in the headline. Resultantly, 356 articles were extracted and became the sample. Regarding articles from Republika, due to the media's larger scale of operation, the research utilized both purposive and constructed week sampling. While keeping the same criteria to provide a fair comparison, constructed week sampling is more effective than simple random sampling [37]. Two completed weeks of articles were sampled to achieve representativeness for the articles belonging to the political category [38]. With that in mind, a sample of 402 articles published from May 31 to April 13, 2019, fitting the criteria, were selected.

For this research, the conceptual content analysis had been deemed most suitable due to its latent nature in quantifying the focus of textual data and drawing conclusions through the frequency and occurrence of most essential keywords [39; 40]. The articles sampled were processed using the NVivo software, as part of the Computer-Aided Text Analysis (CATA) process, due to its ability to process critical quantitative data with high reliability. Like research by Hasan and Dauda [11] and Gandasari and Dwidienawati [41] on the Malay and Indonesian media, respectively, NVivo is suitable to process substantial amounts of textual data and an intuitive approach in content analysis coding. The focus of Islamic journalism's reporting was quantified through the 50 most frequent keywords, aside from conjunctions and prepositions. The 50 keywords from each set of samples, totaling 100 units of analysis, were manually coded.
using a priori codebook design based on the theoretical framework [42; 43]. The coding process considers several factors in designating the appropriate function and role, as displayed in table 1.

**Table 1. Codebook conceptual framework**

<table>
<thead>
<tr>
<th>Function; role</th>
<th>Identifiers (as framed with the units of analysis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informational-instructive; disseminator</td>
<td>General information, lack of framing, objectivity</td>
</tr>
<tr>
<td>Informational-instructive; curator</td>
<td>Graphics or other media to curate information</td>
</tr>
<tr>
<td>Informational-instructive; storyteller</td>
<td>Curation of information, strong framing</td>
</tr>
<tr>
<td>Advocative-radical; adversary</td>
<td>Hostile or petty tone against government</td>
</tr>
<tr>
<td>Advocative-radical; advocate</td>
<td>Advocating for an underprivileged social group</td>
</tr>
<tr>
<td>Advocative-radical; missionary</td>
<td>Promotion of a specific group or ideology</td>
</tr>
<tr>
<td>Analytical-deliberative; analyst</td>
<td>Contextual frames to criticize an issue</td>
</tr>
<tr>
<td>Analytical-deliberative; access provider</td>
<td>Medium for an audience to participate in the discussion</td>
</tr>
<tr>
<td>Analytical-deliberative; mobilizer</td>
<td>Call for the audience to engage in political issues</td>
</tr>
<tr>
<td>Developmental-educative; change agent</td>
<td>Hopeful tone, framing subject as change bringer</td>
</tr>
<tr>
<td>Developmental-educative; educator</td>
<td>Informative with data to educate the audience</td>
</tr>
<tr>
<td>Developmental-educative; mediator</td>
<td>Inclusive frame or pronouns for commonality</td>
</tr>
<tr>
<td>Critical-monitorial; monitor</td>
<td>A passive critical manner in discussing an issue</td>
</tr>
<tr>
<td>Critical-monitorial; detective</td>
<td>Involving investigative work</td>
</tr>
<tr>
<td>Critical-monitorial; watchdog</td>
<td>Active critical fashion to assertively criticize</td>
</tr>
<tr>
<td>Collaborative-facilitative; facilitator</td>
<td>A government or state friendly frame of reporting,</td>
</tr>
<tr>
<td>Collaborative-facilitative; collaborator</td>
<td>Visible framing geared to defend the government</td>
</tr>
<tr>
<td>Collaborative-facilitative; mouthpiece</td>
<td>Justification of government actions</td>
</tr>
</tbody>
</table>

Aside from displaying each keyword’s word count (n), the research measures the comparative percentage (Σx), a figure indicating the prominence of a keyword denominated by the sum of the top 50 most frequent word count. The coding process has been done by two undergraduate coders that are familiar with journalistic theories. After a one-week training process, a total of 100 keywords, as the unit of analysis, were coded. Based on Krippendorf’s alpha [44; 45], a reliability coefficient figure of 96 percent was achieved.
3 Results and Discussion

To answer RQ1, there are patterns of similarities in terms of the focus of Islamic journalism’s reporting of the 2019 presidential election, as quantified through notable frequent keywords, across both voa-islam.com and Republika, as illustrated in tables 2 and 3.

Table 2. Voa-islam.com’s relevant frequent keywords ordered based on word count

<table>
<thead>
<tr>
<th>Word</th>
<th>Translation</th>
<th>Count (n)</th>
<th>Weighted percentage</th>
<th>Comparative percentage (x)</th>
<th>Function; Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grabow</td>
<td>Grabow</td>
<td>1161</td>
<td>1.67%</td>
<td>11.92%</td>
<td>Advocative- radical; missionary</td>
</tr>
<tr>
<td>Djokovic</td>
<td>Djokovic</td>
<td>630</td>
<td>0.91%</td>
<td>6.47%</td>
<td>Advocative- radical; adversary</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Indonesia</td>
<td>470</td>
<td>0.68%</td>
<td>4.83%</td>
<td>Developmental- educative; change agent</td>
</tr>
<tr>
<td>sandi</td>
<td>sandi</td>
<td>429</td>
<td>0.62%</td>
<td>4.41%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>president</td>
<td>president</td>
<td>364</td>
<td>0.52%</td>
<td>3.74%</td>
<td>Advocative- radical; adversary</td>
</tr>
<tr>
<td>rakyat</td>
<td>populace</td>
<td>291</td>
<td>0.42%</td>
<td>2.99%</td>
<td>Developmental- educative; change agent</td>
</tr>
<tr>
<td>masyarakat</td>
<td>public</td>
<td>189</td>
<td>0.27%</td>
<td>1.94%</td>
<td>Developmental- educative; change agent</td>
</tr>
<tr>
<td>Politik</td>
<td>politics</td>
<td>189</td>
<td>0.27%</td>
<td>1.94%</td>
<td>Critical- monitorial; monitor</td>
</tr>
<tr>
<td>bangsa</td>
<td>nation</td>
<td>181</td>
<td>0.26%</td>
<td>1.86%</td>
<td>Developmental- educative; change agent</td>
</tr>
<tr>
<td>semua</td>
<td>all</td>
<td>169</td>
<td>0.24%</td>
<td>1.74%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Jakarta</td>
<td>165</td>
<td>0.24%</td>
<td>1.69%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>partai</td>
<td>party</td>
<td>165</td>
<td>0.24%</td>
<td>1.69%</td>
<td>Advocative- radical; missionary</td>
</tr>
<tr>
<td>Islam</td>
<td>Islam</td>
<td>164</td>
<td>0.24%</td>
<td>1.68%</td>
<td>Advocative- radical; missionary</td>
</tr>
<tr>
<td>ekonomi</td>
<td>economy</td>
<td>155</td>
<td>0.22%</td>
<td>1.59%</td>
<td>Critical- monitorial; monitor</td>
</tr>
<tr>
<td>sandiaga</td>
<td>sandiaga</td>
<td>124</td>
<td>0.18%</td>
<td>1.27%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>pemerintah</td>
<td>government</td>
<td>116</td>
<td>0.17%</td>
<td>1.19%</td>
<td>Advocative- radical; adversary</td>
</tr>
<tr>
<td>subianto</td>
<td>subianto</td>
<td>115</td>
<td>0.17%</td>
<td>1.18%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>politics</td>
<td>politician</td>
<td>102</td>
<td>0.15%</td>
<td>1.05%</td>
<td>Critical- monitorial; monitor</td>
</tr>
<tr>
<td>Jesus</td>
<td>case</td>
<td>96</td>
<td>0.14%</td>
<td>0.99%</td>
<td>Critical- monitorial; monitor</td>
</tr>
<tr>
<td>ulama</td>
<td>cleric</td>
<td>95</td>
<td>0.14%</td>
<td>0.98%</td>
<td>Advocative- radical; missionary</td>
</tr>
</tbody>
</table>

Table 3. Republika’s relevant frequent keywords ordered based on word count

<table>
<thead>
<tr>
<th>Word</th>
<th>Translation</th>
<th>Count (n)</th>
<th>Weighted percentage</th>
<th>Comparative percentage (x)</th>
<th>Function; role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grabow</td>
<td>Grabow</td>
<td>1386</td>
<td>1.51%</td>
<td>8.12%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>Djokovic</td>
<td>Djokovic</td>
<td>1356</td>
<td>1.48%</td>
<td>7.94%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>president</td>
<td>president</td>
<td>691</td>
<td>0.75%</td>
<td>4.05%</td>
<td>Informational- instructive; disseminator</td>
</tr>
<tr>
<td>calon</td>
<td>candidate</td>
<td>509</td>
<td>0.56%</td>
<td>2.98%</td>
<td>Informational- instructive; disseminator</td>
</tr>
<tr>
<td>m’a’ruf</td>
<td>m’a’ruf</td>
<td>457</td>
<td>0.50%</td>
<td>2.68%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>sanding</td>
<td>sanding</td>
<td>455</td>
<td>0.50%</td>
<td>2.66%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>2019</td>
<td>2019</td>
<td>432</td>
<td>0.47%</td>
<td>2.53%</td>
<td>Informational- instructive; disseminator</td>
</tr>
<tr>
<td>sandi</td>
<td>sandi</td>
<td>404</td>
<td>0.44%</td>
<td>2.37%</td>
<td>Advocative- radical; advocate</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Jakarta</td>
<td>347</td>
<td>0.38%</td>
<td>2.03%</td>
<td>Informational- instructive; disseminator</td>
</tr>
<tr>
<td>main</td>
<td>main</td>
<td>300</td>
<td>0.33%</td>
<td>1.76%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>Kiai</td>
<td>Kiai</td>
<td>293</td>
<td>0.32%</td>
<td>1.72%</td>
<td>Informational- instructive; storyteller</td>
</tr>
<tr>
<td>capers</td>
<td>presidential candidate</td>
<td>287</td>
<td>0.31%</td>
<td>1.68%</td>
<td>Informational- instructive; Disseminator</td>
</tr>
<tr>
<td>wakil</td>
<td>vice</td>
<td>269</td>
<td>0.29%</td>
<td>1.58%</td>
<td>Informational- instructive; Disseminator</td>
</tr>
<tr>
<td>subianto</td>
<td>subianto</td>
<td>231</td>
<td>0.25%</td>
<td>1.35%</td>
<td>Informational- instructive; Storyteller</td>
</tr>
</tbody>
</table>
First, it is essential to note that mentions of both presidential and vice-presidential candidates dominate the overall focus of the reporting. However, there is a significant discrepancy in the proportion of coverage by voa-islam.com on presidential candidate Prabowo Subianto (Prabowo, n:1161; Subianto, n:115) and his vice Sandiaga Uno (Sandi, n:429; Sandiaga, n:124), compared to the other presidential and vice-presidential candidates, Joko Widodo (Jokowi, n:630) and Maruf Amin. Notably, no mention of Maruf Amin even managed to crack the top 50 most frequent keywords from voa-islam.com. On the other hand, Republika achieved almost equal coverage between the two presidential candidates (Prabowo, n:1386; Jokowi, n:1356) and vice-presidential candidates (Sandiaga, n:455; Maruf, n:457). As such, it is observed that voa-islam.com showed significantly greater inclination and active promotion of Prabowo and Sandiaga through sustained coverage, the pair who were closely tied with the hardline Muslim groups during their campaign period [26; 25]. This was indicative of the media’s role in appealing to faith-based identity politics, likewise, stated by Hamidah [29].

On top of this discrepancy, attributes of Islam can also be found across both media, with keywords such as Islam (n:164) frequently appearing in voa-islam.com articles, while the keyword ‘cleric’ also having been noted in both voa-islam.com articles (ulama, n:95), and Republika (ulama, n:183). Notably, mentions of clerics in both reports were found to be associated with well-known Muslim scholars in the country, indicating that both Islamic journalism media depicted tendencies of resacralization and desecularization, as well as religious stardom [18; 19].

In a deeper understanding of the focus of reporting of voa-islam.com compared to the more mainstream Republika, it is now pertinent to address RQ2 in analyzing the most common political function and the role the focus is depicted in. Most importantly, these in voa-islam.com articles, as measured through the comparative percentage (Σx), are the adversary role in the advocative-radical function (Σx: 16.71%), as illustrated in table 4.

Table 4. voa-islam.com's most familiar political function and role ordered based on the Σx.

<table>
<thead>
<tr>
<th>Function; role</th>
<th>Words</th>
<th>Sum of comparative percentage (Σx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocative- radical; adversary</td>
<td>Djokovic, president, people, law, presidential election, government</td>
<td>16.71%</td>
</tr>
<tr>
<td>Advocative- radical; missionary</td>
<td>prabowo, party, islam, cleric sandi, all, jakarta, fahri, chief, sandiaga, subianto, candidate</td>
<td>16.27%</td>
</tr>
<tr>
<td>Informational- instructive; storyteller</td>
<td>year, one, daniel, account, percent, vice, vice presidential candidate, number, national, do, 2018</td>
<td>14.30%</td>
</tr>
<tr>
<td>Informational- instructive; disseminator</td>
<td>presidential candidate, number, national, do</td>
<td>13.02%</td>
</tr>
<tr>
<td>Developmental- educative; change agent</td>
<td>Indonesia, populace, public, nation, good</td>
<td>12.91%</td>
</tr>
</tbody>
</table>
As outlined by this research's theoretical framework, Hanitzsch, and Vos' [33] journalistic role model, the adversary role points to a journalist's tendency to display a hostile tone in placing themselves against the political powers of the government. Voa-islam.com's focus of reporting on topics such as Jokowi (x:6.47%), his presidency (president, x:3.74%), and government (pemerintah, x:1.19%), amongst others, indicated the media's oppositional stance. This was further accentuated by the monitor role in the critical-monitorial function (Σx: 9.35%). Unlike the adversary, the monitor is less hostile, although still focused on identifying political misconduct. Voa-islam.com were found to have reported topics such as politics and politicians (Politik, x:1.94%; politics, x:1.05%), the economy (Ekonomi, x:1.59%), as well as drawing attention to corruption cases during Jokowi’s presidency (kasus, x: 0.99%), in this political role.

To juxtapose these findings, the second most prominent political role is the missionary role in the advocating-radical function (Σx:16.27%). The missionary focuses on the active and subjective promotion of a particular ideology. Topics such as Prabowo (x:11.92%), affiliated political parties (partai, x:1.69%), Islam (x:1.68%), and clerics (ulama, x:0.98%), amongst others, were all reported in an overly optimistic tone, framed to be heroes of Islam.

This type of framing is further evidenced by the prominence of the storyteller role in the informational-instructive function (Σx:14.30%). This political role provides background information on a topic to achieve the desired contextual frame. Voa-islam.com articles depicted Prabowo and Sandiaga (Subianto, x:1.18%; Sandi, x:4.41%; Sandiaga, x:1.27%), the ranks of political leaders supporting them (Ketua, x:1.45%); to add credence and legitimacy to this medium’s preferred candidate. Additionally, storyteller reporting on the capital city of Jakarta (x:1.69%) and the usage of the pronoun ‘all’ (semua, x:1.74%) adds another frame of the pair being ‘a man of the people.’ Lastly, voa-islam.com has been found to employ the change agent role in the developmental-educative function (Σx:12.91%) when depicting their preferred presidential pairing. As a mediator between the adversary and the missionary, this role chooses to focus instead on developmental journalism while still carrying implicit undertones that the current condition is far from satisfactory. Topics such as the more extraordinary fate of the country (Indonesia, x:4.83%; Bangsa, x:1.86%) and the populace (rakyat, x:2.99%; Masyarakat, x:1.94%) under Jokowi's presidency were found to be depicted in this manner.

As regards RQ3, this research surmises that the relation between the two variables boils down to the stark contrast between the propaganda depiction of Prabowo, compared to the spiteful slander of Jokowi, as similarly pointed out by Irawanto [10] as well as Herdiansah and Sumadinata [9]. This indicated the zero-sum game at play, as previously argued by Davidi and Ongis [31]. Specifically, voa-islam.com's zero-sum game points to Prabowo being the 'correct' choice for Muslim voters, which polarizes voters by their faith [24]. As such, readers of voa-islam.com, most Muslim, would further amplify their desired socio-political reality and orientation, a social phenomenon previously pointed out by Wang [23] and McCombs [22]. In comparing voa-islam.com's focus on its politically oriented journalistic roles against the more mainstream Republika, the matter becomes clear when denominated by the disseminator's role in the informational-instructive function. This role refers to the most fundamental and ideal journalistic purpose of informing objectively. Despite this, voa-islam.com only managed to record a Σx figure of 13.02%. In contrast, Republika achieved a Σx figure of 47.19% in this role, the most common by a significant margin, as seen from table 5.
Table 5. Republika’s most common political function and role ordered based on the Σx

<table>
<thead>
<tr>
<th>Function; role</th>
<th>Words</th>
<th>Sum of comparative percentage (Σx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informational - instructive;</td>
<td>president, percent, candidate, 2019, number, voice, pairing, Jakarta, party, chief, presidential candidate, grand, vice, debate, one, state, vice presidential candidate, people, mass, April, event, general, national, present, supporters, big, good, city, stadium</td>
<td>47.19%</td>
</tr>
<tr>
<td>disseminator</td>
<td>candidate, people, mass, April, event, general, national, present, supporters, big, good, city, stadium</td>
<td></td>
</tr>
<tr>
<td>Informational - instructive;</td>
<td>prabowo, jokowi, indonesia, maruf, sandiaga, amin, kiai, subianto, widodo, politics, joko</td>
<td>34.03%</td>
</tr>
<tr>
<td>storyteller</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Republika reported on topics, such as both 2019 presidential and vice-presidential candidacies (2019, x:2.53%; president, x:4.05%; calon, x: 2.98%; capers, x:1.68%; wakil, x: 1.58%; cawapres, x: 1.12%), as well as the development of the capital and country (Jakarta, x:2.03%; Negara, x:1.13%; Nasional, x:1.07%) all in the disseminator capacity. As such, it becomes apparent that voa-islam.com indulges in more framing and questionable reporting; the post-truth phenomena about Go and Lee [4], and Arno's (1984) view on the media's ability to accentuate conflict [30]. Additionally, the framing of conflict by voa-islam.com is incredibly petty, in line with Strömbäck and Van Aelst's [17] findings. On the other hand, Republika holds itself to greater impartiality compared to voa-islam.com.

That being said, it is important to note that the second most common function in Republika reporting is the aforementioned storyteller role (Σx: 34.03%); found when covering both presidential candidates (Prabowo, x:8.12%; Subianto, x: 1.35%; Jokowi, x:7.94%; Joko, x: 1.31%; Widodo, x: 1.32%) and their vice-presidential candidates (Sandiaga, x:2.66%; Sandi, x:2.37%; Maruf, x:2.68%; Amin, x:1.76%, Kiai, x:1.72%). This research found that Republika's reporting provided context and building frames on Prabowo as statesmanlike, Jokowi as a political phenomenon, Sandiaga as a man of the people, and Maruf, the religious cleric; provided each individual equal coverage. In Republika's capacity as a media practicing Islamic journalism, reporting remains by and for the Muslim population, as Republika articles were found to have been written with Islam's best interest in mind. As such, the framing of each candidate can be chalked down to Cammaerts and Carpentier's [15] and Inglehart's arguments [6], as the framework of religion always has the inherent potential to skew reporting, and this subjectivity captures the grassroots framework of democracy. Unlike voa-islam.com, however, Republika reported both the negative and positive aspects of each candidate instead of indicating clear favoritism. When contrasting all the keywords head-to-head, voa-islam.com's reporting of the 2019 presidential election can be found to adopt the ‘us and them’ mindset, as previously stated by Hameleers and Schmuck [32].

5 Conclusion

In line with Muchtar et al.'s [12] definition, this research surmised that the brand of Islamic journalism practiced by voa-islam.com and Republika reported the 2019 Indonesian presidential election in catering to the Muslim voters; akin to the ummat concept. The focus of reporting can
be denominated to the objectification of political and societal issues, as forewarned by Arifuddin [13], but from a Muslim perspective that caters to the protection and promotion of Islamic interests. Regarding the political function of such a manner of reporting, voa-islam.com has been found to stray away from the basic journalistic principle of impartiality admittedly, going out of its way to actively promote presidential candidate Prabowo Subianto at the expense of Joko Widodo. On the other hand, as the more mainstream and widely read media, Republika provided equal and impartial coverage, although still denominated from the aforementioned Muslim perspective.

This research concludes that the relationship between Islamic journalism's focus of reporting on the 2019 Indonesian presidential election and its politically oriented journalistic roles, as compared to the mainstream media, is one of contextualizing issues from an Islamic point of view; with voa-islam.com seemingly involved in a violent 'us against them' mindset in equating support for Prabowo to be support for the protection of Muslim integrity in Indonesia. In short, the role of voa-islam.com’s Islamic journalism reporting boils down to the active contextualization and framing of Prabowo as the superior choice for its readers demography; this essentially boils down to the idea that support for Prabowo, can equate to negative reporting for the other presidential candidate, Joko Widodo.

References


Online Learning Using The Zenius App At Madrasah Ibtidaiyah Negeri 8 (MIN) Central Aceh

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Abstract. Zenius is an application developed for distance learning. This application has several advantages, including the availability of subject matter and learning videos. This study aimed to determine the effectiveness of using the Zenius application in online learning at MIN 8 Central Aceh. The research method used in this study is a level 2 development research method, according to Sugiono, namely researching to test existing products. Data collection is done using observation, interviews, and tests. Observations and interviews were conducted at the literature study stage as the first step in level 2 development research. At the same time, the tests used were pretest and posttest—data analysis techniques using quantitative analysis. The results showed that from the limited Trial, the pretest and posttest scores increased with a high significance of 16.67%, 0%, and low, 83.33%. Then it can be said to be effective. In the usage trial, it is known that there is an increase in the pretest and posttest scores with a high significance level of 30%, moderate 0%, and low 70%; it is stated that the use of the Zenius application in learning is effective. The broad class trial found an increase in the pretest and posttest scores with a high significance of 35.53%, moderate 0%, and low 64, 47%. It is stated that the application used in online learning is practical.

Keywords: Learning, Online, Application, Zenius

1 Introduction

Corona virus infection is a disease caused by a coronavirus and causes the main symptoms of respiratory problems. This disease is in the spotlight because of its emergence at the end of 2019 for the first time in Wuhan, China. For the first time, the location of its appearance has made the COVID-19 Covid-19. Symptoms of Covid-19 range from the flu to severe diseases such as Middle East Respiratory Syndrome or what is known as MERS-CoV and Severe Acute Respiratory Syndrome or SARS-CoV.[1] A new type of coronavirus causes Covid-19. This virus is a new type of virus, so this disease was unknown until the Covid-19 outbreak in Wuhan, China, in December 2019. Cases of Covid-19 disease appeared and infected humans for the first time in Wuhan, China. Covid-19 can be spread easily through coughing or breath released by a person with Covid-19.
Splashes of coughs and breaths by Covid-19 sufferers that fall onto the surface of an object can transmit the disease through the thing.[1]. If a person touches an object or inhales the splash then touches his nose, eyes, or mouth, he can contract Covid-19.

The world health organization, the World Health Organization (WHO), urges people to maintain a distance of more than 1 meter from other people to minimize the transmission of Covid-19. The information of Covid-19 is so fast that the World Health Organization (WHO) designated this coronavirus or Covid-19 as a pandemic on March 11, 2020. This global epidemic status or pandemic indicates that the spread of Covid-19 is taking place very quickly. Almost no country in the world can avoid the coronavirus (Mona, 2020), so that governments in various countries have implemented lockdowns or quarantines in the form of separating someone who has been exposed to COVID-19, including Indonesia, as stated by Suwarno, Indonesia, as one of the countries exposed to COVID-19 also implemented a similar policy. Since the first case of COVID-19 was confirmed on March 2, 2020, in Depok, West Java, the number of positive cases continues to grow quite quickly.[2]

The Indonesian government has implemented the Large-Scale Social Restrictions (PSBB) rules to control the spread of Covid-19. This is done hoping that the virus does not spread more widely and healing efforts can run optimally. In this social restriction effort, the Indonesian government has limited activities outside the home, such as educational activities carried out online (online) through online learning since March 2020, referring to the circular letter of the Minister of Education and Culture Number 4 of 2020. Online learning is carried out by utilizing internet technology with The goal is to reduce crowds to prevent the spread of the Covid-19 virus. Online learning is carried out with a distance learning system, namely between teachers and students, not in one room or one place.

Online learning is a new learning model in Indonesia. So many problems occur in the field, as stated by Zain that the limited material received by students makes learning not optimal.[3]. Other problems Students are not able to understand the content of the material that has been presented through online media by the teacher; the internet network is sometimes disrupted, the lack of use of online learning media so that the teacher cannot convey some subject matter that requires specific learning tools and media the maximum.[4] In terms of readiness, as stated by Jauhari, the problem that arises is that the preparation of teachers in making learning tools is a little more complicated; in online learning, teachers are required to master Information Technology (IT) considering that learning is not done face-to-face.[5]. Furthermore, Jauhari revealed that teachers are tired of doing online learning considering a large number of students, different schedules are made so that many teachers are not ready to do online learning, especially to prepare online learning media based on information technology using android applications.[5]. In addition, the factor of unpreparedness of educators is because they are not familiar with online learning and have not been able to use existing platforms or applications used in online learning. This is a particular problem for those who do not understand using IT. (Rudi Haryadi, 2021)

From the description above, it can be understood that there are still teachers who are not ready to do online learning, have difficulty making learning tools, preparing materials, and so on, which is happening in many areas. The same thing happened in MIN 8 Central Aceh. Departing from these problems, the author is interested in researching the use of the Zenius application in online learning; Zenius is a free platform that can be accessed by all teachers in Indonesia, launched for the first time to coincide with National Education Day 2020. Zenius is a free Learning
Management System created by teachers for teachers. Zenius claims that this platform can be used by teachers throughout Indonesia for free, by teachers of all subjects, at all levels of education to facilitate the management of learning activities. Zenius Application Development is a form of Zenus' mission to improve Indonesian educational competence globally. This edutech startup also intends to create a more thoughtful, brighter, and more fun Indonesia. Because the application has available learning materials, the teacher can start classes to overcome the material's difficulties. This study aimed to determine the effectiveness of using the Zenius application in online learning at MIN 8 Bebesen Central Aceh.

2 Research Methods

This research uses the level 2 development research method; according to Sugiono, level 2 development research is development research that aims to test existing products (Sugiyono, 2017), here the position of the researcher is only to try, did not research to test the effectiveness of current products. Level 2 research and development steps include several stages. First, using a particular product, here the product in question is the Zenius application for online learning. Second, literature studies; in this step, the researchers conducted field observations and Interviews related to online learning at MIN 8 Central Aceh. The third Trial, trials were conducted in small groups, use trials, and broad trials. Small group trials were carried out on students in small groups (sample selected at random). The practice of use by carrying out learning using the Zenius application classically in one class of students. Extensive trials by carrying out education using the Zenius application classically in three categories. Fourth, make a test report. analyze the test results, and make conclusions. (Rudi Haryadi, 2021). The data collection technique uses the tests approach to determine the effectiveness of using the Zenius application in online learning. The data analysis used is quantitative analysis to evaluate the effectiveness of using the Zenius application.

3 Results and Discussion

Results of the literature study

At the literature study stage in this level 2 development research, the researchers made observations at the research location, namely at MIN 8 Central Aceh; MIN 8 Central Aceh is one of the basic level Madrasah under the auspices of the Ministry of Religion of Central Aceh which actively implements online learning through the manager application. Group, the whatsapp group, google classroom, and zoom cloud meeting, since March 26, 2020. However, according to the Head of MIN 8 Central Aceh, Irfan, S.Pd.I, although Madrasah is actively implementing online learning, it turns out there are several obstacles, including the lack of teacher readiness to prepare online learning tools. So that it impacts decreasing the absorption of subject matter to students, all students
can take part in the online learning system. Responding to this, the researcher then offers to use the application that Zenius has developed in online learning.

Zenius provides online learning channels for elementary to high school students. Zenius App has three advantages, which are complete, practical, and affordable. Exclusive means that subject matter is available from grade 1 Elementary School to 12 Senior High School according to the education unit level curriculum, 2013 curriculum, and 2013 revised curriculum. There are 80,000 videos and hundreds of thousands of questions from all classes and lessons.

**Limited trial results**

In a limited trial, online learning was carried out using the Zenius application for six students in class 3; the tiny trial stage was carried out by conducting an initial test or pretest before conducting online learning, then online learning was carried out using the Zenius application for one week, after learning using the application genius then carried out a final test, or posttest. The results of the pretest and posttest are presented in the following table:

<table>
<thead>
<tr>
<th>No</th>
<th>Student</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>pretest</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>54</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>62</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>71</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>51</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>53</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>47</td>
</tr>
</tbody>
</table>

**Descriptive Statistical Analysis**
### Descriptives

<table>
<thead>
<tr>
<th>Nilai Pretest</th>
<th>Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
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<td>3.55590</td>
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<tr>
<td>95% Confidence Interval for Mean</td>
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<tr>
<td>Lower Bound</td>
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<td>Upper Bound</td>
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<tr>
<td>5% Trimmed Mean</td>
<td>56.0370</td>
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<tr>
<td>Median</td>
<td>53.5000</td>
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<tr>
<td>Variance</td>
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<tr>
<td>Std. Deviation</td>
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</tr>
<tr>
<td>Minimum</td>
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<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>71.00</td>
<td></td>
</tr>
<tr>
<td>Range</td>
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<td></td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>14.25</td>
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</tr>
<tr>
<td>Skewness</td>
<td>1.054</td>
<td>.845</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.543</td>
<td>1.741</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nilai Posttest</th>
<th>Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>82.8333</td>
<td>2.74975</td>
</tr>
<tr>
<td>95% Confidence Interval for Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Bound</td>
<td>75.7649</td>
<td></td>
</tr>
<tr>
<td>Upper Bound</td>
<td>89.9018</td>
<td></td>
</tr>
<tr>
<td>5% Trimmed Mean</td>
<td>82.5925</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>81.5000</td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>45.367</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>6.73540</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>76.00</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>94.00</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>18.00</td>
<td></td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>12.00</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>.923</td>
<td>.845</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.280</td>
<td>1.741</td>
</tr>
</tbody>
</table>
Data Normality Prerequisite Test

From the pretest and posttest data, the normality of the data will be tested. Normality test or prerequisite test is used to test whether the variables are normally distributed or not to perform the t-test. If the data is not normally distributed, then the researcher must modify it first, but if it is usually distributed, then immediately perform the core test or t-test. The following is the calculation of the data normality test using SPSS.

### Tests of Normality

<table>
<thead>
<tr>
<th>N-Gain</th>
<th>Statistic</th>
<th>df</th>
<th>Sig.</th>
<th>Statistic</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>High N-Gain&gt;0.7</td>
<td>1.106</td>
<td>6</td>
<td>.913</td>
<td>6</td>
<td>.495</td>
<td></td>
</tr>
<tr>
<td>Low 0.3=&lt; N-Gain=&lt;0.7</td>
<td>2.093</td>
<td>6</td>
<td>.923</td>
<td>6</td>
<td>.527</td>
<td></td>
</tr>
<tr>
<td>Medium N-Gain&lt;0.3</td>
<td>0</td>
<td>0</td>
<td>1.000</td>
<td>0</td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>

* This is a lower bound of the true significance.

### T-test (paired samples t-test)

**Paired Samples Correlations**

<table>
<thead>
<tr>
<th>N</th>
<th>Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>.945</td>
<td>.004</td>
</tr>
</tbody>
</table>

Value of Sig. (P-Value) = 0.004 < 0.05, it can be concluded that the two groups of data are correlated.

**Paired Samples Test**

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Nila Pret &amp; Nila Posttest</td>
<td>-26.50000</td>
<td>3.20936</td>
<td>1.31023</td>
<td>-29.86892, -23.13108</td>
<td>-20.226</td>
<td>5</td>
</tr>
</tbody>
</table>

Sig. (2-tailed) / p-value < 0.05, it can be concluded that there is a significant difference in value between before and after treatment in a limited trial.
Trial use
In the trial use, online learning was carried out using the Zenius application to 30 class 4 students; the Trial was carried out by conducting a pretest before doing online education, then online learning using the Zenius application was carried out for one week, after learning using the Zenius application was then carried out a final test. Or posttest. The results of the pretest and posttest are presented in the following table:

<table>
<thead>
<tr>
<th>NO</th>
<th>STUDENTS NAME</th>
<th>PRETEST</th>
<th>POSTTEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Achmad Abi Thofani</td>
<td>50.00</td>
<td>78</td>
</tr>
<tr>
<td>2</td>
<td>Achmad Ragil Surya Firnandha</td>
<td>44.00</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>Agung Wicaksono Abdullah Putra</td>
<td>42.00</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>Akhmad Mukhyiddin Arga Pratama</td>
<td>42.00</td>
<td>81</td>
</tr>
<tr>
<td>5</td>
<td>Arif Kuswardana</td>
<td>34.00</td>
<td>76</td>
</tr>
<tr>
<td>6</td>
<td>Aulia Dwi Rahmawati</td>
<td>34.00</td>
<td>76</td>
</tr>
<tr>
<td>7</td>
<td>Aura Dewi Budi Lestari</td>
<td>36.00</td>
<td>84</td>
</tr>
<tr>
<td>8</td>
<td>Chayla Ezra May Anjani</td>
<td>38.00</td>
<td>78</td>
</tr>
<tr>
<td>9</td>
<td>Daniel Oktavianto</td>
<td>34.00</td>
<td>78</td>
</tr>
<tr>
<td>10</td>
<td>Diwantaka Kusuma Putra</td>
<td>28.00</td>
<td>78</td>
</tr>
<tr>
<td>11</td>
<td>Farel Agustian Crisjianto</td>
<td>46.00</td>
<td>78</td>
</tr>
<tr>
<td>12</td>
<td>Forza Hakim Saputra</td>
<td>42.00</td>
<td>78</td>
</tr>
<tr>
<td>13</td>
<td>Heni Kumala Pertiwi</td>
<td>34.00</td>
<td>82</td>
</tr>
<tr>
<td>14</td>
<td>Imroatul Azizah</td>
<td>44.00</td>
<td>84</td>
</tr>
<tr>
<td>15</td>
<td>Titania Kusherawati</td>
<td>52.00</td>
<td>86</td>
</tr>
<tr>
<td>16</td>
<td>Jeni Veronica Anggun Zahraini</td>
<td>40.00</td>
<td>84</td>
</tr>
<tr>
<td>17</td>
<td>Madani Firmansyah</td>
<td>38.00</td>
<td>85</td>
</tr>
<tr>
<td>18</td>
<td>Muhamad Aldian Syaputra</td>
<td>38.00</td>
<td>76</td>
</tr>
<tr>
<td>19</td>
<td>Muhammad Alvin</td>
<td>58.00</td>
<td>84</td>
</tr>
<tr>
<td>20</td>
<td>Muhammad Bagas Setyawan</td>
<td>42.00</td>
<td>85</td>
</tr>
<tr>
<td>21</td>
<td>Muhammad Iqbal Ikhwanto</td>
<td>34.00</td>
<td>85</td>
</tr>
<tr>
<td>22</td>
<td>Mukhamad Junaidi Irgi Dwitama</td>
<td>42.00</td>
<td>81</td>
</tr>
<tr>
<td>23</td>
<td>Risk Rismawati</td>
<td>36.00</td>
<td>87</td>
</tr>
<tr>
<td>24</td>
<td>Rehan Bagus Saputra</td>
<td>46.00</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Score</td>
<td>Grade</td>
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<td>--------------------------------</td>
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<tr>
<td>25</td>
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<td>76</td>
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<tr>
<td>26</td>
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<td>76</td>
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<tr>
<td>27</td>
<td>Salsabila Hilda Agustin</td>
<td>56.00</td>
<td>76</td>
</tr>
<tr>
<td>28</td>
<td>Saverio Noviansyah</td>
<td>48.00</td>
<td>76</td>
</tr>
<tr>
<td>29</td>
<td>Umrotus Sholikhah</td>
<td>44.00</td>
<td>79</td>
</tr>
<tr>
<td>30</td>
<td>Vanesa Adelia Putri</td>
<td>58.00</td>
<td>82</td>
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</table>

**Descriptive Statistical Analysis**

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Std. Error</th>
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</thead>
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<td><strong>Nilai Pretest</strong></td>
<td>42.0567</td>
<td>1.35437</td>
</tr>
<tr>
<td>Mean</td>
<td>42.0567</td>
<td>1.35437</td>
</tr>
<tr>
<td>95% Confidence Interval for Mean</td>
<td>39.3267</td>
<td>44.3867</td>
</tr>
<tr>
<td>5% Trimmed Mean</td>
<td>41.8519</td>
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</tr>
<tr>
<td>Median</td>
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<td>Variance</td>
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<td>Std. Deviation</td>
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</tr>
<tr>
<td>Minimum</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Interquartile Range</td>
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</tr>
<tr>
<td>Skewness</td>
<td>593</td>
<td>.427</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.08</td>
<td>.933</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nilai Posttest</strong></td>
<td>80.0323</td>
<td>.67889</td>
</tr>
<tr>
<td>Mean</td>
<td>80.0323</td>
<td>.67889</td>
</tr>
<tr>
<td>95% Confidence Interval for Mean</td>
<td>78.8449</td>
<td>81.4218</td>
</tr>
<tr>
<td>5% Trimmed Mean</td>
<td>79.4259</td>
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</tr>
<tr>
<td>Variance</td>
<td>13.626</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>3.71829</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>75.00</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>87.00</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>12.00</td>
<td></td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>8.00</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>356</td>
<td>.427</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.321</td>
<td>.933</td>
</tr>
</tbody>
</table>
Many students Percentage

<table>
<thead>
<tr>
<th>Category improvement</th>
<th>Category N-Gain</th>
<th>Many students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>N-Gain&gt;0.7</td>
<td>9</td>
<td>30.00%</td>
</tr>
<tr>
<td>Low</td>
<td>0.3=&lt; N-Gain=&lt;0.7</td>
<td>21</td>
<td>70.00%</td>
</tr>
<tr>
<td>Medium</td>
<td>N-Gain&lt;0.3</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Data Normality Prerequisite Test

From the pretest and posttest data, the normality of the data will be tested. Normality test or prerequisite test is used to test whether the variables are normally distributed or not to perform the t-test. If the data is not normally distributed, then the researcher must modify it first, but if it is usually distributed, then immediately perform the core test or t-test. The following is the calculation of the data normality test using SPSS.

### Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic</td>
<td>df</td>
<td>Sig</td>
</tr>
<tr>
<td>Nilai Pretest</td>
<td>.137</td>
<td>30</td>
</tr>
<tr>
<td>Nilai Posttest</td>
<td>.205</td>
<td>30</td>
</tr>
</tbody>
</table>

<sup>a</sup> Lilliefors Significance Correction

Value of Sig. (P-Value) at the posttest value = 0.002 <0.05, it can be concluded that the posttest value is not normally distributed. So the difference test does not use the t-test, but the different test with nonparametric statistics.

### T-test (paired samples t-test)

<table>
<thead>
<tr>
<th>Test Statistics&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Nilai Posttest - Nilai Pretest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-4.784&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>b</sup> Wilcoxon Signed Ranks Test  
<sup>b</sup> Based on negative ranks.

asympt. Sig. (2-tailed)/p-value < 0.05, it can be concluded that there is a significant difference between the values before and after the treatment in the one-class Trial. The broad class trial was carried out in class 5 as many as three categories, with 76 students. The Trial was carried out by conducting a pretest before doing online learning. Online learning was carried out using the Zenius
application for one week; after learning, the Zenius application was carried out with a final test or posttest.

<table>
<thead>
<tr>
<th>NO</th>
<th>STUDENT NAME</th>
<th>PRE TES</th>
<th>POST TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aditiya Bima Pratama</td>
<td>40.00</td>
<td>78</td>
</tr>
<tr>
<td>2</td>
<td>Ahmad Annas Ashari</td>
<td>48.00</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>Ahmad Fardhan Nitasal</td>
<td>34.00</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>Amelia Dwi Rahma</td>
<td>40.00</td>
<td>81</td>
</tr>
<tr>
<td>5</td>
<td>Dhafa Ananda Wahyu Ramadhan</td>
<td>30.00</td>
<td>76</td>
</tr>
<tr>
<td>6</td>
<td>Dwi Ramadhani</td>
<td>50.00</td>
<td>76</td>
</tr>
<tr>
<td>7</td>
<td>Eli Nirmala</td>
<td>44.00</td>
<td>84</td>
</tr>
<tr>
<td>8</td>
<td>Ella Nafsiyah</td>
<td>42.00</td>
<td>78</td>
</tr>
<tr>
<td>9</td>
<td>Ilham Harsena Ibrahim</td>
<td>42.00</td>
<td>78</td>
</tr>
<tr>
<td>10</td>
<td>Islamie Bi Kafa</td>
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<td>78</td>
</tr>
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<td>11</td>
<td>Jofita Dwi Sariyah Ningsih</td>
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<td>78</td>
</tr>
<tr>
<td>12</td>
<td>Mohamad Athala Andriyan Muzakky</td>
<td>36.00</td>
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<tr>
<td>13</td>
<td>Mohammad Hendra Setiawan</td>
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<td>14</td>
<td>Muhammad Imam Ghozali</td>
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<td>84</td>
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<td>Muhammad Junior Putra Pratama</td>
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<td>Muhammad Rico Sugianto</td>
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<td>17</td>
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<td>Nadia Salsabil</td>
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<td>76</td>
</tr>
<tr>
<td>19</td>
<td>Putri Khoiriyah</td>
<td>44.00</td>
<td>84</td>
</tr>
<tr>
<td>20</td>
<td>Revalina Marshanda</td>
<td>52.00</td>
<td>85</td>
</tr>
<tr>
<td>21</td>
<td>Salsa Nabila Lestari Fajri</td>
<td>40.00</td>
<td>85</td>
</tr>
<tr>
<td>22</td>
<td>Tanaya Eka Arum Sholichin</td>
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<td>81</td>
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<td>23</td>
<td>Yoga Dwi Pratama</td>
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<td>87</td>
</tr>
<tr>
<td>24</td>
<td>Zahra Angel Arabella</td>
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<td>25</td>
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<tr>
<td>1</td>
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</tr>
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<td>2</td>
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<tr>
<td>3</td>
<td>Avarael Muhamad Jamiludin</td>
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<td>4</td>
<td>Bangkit Taukhid Wahabain</td>
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</tr>
<tr>
<td></td>
<td>Name</td>
<td>Score</td>
<td>Rank</td>
</tr>
<tr>
<td>---</td>
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<td>-------</td>
<td>------</td>
</tr>
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<tr>
<td>2</td>
<td>Ade Indri Fitriana</td>
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<td>82</td>
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<td>3</td>
<td>Ahmad Diki Abdillah</td>
<td>34.00</td>
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<tr>
<td>4</td>
<td>Angga Febi Saputra</td>
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<tr>
<td>13</td>
<td>Gilang Sak Bana</td>
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<td>76</td>
</tr>
<tr>
<td>14</td>
<td>Intan Nur 'Aini</td>
<td>52.00</td>
<td>77</td>
</tr>
<tr>
<td>15</td>
<td>Jerry Manggali Putra</td>
<td>42.00</td>
<td>77</td>
</tr>
<tr>
<td>16</td>
<td>Khaliyah Ardana Putri</td>
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<td>87</td>
</tr>
<tr>
<td>17</td>
<td>Merri Tri Viana</td>
<td>28.00</td>
<td>94</td>
</tr>
<tr>
<td>18</td>
<td>Mohammad Ilham Farizky</td>
<td>60.00</td>
<td>81</td>
</tr>
<tr>
<td>19</td>
<td>Muhammad Ilham</td>
<td>52.00</td>
<td>82</td>
</tr>
<tr>
<td>20</td>
<td>Muhammad Samsul Arifin</td>
<td>44.00</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>Nurlita Putri Dwi Ramadhanis</td>
<td>44.00</td>
<td>76</td>
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<td>23</td>
<td>Rahmat Wisnu Adi Pradana</td>
<td>38.00</td>
<td>76</td>
</tr>
<tr>
<td>24</td>
<td>Tama Assa Maulana</td>
<td>44.00</td>
<td>79</td>
</tr>
<tr>
<td>25</td>
<td>Vernanda Aprilian Hardiansyah</td>
<td>36.00</td>
<td>78</td>
</tr>
<tr>
<td>26</td>
<td>Yunia Diana Ayu</td>
<td>32.00</td>
<td>76</td>
</tr>
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Descriptive Statistical Analysis

<table>
<thead>
<tr>
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<th>Std Error</th>
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<tr>
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<td>0.0715</td>
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<tr>
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<td>43.9907</td>
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<tr>
<td>5% Trimmed Mean</td>
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<tr>
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<tr>
<td>Maximum</td>
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<td>Range</td>
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<td>Interquartile Range</td>
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</tr>
<tr>
<td>Skewness</td>
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<td>.25</td>
</tr>
<tr>
<td>Kurtosis</td>
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<td>.546</td>
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<table>
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<th>Std Error</th>
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</thead>
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<tr>
<td>N Nilai Posttest</td>
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<td>0.0715</td>
</tr>
<tr>
<td>95% Confidence Interval for Mean</td>
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<tr>
<td>5% Trimmed Mean</td>
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<tr>
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<tr>
<td>Variance</td>
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<td>Minimum</td>
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<tr>
<td>Maximum</td>
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<td>Range</td>
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<tr>
<td>Interquartile Range</td>
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<tr>
<td>Skewness</td>
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<td>2.76</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.360</td>
<td>.545</td>
</tr>
</tbody>
</table>
Prerequisite Test Data Normality

From the pretest and posttest data, the normality of the data will be tested. Normality test or prerequisite test is used to test whether the variables are normally distributed or not to perform the t-test. If the data is not normally distributed, then the researcher must modify it first, but if it is usually distributed, then immediately perform the core test or t-test. The following is the calculation of the data normality test using SPSS.

Value of Sig. (P-Value) at the posttest value <0.05, it can be concluded that the posttest value is not normally distributed. So that the difference test does not use the t-test but the different test with nonparametric statistics.

Uji nonparametric two related samples (Wilcoxon Signed Ranks Test)

<table>
<thead>
<tr>
<th>Category improvement</th>
<th>Category N-Gain</th>
<th>Many students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>N-Gain&gt;0.7</td>
<td>27</td>
<td>35.53%</td>
</tr>
<tr>
<td>Low</td>
<td>0.3=&lt; N-Gain=&lt;0.7</td>
<td>49</td>
<td>64.47%</td>
</tr>
<tr>
<td>Medium</td>
<td>N-Gain&lt;0.3</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Tests of Normality

<table>
<thead>
<tr>
<th>Test of Normality</th>
<th>Kolmogorov-Smirnova</th>
<th>Shapiro-Wilk</th>
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<td>df</td>
<td>Sig</td>
</tr>
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<td>Nila Pretest</td>
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<td>76</td>
</tr>
<tr>
<td>Nila Postest</td>
<td>.215</td>
<td>76</td>
</tr>
</tbody>
</table>

a. Lilliefors Significance Correction

asympt. Sig. (2-tailed)/p-value < 0.05, it can be concluded that there is a significant difference between the values before and after the treatment in the broad class trial.
4 Conclusion

from the explanation above, it can be concluded that The results showed that from the limited Trial, the pretest and posttest scores increased with a high significance of 16.67%, 0%, and low, 83.33%. Then it can be said to be effective. In the usage trial, it is known that there is an increase in the pretest and posttest scores with a high significance level of 30%, moderate 0%, and low 70%; it is stated that the use of the Zenius application in learning is effective. The broad class trial found an increase in the pretest and posttest scores with a high significance of 35.53%, moderate 0%, and low 64, 47%. it is stated that the application used in online learning is a practical.

Reference

Abstract. The covid-19 pandemic forced the government to implement new learning refers to a blended learning system. This research analyzes the integration of creative thinking skills science learning using composite learning systems in elementary schools during the covid-19 pandemic. Research case study qualitative with descriptive percentages. Collected data: observation, interviews, documentation, and questionnaire. Data validity: sources and triangulation techniques. Data analysis techniques using: collection, reduction, presentation, and conclusions. The results of research integration creative thinking skills in science learning using blended learning system implementation low with (Mo<Md<Me), mean = 13.84 and frequency distribution of the majority 47.37%. Percentage learning authenticity indicator 38.50%, flexible 36.90%, elaborative 24.60%. Constraints: limited learning difficulty developing new thinking, writing answers to similar books, and answering questions not detailed. Efforts: apperception, freedom of discussion during online and face-to-face learning, development of High Order Thinking Skill (HOTS) relevant life, strengthening concepts by reading before understanding, and maximizing WhatsApp features including video calls and voice notes.

Keywords: creative thinking skills, science, blended learning system
the environment but complex for students to understand, and the material is complicated preliminary discussion. Science is a system that derives evidence from the universe through everyday observations and experiments on life and natural phenomena that meet the needs of students. Alternative to overcome these difficulties to strengthen the integration abilities of creative thinking learning because of the importance of mastering the material as the basis for further education, if in elementary school the ability to understand the material has not been learned well, it will not be easy to understand the following material. Educators can create learning programs that focus on creative thinking skills to help students build problem-solving skills [13]–[16]. Science instruction is very near to kids, is understandable by students, and the materials are complicated. Science is a system that develops universe proof from daily observation and experimentation of living and natural events that suit students' requirements. During the COVID-19 pandemic, creative thinking skills must still be integrated into learning as one of the 21st-century competencies that must be included in abstract science material that cannot be observed directly as 21st-century skills. States that training is a systemic attempt to build a learning process for students to develop themselves in religious, spiritual strength actively, personality, self-control, and intelligence needed by themselves, society, and the state. At a basic level, 21st-century skills are not yet fully integrated into learning. Ideally, integrating creative thinking talents as 21st-century skills can increase students' motivation and understanding. Students need to be encouraged to explore information and build meaning in a class by getting used to thinking creatively. The development of creative abilities or innovation will produce a helpful breakthrough. The ability to think creatively and work creatively is strengthened, stating that creative skills can be achieved by using techniques to create broad ideas to gain new ideas [11]. New ideas are then elaborated, analyzed, and evaluated to improve and maximize creative thinking. Creative thinking is then developed, implemented, and communicated to others. Creativity and innovation will be easier to create if students have the opportunity to think divergently (branching). Thinking outside of existing habits and involving new ways of thinking, conveying new ideas and solutions, asking unusual questions, and proposing likely answers must be developed and accustomed to students. Blended learning or blended learning systems can improve pupils' inventiveness solving a problem because encouragement of students always to think [12]. The goal is that, throughout the Covid 19 pandemics, schools will continue to incorporate creative thinking abilities according to skills from the 21st century. Creativity facilitates creating something new to solve a problem in everyday life, assisted by blended learning during the Covid-19 pandemic. Based on observations that occurred at SDIT Mutiara Boyolali, they have implemented a blended learning system. However, in actuality, it still exists many obstacles that teachers and students still experience because the system is being implemented for the first time in an emergency of the COVID-19 pandemic. Time constraints, while online learning constraints are the limited technological capabilities of teachers and parents of students. There are many learning platforms available, but the teacher only informs the material through the WhatsApp platform, and the teacher sends more assignments than the material. At this time, worried about creative thinking, Students who consist of several aspects, including original, flexible, and elaborative, will be hampered. Whereas in science learning, these things must be mastered by students so that education runs as it should. Teachers and students have technological limitations in the distance learning process [20]. The preliminary findings show that aspects of creative thinking skills in the form of originality, flexibility and complexity indicate potential obstacles to their being integrated well in primary schools. So it is necessary to evaluate them to reduce obstacles to implementing a blended system of learning on thought creative skills. They are
considering that the blended learning approach was initially adopted during the COVID-19 pandemic in primary schools.

Minimizing pandemic problems in education by using alternative training. The new average reform era in the field of education began with e-learning and continued to blended learning. Schools can also adopt a composite learning system according to the requirements and, at the same time, implement a teaching system [17]. Learning that combines face-to-face and blended learning techniques is termed the online, which is a superior method to combine various learning methods, pedagogical approaches, and internet technology [18], [19]. Solutions to include creative science thinking skills to build student thinking with a combined system of learning. It is therefore important to grasp the material in science so that the material may be understood. In the pandemic COVID-19, schools can use a blended learning system with various methodologies to incorporate creative thinking abilities into the student throughout the Pandemic of the COVID-19.

The role of instructors and students may alter before implementing the blended learning system based on research, and e-learning is engaging because it increases the clarity of learning to individuals, the learning process, and feedback [21]. This research focuses on blended learning systems without specifically for creative thinking skills as 21st-century skills. Blended learning system including digital and face-to-face training can assist the development of skills [22]. The difference between this research from previous research is the subject and focus of the material. The issues in the previous study were that students and were not focused on learning science, while this study focused on the scope of elementary schools and learning science. Technological advances are an essential part of enhancing learning quality and results in research. However, previous research was not carried out during a pandemic emergency, so that the results would be different from those in a crisis. The study outcomes are backed by other literature sources accessible online, and information is discussed in face-to-face, offline meetings. A mixed system of learning is called that mixture of online and offline learning. The learning strategy blends face-to-face learning with online learning. The learning idea offers technology for integrating face-to-face learning and online learning approaches to help instructors through their learning processes [23]. The distinction between this study and past studies is the research theme and focus. This research focuses on primary and scientific students with components of knowledge in the form of creative thinking abilities in the 21st century.

This urgency of the research was carried out because it can consider alternative learning systems during the COVID-19 emergency. The results of this study have implications for finding solutions to improve creative thinking skills in science learning with blended learning system learning to be more effective. The recommendation in this study is that teachers are more creative in implementing blended learning system learning strategies so that the success of creative thinking skills in learning science for students can be adequately achieved. Given the relevance of science learning materials and creative thinking abilities, research into integrating creative thinking skills with a combined learning system is required. In the present COVID-19 pandemic situation, a hybrid learning system offers a new solution.

2 Research Methods

The research was carried out with a qualitative style of investigation. Descriptive is the research design employed. Study aim to evaluate the integration of creative thinking skills in scientific learning uses blended learning. The research design is presented in figure 1:
Observations and research were carried out in February-May 2021. Data collecting strategies in the study included observation for direct data acquisition, a questionnaire to reinforce the respondent's knowledge on other things he knows, documentation in the form of work data for the student, and a half-structured interview to find out more often. The subjects interviewed in this study were 19 students, teachers, and principals at SDIT Mutiara Boyolali, Central Java.

Table 1. Instrument integration of science learning creative thinking skill in elementary school with blended learning system

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>Finding old concepts and writing new ones. Explaining new approaches based on the concept. Solve problems in new ways from unusual combinations of familiar elements.</td>
</tr>
<tr>
<td>Flexible</td>
<td>I am giving an interpretation to an image, story, or problem. Explain the various combinations of interpretations with the elements found. Classify things according to different divisions (categories).</td>
</tr>
<tr>
<td>Elaborative</td>
<td>We are looking for a deeper meaning to the answer or problem solving by performing detailed steps. Develop found ideas or concepts found in detail.</td>
</tr>
</tbody>
</table>
Descriptive calculations of percentages are then interpreted into sentences. Calculate the rate by using the following percentage formula:

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

**Information:**
- \( P \) = percentage
- \( f \) = the number of frequencies of each answer chosen by the respondent
- \( n \) = the number of frequencies or the number of individuals (Arikunto, 2016).

The score data is the total score of all aspects of creative thinking skills in science learning using the blended learning system PAP (Based Reference Assessment), which will change the average value.

**Table 2.** Table rules for converting average and ideal standard deviations on a five scale

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 ( X &lt; 32 )</td>
<td>Very high</td>
</tr>
<tr>
<td>19 ( X &lt; 23 )</td>
<td>High</td>
</tr>
<tr>
<td>14 ( X &lt; 18 )</td>
<td>Medium</td>
</tr>
<tr>
<td>9 ( X &lt; 13 )</td>
<td>Low</td>
</tr>
<tr>
<td>0 ( X &lt; 8 )</td>
<td>Very low</td>
</tr>
</tbody>
</table>

Triangulation of sources and techniques is the validity of the data. The verification of data trustworthiness utilizing several methodologies, including observations, documents, interviews and questionnaires. In contrast, triangulation of data sources came from multiple sources. Data analysis techniques by way of data are arranged, sorted, grouped, then classified by model, covering data, data reduction, presentation and conclusion of data according to Milles & Huberman. Data were examined in the form of tests based on the rubric supplied. Then the data was described and then analyzed by determining the type of descriptive percentage obtained by each indicator.

### 3 Results and Discussion

The integration of creative thinking skills in learning is important because it trains students to produce many varied ideas, develop ideas into more details that come from themselves. Creative thinking skills in science learning with a blended learning system are low. The analysis of Scientific education with a combined learning method achieves innovative thought talents for 19 students is presented in polygons, as shown in Figure 1.
Based on known polygon curves (Mo<Md<Me), a positive squint curve means most scores tend to below. Mean = 13.84 changed by PAP in table 3, the creative thinking skills with a blended learning system are therefore low.

**Table 3.** Frequency distribution percentage of creative thinking skills in science learning using a blended learning system

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>31.60 %</td>
</tr>
<tr>
<td>Medium</td>
<td>3</td>
<td>15.78 %</td>
</tr>
<tr>
<td>Low</td>
<td>7</td>
<td>36.84 %</td>
</tr>
<tr>
<td>Very low</td>
<td>3</td>
<td>15.78 %</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>100 %</td>
</tr>
</tbody>
</table>

The learning process with projects significantly influences critical and creative thinking in blended learning system learning [24]. The first education of prospective professors should entirely be focused on good knowledge of their topic, mastery of different approaches, and creative thinking development. Science training offers many chances to improve intellectual abilities such as analysis and synthesis, comparison and submission, information management and teamwork. The main aim of various teaching techniques is to create fresh, creative ideas at the educational level of these talents [25]. Creativity and the development of thinking skills of
the scientific method of the kid, the lecturers' attitude, the level of practice and activity given to kids is crucial for school education [26]. Schools, teachers, parents, communities, and policymakers can make a difference in enhancing creativity. Creative skills will encourage students to be successful because they can develop something new using a combination learning or blended learning system to maximize WhatsApp features, including video calls and voice notes.

Blended learning on creative abilities utilizes a structural equation model to verify certain factors that may benefit instruction in education [27]. Using a blended learning system can also be used as an alternative during the pandemic COVID-19 to build the creative thinking talents of pupils yet. Learning with blended learning is a competent instructor in the classroom and is designed to offer his pupils knowledge of creative thinking. At some periods, students are independent and accountable for their education. The environment of e-learning will make students play an active part in their knowledge [28].

Using a blended learning system can also be used as an alternative during the pandemic COVID-19 to build the creative thinking talents of pupils yet. Learning with blended learning is a competent instructor in the classroom and is designed to offer his pupils knowledge of creative thinking. At some periods, students are independent and accountable for their education. The environment of e-learning will make students play an active part in their knowledge [28]. The COVID-19 pandemic involves education both online and personally, or with a combination of learning blended learning system approach—each of these three days of online and offline learning alternates. The combined classroom learning model reverses the teachers delivery of learning materials from the classroom to watching the delivery of learning materials through videos at each student's home.

Face-to-face classroom teaching is utilized for group debates, resolution and collaborative projects between students and their peers. Instruction from the teacher has become theoretical knowledge and understanding of problems that must be solved when entering or attending face-to-face learning sessions in class [29]. In one day, face-to-face learning can be completed in three hours. Learn online with WhatsApp, take advantage of all available features such as voice notes, video calls, and time flexibility.

E-learning systems for the promotion of creative thinking amongst students in a virtual learning environment through communication between students, teachers, students and students, explicit knowledge, collaboration and the gathering of knowledge, existing online tools for designing the system e-learning, e-learning model is essential to improving creativity [30]. Learning is attempted to make students feel comfortable and happy by being continuously introduced to the real-life atmosphere. Face-to-face and online classroom performances offer a broader opportunity to investigate and explain to discover different thoughts [12]. A blended learning system enhances creative thinking because it allows students to think efficiently, starting with researching interesting logical problems, generating imaginations according to the ideas learned, and completing exercises.

### 3.1 Original

All students have these skills to develop new ideas through face to face and online learning, although they vary among individuals. Creative thinking abilities involve scientific ideas and skills in processes, such as discovering the material from which an object is created, reasoning about links between causes and effects and the use of measuring instruments [26]. The following are the results of the student's answers to the questionnaire about creative thinking skills in the original aspect, presented in the following graph:
The highest percentage of original aspects in the graph above is the indicator of choice never with a rate of 49.12%. When learning science with the blended learning system has not been well integrated. While in understanding the overall creative thinking skill aspect of the original 38.50%.

Originality or authenticity is an aspect of creative thinking skills. In this aspect, it has been applied in learning. Students have not been able to find old concepts and write new ideas and tend to write precisely the explanation according to the book. Most students find it challenging to solve problems that require solutions obtained from original thinking directly, which is because they tend to memorize concepts. The solution is that teachers and parents More customized assistance for the learning, autonomous and collaborative learning [31]. General students of primary school were allowed to find their most creative answers, but aspects, completeness, practicality showed that Students judged rather than ignored completeness. Students may consider all aspects but choose First because most cognitive work and time are needed for such thoughts [32]. It is highly essential to think about new ideas. When creative thinking grows and ideas are born, creative, imaginative, material visions and know-how are generated by creating information.

Learning to provoke the sensitivity of students to bring up new things is done by the teacher without asking questions related to the material in everyday life thoroughly because of the limited time to study. Providing explanations with new approaches based on concepts has not been fully achieved by students because they do not explain concepts in detail and are only based on books without being associated with everyday life. Emphasis on skill development is essential to enhance knowledge-building ability by improving students' skills [33]. Limited study time and explanations do not explain an idea in detail and only books can help instructors work with solutions to develop learning areas that promote the mutual learning process.

Solving problems in new ways from unusual combinations of common elements, not all students have fully achieved this because students only explain the details in the book without any blends with existing features in daily life. According to the book, the low score of most of the students in answering the questions is probably due to their failure to describe the idea clearly and entirely tendency respond as is usually explained during the class. Relatively weak adaptation was found in school students who were not accustomed to using their creativity and thoughts towards others. Rote learning is the pedagogical approach to education in such schools.
The solution is to ask them to voice their own opinions or views, not just spit out the information provided by the teacher with innovation [34]. This results in low imagination in creating a new idea. Only a few students gave answers by mentioning the expected ideas, despite the lack of complete and clear explanations. These obstacles occur due to limited learning time due to the covid 19 pandemic because blended learning system learning is carried out in a limited time so that learning difficulties develop new thinking. The use of inappropriate learning models can lead to unsatisfactory results. Learning models and media must help teachers and students establish good interactive relationships to understand the teaching material and solve problems. The model that can be applied is project-based learning. Solving issues orally and in writing, creativity always provides something new and meaningful following everyday life before the teacher implements education [35]. Students can not describe the specifics of a book without mixing up existing characteristics of daily life to have student comments and models interactive media learning.

3.2 Flexible

Flexibility is a creative thinking talents component. In this respect, face-to-face and online learning have been utilized. All students have these abilities, but it varies between students. The outcomes of the student are as follows answers to the questionnaire about creative thinking skills in the flexible aspect, presented in the following graph:

![Graph showing results of students' questionnaire answers on flexible aspects](image)

**Fig. 4.** Results of students' questionnaire answers on flexible aspects

The highest percentage of flexible aspects in the graph above is the indicator of choice never with a rate of 50.87%. When learning science with a blended learning system, the elastic elements have not been well integrated. Meanwhile, in the overall learning of creative thinking skills, the flexible aspect is 36.90%.

The learning teacher gives written assignments, and the teacher asks students to write science material based on categories. Students carry out the process of working on the task by working on the questions in the textbook accompanied by explanation reasons for answering.
When learning online, the functions given are about the material by doing simple experiments and then working on questions about the investigation, which then collects the results in the form of photos. It fits project assignments given to students have stimulated them to understand the concepts learned in creating products [24]. However, in practice, it is not entirely owned by students. Students have not been able to provide an interpretation of an image, story, or problem, Interpret an article's conclusion or link concepts according to different viewpoints, as the conduct of a person with flexible think talent is enough to produce many interpretations of a picture, history or problem, which varies. This is inversely proportional to the application of blended learning, and the results show that the effect is flexible, runs in learning activities [36]. This is due to the pandemic situation, which limits the time in the implementation of blended learning. A solution that can be used as a reference is to use a learning model that applies a simple experiment. Which can improve knowledge mastery, help students apply knowledge to solve problems, and actualize scientific literacy and creativity competencies [37]. Creative thinking skills taught in relevant content will encourage students' thinking skills into creative thinking habits while playing with ideas and processing content information in various ways. Students will feel joy in learning, find meaning and personal relevance in [24]. Interpret a picture, narrative, or issue. Interpret the conclusion of an article that the pupil does not possess the skills. An alternative approach that improves knowledge helps with small experiments solve scientific problems and creativity.

Explaning various combinations of interpretations accompanied by elements found that students do not have because they tend to write according to what is in the book and do not develop arrangements other than textbooks. Students have not been able to relate information in real life and those obtained from the school by providing various possible answers. Even though the ability students can strengthen and develop intellectual skills associated with acquiring creative thinking to connect their work to other knowledge areas. The solution is to make systematic observations of reality, investigate the spot, and collect information [25]. Students could not integrate facts about actual life with those obtained by providing alternative answers with solutions for which rigorous, realistic observations, location investigation and information collecting might be required.

Classifying things according to different divisions (categories) cannot be wholly owned by students. Students were asked to describe problems related to problems by evaluating the experimental process presented in the issue. Students better understand the practical steps that are written in the task accompanied by pictures. The teacher Provide closed questions so that it is difficult to develop creative thinking. Creative thought is a process that provides several possible answers when answering specific questions. Therefore, the project method is very relevant to improve creative thinking skills. Students are happy and interested in the completed project [38]. Methodological processes are relevant to the long-term development of practices and the end of the opening of methods.

Answers from students show that one piece of knowledge has not been related to information from various fields. Students must link their learning experiences from past to present. Teachers should assist pupils in clarifying their concepts. Online and personal learning freedom to talk is required to improve learning towards a relevant life to the High Order Thinking Skill (HOTS) issue. Learners are encouraged to increase their conceptual knowledge and to implement their knowledge. Contribute to the learning results of scientific students, including academic success, creative thinking and research. Instructors are called upon today to cooperate with their fellow teachers to develop conditions that foster a more mutual commitment to learning. Teachers should be trained to improve their learning involvement. Stressing creative thinking abilities is crucial to enhance the capacity of pupils to build their knowledge. Teachers
should thus allow pupils to improve their research abilities [33]. Teacher training must be conducted to teach students how to grasp interconnected ideas in daily life by raising HOTS inquiries.

3.3 Elaborative

Elaborative is an aspect of creative thinking skills. In this aspect, it has been applied in face-to-face and online learning, basically, the ability of students to provide detailed or elaborative explanations when learning heat material face-to-face and online. All students have this ability. Students have not been able to solve problems that contain limited information by practising science concepts during learning. The following are the results of the student's answers to the questionnaire about creative thinking skills in the elaborative aspect, presented in the following graph:

![Graph showing results of students' answers on the elaborative aspect](image)

**Fig. 5.** Results of students' questionnaire answers on the elaborative aspect

The highest percentage of flexible aspects in the graph above is the indicator of choice never with a rate of 52.63%. When learning science with a blended learning system, the elaborative elements have not been well integrated. Meanwhile, in the overall learning of creative thinking skills, the elaborative aspect is 24.60%.

Students have not explained coherently and in detail from one level to another, especially during the experiment or the experimental process. Students can not look for a deeper meaning to the answer or problem solving by taking detailed steps on science material questions because they do not detail the discovery process. Solutions that can be applied in a way that students can explain coherently and in fact from one level to another, especially during the experiment or the experimental process. Face-to-face learning begins with telling stories or events in everyday life, both inside and outside the book. The teacher provides opportunities for students to answer questions or express their opinions [39]. Teachers can discuss concept learning material, determine issues, formulate problems, present literature studies, present frames, present hypotheses, and develop research methods, including research parameters and tools for research, current research flow chart and data processing techniques, and analysis techniques. These are
all components that matter. We can observe how challenges may be formulated and solved and how the advantages of research are communicated in life. Creativity may be an indigenous feature but may also be improved in the classroom through any means, and educators must include activities that foster the creativeness of teachers [28]. Students could not discover comprehensive procedures to create a logical conclusion. Teachers may begin learning via things in their lives and offer students the opportunity to voice their ideas.

Students have not been able to develop ideas or concepts found in detail and only mention what they know from the learning process without linking them to what is in the book to explain the development of ideas. Constraints are most likely due to a science learning experience that uses a blended learning system with a limited time. Learning should be able to help students to actualize their understanding of science learning. Students will more easily understand it if learning activities are linked to real-world situations. They are strengthening concepts by reading before learning. The curiosity of students will develop so that there is an increase in skills in creative thinking. Solutions to enhance creative thinking, teachers can generate many ideas and thoughts on a topic or problem, explore different points of view, and then reshape or simplify concepts, increasing open-mindedness tolerance for fantastic and entertaining ideas and creative thinking chances. Combine and develop them. Ideas. In addition, helping to express educated, flexible ideas successfully and have an excellent educational role [40]. Educators also have to monitor and manage the circumstances of learning even after face-to-face instruction is done. Educators can still use online courses to allow teachers to study the material before (offline) learning and require technology-based learning strategies [41]. Students could not generate ideas to enhance a concept. Teachers provided insights and opinions on a subject or issue to examine students' diverse perspectives and redefine or simplify the idea and openness.

4 Conclusion

Integrating creative thinking skills in science learning with applying the blended learning system in elementary schools is low. Various obstacles cause this, namely limited learning difficulties, developing new thoughts, writing answers to similar books, answering non-detailed questions. Efforts that can be implemented are apperception, freedom of discussion during online and face-to-face learning, development of learning towards life relevant to High Order Thinking Skill (HOTS) questions, strengthening concepts by reading before learning, and maximizing WhatsApp features including video calls and voice notes.

Acknowledgements. The authors would like to thank the principal, teachers, and students of the State Mutiara Islamic Elementary School Boyolali.

References
Prediction of Success Construction Claims by Construction Provider Due to Delays in Completion Work

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Abstract. To compete in the construction business, it is also necessary to be careful in seeing the opportunity for claims due to delays in completion work, especially for construction providers who often fail in filing claims. Most of the previous research on claims was more about predicting the appearance of claims. In fact, the claim that arises does not stop until it is accepted or not. So this research is conducted so that construction providers know how to make claims successful. We conducted a literature review and Decision tree method C4.5 to determine the order of success factors for claims from the most influential, and the research showed administration of claims is the most influential factor in the success of a claim so claim can be accepted and with a model accuracy of 81.29.

Keywords: Claim, Prediction, Success factors, Decision tree, C4.5 algorithm.

1 Introduction

Delay in completion of work is one of the causes of claims and disputes. Delay in the completion of work is an almost common occurrence in a construction project, both private and government projects. For example, the delay that occurred in the Government's National Strategic Project (PSN). The Committee for the Acceleration of Priority Infrastructure (KPPiP) delivered 12 (twelve) PSN projects that were supposed to be completed by the end of 2019 but were postponed to 2020 [1]. The impact of delays is conflict and debate about what and who is the cause, also creates time demands, and added costs [2].

Claims for extension of time and additional cost or losses and expenses that submitted by construction providers often not optimal because of the position of construction users who are considered superior and construction providers are worried about getting bad reviews from clients and being seen as "claimants".

By knowing how claims can be accepted by construction users, judging from the success factors for claims, it will make the submission of claims made by construction providers more optimal. then a research is conducted on the prediction of the success of construction claims by construction providers due to delays in the completion of work.

The first research method used is a literature review to obtain the success factors for claims for work delays due to service users. To make a prediction model for claim success, the classification technique Decision Tree C4.5 is used, because it can convert data into decision rules. This decision tree can detail complex decision-making processes into simpler ones so that
problem solutions can be more easily obtained and interpreted. Decision trees are used to solve a problem where each node is a decision and leaves are the solution to the problem [3]. A tree is a data structure consisting of nodes and edges [4]. The algorithm to build the decision tree is C4.5 which used gain ratio as splitting criteria. It begins from the root node which contains the entire dataset and than split by an attribute the forming nodes and edges which connecting the nodes. This process maintains recursively with the rules of splitting (goodness of cut up criterion) till the criteria are met. A node that isn’t splitting anymore is referred to as a leaf node and classified with the majority class.

2 Research Methods

2.1. Literature review

Literature review is used to obtain the success factors for claims for work delays due to service users. Furthermore, validation is carried out with a validation questionnaire. The questionnaire contains responses from experts in the form of yes or no that the success factors for existing claims are in accordance with the success factors for each claim submission made.

2.2. Decision tree C4.5

Methods Data analysis with the decision tree algorithm C4.5 in this study is depicted in Fig. 1.

To find out the gain ratio, first calculate the entropy, entropy is used to determine how informative the attribute is. S is the Set of Cases, n is the number of partitions S. and pi is the number of cases on partition i. It is given by equation (1).

$$\text{Entropy (S)} = \sum_{i=0}^{n} - pi * \log_2 pi$$  \hspace{1cm} (1)

After knowing the entropy, then calculate the information gain. S is the Set of Cases, n is the number of partitions attribute A, |Si| is the number of cases on partition i, and |S| is the number of cases in S. It is given by equation (2).

$$\text{Gain (S,A)} = \text{Entropy (S)} - \sum_{i=1}^{n} \frac{|S_i|}{|S|} \cdot \text{Entropy(Si)}$$  \hspace{1cm} (2)

To determine the root node with the C4.5 algorithm, the largest value of the gain ratio will be used, because the gain ratio can provide a more specific value than the gain or
information gain. However, it is necessary to first calculate the split information with the equation (3).

\[
\text{SplitInfo}(S,A) = \sum_{i=1}^{c} \frac{S_i}{S} \log_2 \frac{S}{S_i}
\]

Gain Ratio formula is found in equation (4), as follows.

\[
\text{Gain ratio} = \frac{\text{Gain}(S,A)}{\text{Split Information}(S,A)}
\]

The gain in equation is the result of calculating the Information gain obtained after calculating the Entropy. Then select the gain ratio that produces the best practitioner or the greatest value to then be used as the root node in the C4.5 decision tree.

2.3. Model validation with k-cross validation

Model validation with k-fold Cross Validation is a technique to ensure that the results found in the analysis can be generalized to an independent and invisible data set. This study uses 2 fold cross validation because of the small amount of the data. In two-fold cross-validation the data is partitioned into independent and similar subsets and using random assignment into the training data set and the test data set. The model is then constructed using data from the k - 1 subset, using the data subset as the test set. This is done iteratively until we have k different models, see Figure 2. The results from the k models are then combined using the average or selecting.

![Fig 2. Splitting research data by 2 fold cross validation](image)

In cross-validation k = 2, the data set is randomly generated and then divided into two sets (d0 and d1), so that both sets have the same size. Then training will be carried out on d0 and validation on d1, followed by training on d1 and validating on d0.

Performance measure is very important to indicate how well the model classifies information. In general, the confusion matrix table as in Table one is used when verify values are notable to judge the model performance on a group of take a look at data [4]. Model performance is measured by conniving the worth of accuracy.

<table>
<thead>
<tr>
<th>Actual</th>
<th>Predicted</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>True Negative (TN)</td>
<td>True Positive (TP)</td>
<td>False Negative (FN)</td>
<td>False Positive (FP)</td>
</tr>
</tbody>
</table>

Table 1. Confusion matrix
Accuracy = \frac{TP+TN}{TP+FP+TN+FN}

Accuracy is obtained by calculated verity foreseen observation divided by total observations. exactness additionally called positive predicted values is obtained by calculated the true predicted positive observations divided by total predicted positive observations.

3 Result and Discussion

Success factors for construction claims by construction providers due to delays in completing work

The questionnaire contains the success factors of claims based on previous research references which are then verified whether these claim success factors can be used as a reference to determine the prediction of the success of construction claims by service providers due to delays in completing work. The results of the recapitulation of phase 1 data collection can be seen in Table 2.

Table 2. Recapitulation of validation of construction claim success factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Claim success factor</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Does the submission of the claim state the claim requested (its rights and compensation)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>2.</td>
<td>What is cause of the claim</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>3.</td>
<td>Complete or not the details of the claim</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>4.</td>
<td>Complete or not the evidence for each claim</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>5.</td>
<td>Is the claims analysis appropriate on a contractual/legal basis/based on evidence</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>6.</td>
<td>Is there any prior notification of the submitted claim</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>7.</td>
<td>Complete or not Project documentation</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>8.</td>
<td>Complete or not Project administration</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>9.</td>
<td>Persuasive presentation</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>10.</td>
<td>How does the submission document explain the cause and effect of the claim</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>11.</td>
<td>Relationship between Construction Providers and Construction Users</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
<tr>
<td>12.</td>
<td>Significance and criticality of claims</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>✓</td>
</tr>
</tbody>
</table>
Based on the results of data collection on the factors that affect the success of claims, all of these factors can be used to determine the prediction of the success of construction claims by construction providers due to delays in completing work. Of the 12 (twelve) factors that influence the success of the above claims, there are two factors that are difficult to measure, namely the relationship between construction providers and construction users and the significance and criticality of claims. Based on discussions with experts, the relationship between construction providers and construction users will be measured by the number of projects that have been worked on together, see Table 3.

**Table 3. Construction provider and construction user relationship category table**

<table>
<thead>
<tr>
<th>The number of projects working together</th>
<th>Relationship between construction provider and construction user</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 projects</td>
<td>good</td>
</tr>
<tr>
<td>1-2 projects</td>
<td>enough</td>
</tr>
</tbody>
</table>

Meanwhile, the significance and criticality of claims are measured by the value claimed compared to the value of the construction contract, and also the amount of time claimed compared to the implementation period based on the contract. However, the significance and criticality of claims cannot be assessed only in one claim submission, because if there are further claims then the number can be large and significant, so that the construction provider always considers the claimed value to be significant and the time claimed is considered critical because it has exceeded the planned completion time.

**Decision tree model predicts the success of claims by construction providers due to delays in completing work**

Each claim submission is identified the cause of the delay in completing its work to find out if the delay is caused by the construction user. Claims submitted include extension time and additional costs that follow which are submitted separately or submitted all at once in one submission. Each claim submission is carried out by collecting data according to the factors that affect the success of claims obtained in the previous data processing. The 37 data collected can be seen in Table 4.

Furthermore, calculations are carried out using the entropy, gain, split Information and gain ratio formulas for each attribute as follows:

Number of data  = 37  
Accepted    = 20  
Not Accepted  = 17  

Then the value of entropy \( S = (-20/37)*\log_2(20/37)+(-17/37)*\log_2(17/37)) \n= (-0.541*-0.888)+(-0.459*-1.122)  \n= 0.47974339 + 0.51550916 \n= 0.995252549  

and the calculation is continued with Microsoft Excel, see Table 5.
Table 4. Data on submission of claims by contractor providers along with factors that affect the success of claims

<table>
<thead>
<tr>
<th>Code of claim</th>
<th>Submission Document states the claim requested (its rights and compensation)</th>
<th>Claim Details</th>
<th>Evidence of each claim</th>
<th>Claim for each cause of claim</th>
<th>Element of claim cost</th>
<th>Analysis of claims based on contract/law/with evidence</th>
<th>The terms/conditions of the claim have been met</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
<td>h</td>
</tr>
<tr>
<td>G1</td>
<td>Y</td>
<td>Y</td>
<td>complete</td>
<td>Time &amp; cost</td>
<td>prelim</td>
<td>Y</td>
<td>Not listed</td>
</tr>
<tr>
<td>G2</td>
<td>Y</td>
<td>Y</td>
<td>complete</td>
<td>time</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>G3</td>
<td>Y</td>
<td>Y</td>
<td>complete</td>
<td>cost</td>
<td>N</td>
<td>N</td>
<td>Not listed</td>
</tr>
<tr>
<td>G4</td>
<td>Y</td>
<td>Y</td>
<td>complete</td>
<td>time</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>G5</td>
<td>Y</td>
<td>Y</td>
<td>complete</td>
<td>Cost</td>
<td>Over-head</td>
<td>N</td>
<td>N</td>
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</table>

Table 4. (cont.)

<table>
<thead>
<tr>
<th>Code of claim</th>
<th>Claim notif</th>
<th>Project doc.</th>
<th>Project adm.</th>
<th>Persuasive presentation</th>
<th>Explaining cause and effect of claim</th>
<th>Contractor relationship with Owner</th>
<th>Significant claim</th>
<th>Claim accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>i</td>
<td>j</td>
<td>k</td>
<td>l</td>
<td>m</td>
<td>n</td>
<td>o</td>
<td>p</td>
</tr>
<tr>
<td>G1</td>
<td>Y</td>
<td>complete</td>
<td>complete</td>
<td>Y</td>
<td>Y</td>
<td>enough</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>G2</td>
<td>Y</td>
<td>complete</td>
<td>complete</td>
<td>N</td>
<td>Y</td>
<td>enough</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>G3</td>
<td>N</td>
<td>complete</td>
<td>complete</td>
<td>N</td>
<td>N</td>
<td>enough</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>G4</td>
<td>Y</td>
<td>complete</td>
<td>complete</td>
<td>Y</td>
<td>Y</td>
<td>enough</td>
<td>Y</td>
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<tr>
<td>G5</td>
<td>Y</td>
<td>complete</td>
<td>complete</td>
<td>Y</td>
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<td>enough</td>
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</table>

G37
Table 5. Calculation of the value of entropy, information gain, split information, and gain ratio for each attribute to determine the root node.

<table>
<thead>
<tr>
<th></th>
<th>Year of data</th>
<th>Accepted</th>
<th>Rejected</th>
<th>Entropy</th>
<th>Gain</th>
<th>Split Information</th>
<th>Gain Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>37</td>
<td>20</td>
<td>17</td>
<td>0.99525</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Claim Details</strong></td>
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<tr>
<td><strong>Evidence of each claim</strong></td>
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<td><strong>Claim for good cause of claim</strong></td>
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<td><strong>Evidence of claim cause</strong></td>
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<tr>
<td><strong>Analysis of claim based on contact law/voice evidence</strong></td>
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<tr>
<td><strong>Ya</strong></td>
<td>26</td>
<td>17</td>
<td>9</td>
<td>0.91509</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tidak</strong></td>
<td>11</td>
<td>3</td>
<td>8</td>
<td>0.84535</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From the results of the calculation of the data table, it is known that the attribute with the highest gain ratio is "claims administration" which is 0.50982. Thus the attribute “Administration claims” can be a root node. There are 2 values for the “Claim administration” attribute, namely “Complete” and “incomplete”. The attribute value "incomplete" has classified the claim submission data as rejected so that no further calculations are needed, but for the attribute value "Claim administration" "yes" further calculations need to be carried out.

The decision tree formation process stops because all data records in the last node have got the same class, there are no record attributes that can be partitioned again and no records in the branch are empty. So that the final decision tree based on manual calculations can be described as on Figure 3.
Fig 3. Decision tree model predicts the success of claims by construction providers due to delays in completing work

Model validation

Table 6. Confusion Matrix decision tree with 2-fold cross validation

<table>
<thead>
<tr>
<th></th>
<th>true Diterima</th>
<th>true Ditolak</th>
</tr>
</thead>
<tbody>
<tr>
<td>pred. Diterima</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>pred. Ditolak</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

From Table 6 can be explained that the number of data is 27 where 20 claim submissions are predicted correctly (true positive / TP) that the claim can be accepted, while 7 claims submissions are predicted incorrectly (false positive / FP) by the decision tree classifier C4.5, where in fact the submission of the claim was rejected. Tests on the submission of claims that are predicted to be rejected show that 10 claim submissions (true negative / TN) are correctly recognized that the claim submission is rejected, and no claim submissions are received according to the prediction (false negative / FN). So that the values of accuracy, precision, and recall are 81.29%, 100%, and 59.72%, respectively.

4 Conclusion

Rules for accepted claims: 1) If the claim administration is complete and the claim terms/conditions have been met, the claim is accepted. 2) If the claim administration is complete,
the terms/conditions of the claim have been fulfilled not stated in the contract/law, there is a claim notification then the claim is accepted.

Rules for rejected claims: 1) If the claim administration is incomplete then the claim is rejected. 2) If the claim administration is complete, the terms/conditions of the claim do not meet the requirements in the contract/law, then the claim is rejected. 3) If the claim administration is complete, the terms/conditions of the claim have been fulfilled not stated in the contract/law, there is no claim notification then the claim is rejected. Decision Tree C4.5 method can be implemented to predict the success of claim submission by service providers to service users with an accuracy rate of 81.29%.

References


The Evaluation of the Learning Management System Implementation for Functional Distance Learning of Basic Tax Instructor

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Abstract. This research evaluated the implementation of a Learning Management System (LMS) designed for the Functional Distance Learning (DL) of Basic Tax Instructor. The object of study is the four classes of Basic Tax Instructor Functional DL at Jakarta, Yogyakarta, Pontianak, and Manado, Indonesia. The primary data were obtained from questionnaires submitted to 115 participants and the secondary data in the form of graduation data. The research method is descriptive qualitative. An essential finding of this study is that the LMS is good, easier to access, to learn, provides complete, real-time, has a nice and attractive look, creative, engaging, and accessible. The problem with accessing the LMS is signal/network issues. For improving it, some participants suggest the LMS make it more attractive, always updated, more easy to access, added some feature, accessible for all the time, it integrated with institution learning center (Kemenkeu Learning Center), and make more simple.

Keywords: ADDIE, covid-19, distance learning, implementation LMS, learning management system.

1 Introduction

The Covid-19 pandemic has forced people to keep their distance, avoid face-to-face meetings and stay away from crowds, but work and learning still have to go on. The implementation of education and training must also quickly adapt to changes. Information technology, which has developed rapidly at this time, is beneficial in overcoming this issue. Because face-to-face learning is not possible, distance learning is a solution during this pandemic and may even continue to be done if it is more effective and efficient.
However, the learning process certainly requires interaction between the learner and the teacher. The exchange of learners and teachers can occur in different places at the same time or in other places at different times. The learning process in which the learner and teacher are in various areas is known as distance learning. Warsito (2011) says distance learning and training is a learning model that gives students the freedom to learn without being bound by space and time with as little help as possible from others [1]. Bozkurt (2019) stated that distance education (DE) and open and distance learning (ODL) transform and adapt according to changing paradigms [2]. Because the place is different, we need media to learn media that can be done by using information and communication technology.

Currently, various information technology products are available to help teachers and students to be able to do learning [3]. The internet is a learning resource that provides a lot of information and is easy to access. However, it will be more challenging to find suitable and reliable learning materials because of the ease of sharing learning materials [4]. Therefore, it is necessary to create a learning resource built and filled by competent and authorized parties. This learning resource can be made on a Learning Management System (LMS).

Most learning management systems (LMS) are web-based, built using various development platforms such as Java/J2EE, Microsoft.NET, or PHP. Most systems are commercially developed and have a commercial software license, but some systems have an open-source right. Moodle, for example, is widely used as an open-source code system, and WebCT (Blackboard) is widely used as a commercial program. Researchers' search for new LMS will change based on needs and technological advances [5]. The internet today offers many tools and application packages for educators that can be used at all stages of teaching, and these tools increase the effectiveness and efficiency of teaching [3]. Meanwhile, according to Soykan & Şimşek (2017), LMS itself is the main component to implement distance education effectively [5]. So, distance learning media using LMS becomes something that is needed, so that learning can run as expected.

Considering the increasing need to build LMS, research on developing LMS-based e-learning is very feasible. According to Rabiman et al. (2020), the LMS assessment is based on its benefit, function, visual communication, learning design, material content, and language and communication. The use of LMS increases the satisfaction and quality of learning [6]. Currently, Google offers a service to create an accessible website because it does not require programming language skills, and it is free, namely Google Sites. Based on the LMS based on Google Sites, teachers can create classical guidance media and can create positive content that students can utilize via smartphones. Google Sites can also be integrated with other Google services, such as Google Forms, Google Sheets, Google Slides, and other services outside of Google, such as Padlets. Learning materials in pictures, animations, interesting video shows, or short cinemas can be used in class or outside the classroom with smartphone facilities and internet networks [7]. Given the many facilities offered by Google Sites, the LMS based on Google Sites is an alternative as a distance learning media.

One of the training organized by the Tax Education and Training Center (Pusdiklat) of the Ministry of Finance of the Republic of Indonesia is the Distance Learning (DL) Functional Basic Tax Instructor. In implementing the Functional DL of Tax Instructor in 2021, a Learning Management System based on Google Sites has been built and applied in several learning classes. Juliarini & Kurachman (2020) say that the challenge in designing distance learning is how to keep learning compelling and exciting even without direct meetings between teachers and students [8]. Therefore, studying whether the Learning Management System of the Functional DL Basic Tax Instructor built can make learning more accessible, more interesting,
and efficient to achieve learning objectives. Evaluation of the implemented learning design is needed to develop and improve the LMS so that in the next period, it will be better.

2 Literature Review

Learning Management System (LMS) is a web-based application that can be accessed with a web browser from anywhere as long as there is an internet connection. According to Llantos & Justina E. Estuar (2018), LMS provides tools for teachers to create online learning sites and provides access for learners to access learning materials [9]. There is an encouragement to use LMS from the environment in improving the teaching and learning experience. All LMS systems are highly dependent on available technology, information, and communication infrastructure. Most universities in the United States, United Kingdom, Canada, and Australia, including 28 universities in Saudi Arabia, use different LMS systems [10].

Zheng et al. (2018) underlined that organizational support and technical support play a significant role in developing LMS, resulting in perceived benefits from using LMS. The implication is that universities can increase LMS use and achieve more effective outcomes in web-based learning distance learning [11]. LMS enhanced with the Internet of Things (IoT) will start a new generation of learning system management. The advancement of intelligent devices, new applications, new strategies, and new inventions will change the LMS style in the future [12].

Currently, many available LMS is ready to be used; one of them is LMS based on Google Sites. Setyawan's research (2019) shows that learning media innovation using the Google Sites website is attractive to teaching participants to motivate them to participate in learning actively. Google Sites can also create forms and other instruments as assessments and evaluations integrated on a completed page. Mukti (2020) stated that Google launched Google Sites to build classrooms, schools, or other websites by combining various information in one place, including videos, presentations, attachments, and texts, which can be shared according to the user's need [13]. One of the advantages of this Google product is that this product is provided free so that from a cost perspective, it is not an issue for teachers and students to use it.

Google Sites can also help teachers and students to show their work to others by uploading their work. This will be very interesting because it will encourage students to continue to create better jobs since knowing that their work will be published. Maheshwary & Bhandari (2019) said that the more the audience, the more effort they will put into making even more products [14]. Google Sites as an LMS creation platform has several advantages as follows:

1. Can attract educators/teachers because of its convenience. Technically, making website media using Google Sites is very easy; no language skills or programming code and HTML are needed; click, drag, and drop what you want to display on the LMS site. The templates from Google-Sites are pretty numerous and attractive, and users can easily customize them according to their wishes.

2. Google Sites is rich in content because it integrates with other Google services. Users can insert images, videos, documents, spreadsheets, presentations, forms, jamboards, photo slideshows, and calendars. Some applications provided by Google can also be integrated into Google Sites, such as pallet, youtube, and quizizz. In Google Sites, there is a search feature, so users can also search on these Google Sites content pages and find pages and various documents quickly, just like on Google.com.
3. Building a site with Google Sites allows each teaching team member to work together to fill in the content. The settings are elementary to do just by setting the owner's permissions and collaborators who can edit the LMS page.

4. Lots of learning activities are provided by Google Sites. Google Sites can be integrated with other Google services or services outside of Google combined with various learning media. Learners can learn training materials through modules, broadcast materials, or learning videos. Teachers can integrate it with Google Forms, Google Sheets, or Google Classroom as a learning evaluation material. Likewise, to administer the results of student discussions, it can be integrated with pallets.

5. Easy access for learners. Google Sites provides services so that the LMS site can be accessed by users in three modes, namely mobile phones, tablets, or computers. This provides flexibility and convenience for users to access it.

6. Building an LMS using Google Sites is free. LMS developers can use Google Sites to create a complete learning site without hosting or buying a domain, which requires considerable funds. With Google Sites, you can even create an LMS site for free. The capacity provided by Google for each LMS account is 15 GB, along with the Google Sites application and other Google application services that can be integrated into Google Sites. Several other free applications such as Youtube and Padlet can also be integrated into Google Sites so that LMS content will become more complete and exciting.

Aside from its advantages, Google Sites also has disadvantages, especially the unavailability of tools/plugins that can manage the users, including the access setting of each user. In freeware, Google only provides 15 GB of storage space; of course, additional storage space is needed to keep more learning materials.

According to Rusdi (2018), products for learning currently popularly designed and developed are teaching materials, teaching multimedia, teaching aids, student worksheets, and assessment instruments [15]. Rusdi (2018) wrote that the development of learning multimedia was studied in detail by Lee & Owens (2004) in their book “multimedia-based Instructional Design,” with the development steps through the main ADDIE framework (Analysis, Design, Development, Implementation, and Evaluation) as illustrated with Figure 1 below.

**Core Elements of the ADDIE Model**

![Figure 1](https://lpmpjatim.kemdikbud.go.id/)

**Figure 1. Five Steps of ADDIE Learning Design**
Source: https://lpmpjatim.kemdikbud.go.id/
Nichols Hess & Greer (2016) cites Branch (2009) that the ADDIE instructional design framework has five phases.

1. Analyze the learning situation (Analysis);
2. Design goals and principles to solve problems in learning situations (Design);
3. Develop resources to meet this specification (Development);
4. Apply learning resources in learning situations (Implementation); and
5. Evaluate how these resources meet instructional needs (Evaluation). [16]

The process of developing learning media requires expert testing, individual research subjects, implementation on a limited scale and a wide-scale (in the field), and revisions to create the product design better so that the product developed meets the criteria as a good product and is empirically tested [17]. Rusdi (2018) reminds us that designing and producing something innovative with a well-thought-out concept requires adequate knowledge and skills. If we want to develop multimedia learning using specific software, we need to cover the following things.

1. Technically, they can operate the software optimally and know the limitations of the software's capabilities so that it may need to be combined with other software.
2. I am learning design concepts and procedures. It is essential that the developed multimedia considers the principles of teaching and learning to be used as information media.
3. Mastery of the material and understanding of cognitive load theory. Based on cognitive load theory, to achieve effective learning, interactive media development should reduce the processing of extraneous cognitive load, regulate the processing of intrinsic cognitive load, and help develop germane cognitive load processing.
4. Design and development research is group research. The special competence of each team member characterizes the resulting product.

The problems of designing and developing their models are: 1) what are the specifications of the models that have been designed and developed?; 2) how changes have been made to the existing model?; 3) how are the components and sequences of the models that have been generated?; and 4) what is the impact of using the model? [15]. LMS is a learning medium that is in line with the development of learning technology. However, in the development of this LMS, it still refers to the learning design created by preparing learning design, such as the ADDIE framework.

Previous research

Rabiman et al. (2020) stated that the development of LMS-based learning divides the development model into three phases: phase I needs assessment; phase II, design; and phase III, design and implementation. Overall evaluation and revision were done on the three stages of the development model [6]. Setyawan (2019) designs the development plan by adapting the ASSURE development model, including Analyze, State Objective, Select Method, media and materials, Utilizing media and materials, requiring learner participation, and Evaluating. Besides being called a design for teaching and learning activities, the ASSURE model development design is also a class-oriented media development model. There are six stages in this development model, which are: 1) Analyze the characteristics of students as learning subjects (Analyze); 2) Establish media standards and objectivity (State Objective); 3) choose a strategy, the use of technology and materials (select method, media, and material); 4) use of media and material technology; (Utilize media and materials) 5) Require student participation,
in this case, requires implementation as a form of media testing in class (require learner participation); 6) evaluate the media that has been tested as a basis for making improvements (Evaluate).

According to Kumbhar (2020), building a website or portal using Google Sites is accessible and user-friendly [18]. Setyawan's research (2019) shows that class-oriented classical guidance services using the Google Sites website are accepted and feasible to be implemented. Awuah (2015) states that learning uses Google Apps for Education (GAFE), which mainly uses Google Sites. 84% of science students said their learning performance had increased, and 91% of students were satisfied with the learning compared to traditional methods that used little or no technology [19]. Regarding the google-site, Widodo (2017) argues that Google Site is one of the LMS that has been proven to be used in learning mathematics and improving primary school pre-service teachers [20]. In distance learning, research by Juliarini & Kurachman (2020) concluded that the Tax Instructor Service DL at BDK Cimahi in August 2020 was adequate. Still, there were network issues in the implementation of learning. In this case, the reliability and availability of the internet network were some of the things that should be considered so that long-distance learning runs well[8].

3 Research Method

This research aims to obtain information related to perceptions and opinions of learning participants and teachers' views on using the Learning Management System for Functional Distance Learning of Basic Tax Instructor. Statements and inputs obtained will be submitted to the LMS creator to be used as material for improvement. Research data is in the form of primary data and secondary data. Preliminary data were obtained from questionnaires made in google sheets given to teachers and participants and observation notes made by researchers who were also teachers in both classes, in the form of the score of learning participants' activities. Secondary data in the form of participant data and passing grade data, as well as literature study. The research object is the Functional DL of Basic Tax Instructor, held in four locations spread across various regions in Indonesia, as shown in Table 1.

Table 1. Research Object

<table>
<thead>
<tr>
<th>No</th>
<th>Learning Organizer</th>
<th>Date</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BDK Pontianak</td>
<td>18-26 January 2021</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>BDK Manado</td>
<td>15-23 February 2021</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>BDK Yogyakarta</td>
<td>01-09 March 2021</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>Pusdiklat Pajak</td>
<td>01-09 March 2021</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td></td>
<td>118</td>
</tr>
</tbody>
</table>

Source: Tax Education and Training Center, 2021

Table 1 shows that the research object is the participants in four classes with four different training locations. Here, we do hope that a complete input/response can be obtained. Researchers also teach in these four classes to be directly involved in learning and observe the class.
This research is a research design and development of learning media using the ADDIE method, specifically at the evaluation stage. This stage pays attention to the opinions and inputs of its users, which are the learners, obtained through a questionnaire made through the google form as reference material to provide suggestions/plans for improvement of the LMS media that has been formed. Data analysis was done qualitatively descriptive.

4 Results and Discussion

Training Program

The 2021 Basic Tax Instructor Functional Distance Learning Training Program is developing the previous year's program, 2020, after undergoing adjustments, especially in additional subjects and additional learning hours. This DL is intended for candidates for Tax Instructor Functional Officers. The material and the number of learning hours provided are as follows.

<table>
<thead>
<tr>
<th>No</th>
<th>Material</th>
<th>Number of Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management of the Implementation of Tax Instructor Activities</td>
<td>13 Sync 3 Async 16 Sum</td>
</tr>
<tr>
<td>2</td>
<td>Tax Service Administration</td>
<td>10 Sync 0 Async 10 Sum</td>
</tr>
<tr>
<td>3</td>
<td>Tax Instructor Methods and Techniques</td>
<td>12 Sync 3 Async 15 Sum</td>
</tr>
<tr>
<td>4</td>
<td>Communication Ability</td>
<td>18 Sync 3 Async 21 Sum</td>
</tr>
<tr>
<td>5</td>
<td>Introduction to Contact Center Management</td>
<td>10 Sync 0 Async 10 Sum</td>
</tr>
<tr>
<td>6</td>
<td>Lecture I: Current Policy on Instructor</td>
<td>2 Sync 0 Async 2 Sum</td>
</tr>
<tr>
<td>7</td>
<td>Lecture II: Administration System and Credit Score</td>
<td>2 Sync 0 Async 2 Sum</td>
</tr>
<tr>
<td>8</td>
<td>Provisions for Functional Tax Instructor Total</td>
<td>67 Sync 9 Async 76 Sum</td>
</tr>
</tbody>
</table>

In Table 2, it can be seen that most of the learning (88.16%) was done in synchronization, which was done from 08.00 WIB to 17.00 WIB with two coffee breaks for 15" and one lunch and prayer break for 60". Asynchronous learning has a total of 9 sessions (11.84%) done at night for 3 hours (135 minutes) in 3 days, starting at 19.00 WIB to 21.15 WIB. In this session, participants work on assignments related to learning materials and prepare presentation materials for the final exam.

The final exam of the Functional DL of Basic Tax Instructor is in the form of a practical exam, and all have been done in 5 hours of learning. Practical exams are conducted online/live, where each participant is asked to make a presentation for 10 minutes/participant, by applying all the theories that have been given, which are the Analysis of the Implementation of Instructor Activities, session plans, activities checklist, infrastructure checklist, broadcast materials, and application of presentation theory. The exam time is 5 hours. To be efficient, participants were divided into two groups, where a teacher as an examiner accompanied each group.

All learning events for the Basic Tax Instructor Functional DL are done within seven working days. Participants were divided into three groups on the last day, and each group presented a performance containing tax counseling materials. This event is called the Gemilang
Show. In this session, all participants brought out their abilities well to collaborate to give exciting performances.

**Learning Management System**

In the previous year, learning materials were stored on a g-drive that all teachers, participants, and organizers could access. This method is considered less effective and less attractive. In 2021 a Learning Management System was created using the google-sites which contains all learning materials and administration, videos, quizzes, questionnaires, assignments, discussion rooms, etc. The appearance of the primary Tax Instructor Functional LMS is presented in Figure 2.

![Learning Management System DL Functional Basic Tax Instructor](image)

**Figure 2.** Learning Management System DL Functional Basic Tax Instructor

In Figure 2, we can see the LMS display, where there is a Home menu, Info, Courses, Gemilang Show, Assignments Upload, Discussion Rooms, and Questionnaires. LMS also provides learning videos connected to YouTube or videos uploaded directly to the LMS, quizzes, and questionnaires with g-forms. Assignments are uploaded in the form of a drive link from each participant's work and a discussion room in the form of a pad where each participant can paste the results of their discussion.

**Demographics of participants**

The total number of learning participants in the four classes is 118 people, which are 30 people in BDK Manado, 24 in BDK Pontianak, 32 in BDK Yogyakarta, and 32 in Pusdiklat Pajak Jakarta. Among 118 participants, the number of male participants was 64 (54.24%) and 54 female participants (45.76%). Although the implementation of education is spread across several regions in Indonesia, it turns out that almost all participants take lessons from Java (only two people who follow from positions outside Java). This is because most of the participants' workplaces are in Java, although training centers manage their training outside Java. This is possible because, in principle, DL can be done from anywhere. Based on the incoming data, out of 118 participants, 115 participants filled out the questionnaire or 97.45%. The profile of 115 respondents is as shown in Table 3.
Table 3. Socio-Demographic Characteristics of the Respondents

<table>
<thead>
<tr>
<th>No</th>
<th>Demographic Characteristics</th>
<th>Participants</th>
<th>Man</th>
<th>Ponti</th>
<th>Yogy</th>
<th>Jkt</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Male</td>
<td></td>
<td>16</td>
<td>10</td>
<td>16</td>
<td>22</td>
<td>64</td>
<td>54.24%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>10</td>
<td>54</td>
<td>45.76%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>118</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>25--30</td>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td>6.96%</td>
</tr>
<tr>
<td></td>
<td>31--35</td>
<td></td>
<td>10</td>
<td>7</td>
<td>10</td>
<td>8</td>
<td>35</td>
<td>30.43%</td>
</tr>
<tr>
<td></td>
<td>36--40</td>
<td></td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>3</td>
<td>28</td>
<td>24.35%</td>
</tr>
<tr>
<td></td>
<td>41--50</td>
<td></td>
<td>9</td>
<td>4</td>
<td>9</td>
<td>13</td>
<td>35</td>
<td>30.43%</td>
</tr>
<tr>
<td></td>
<td>&gt;50</td>
<td></td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>7.83%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>115</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Account Representative</td>
<td></td>
<td>25</td>
<td>16</td>
<td>24</td>
<td>19</td>
<td>84</td>
<td>73.04%</td>
</tr>
<tr>
<td></td>
<td>Structural Officer</td>
<td></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>7.83%</td>
</tr>
<tr>
<td></td>
<td>Klip Agent</td>
<td></td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>22</td>
<td>19.13%</td>
</tr>
</tbody>
</table>

Based on Table 3, it can be seen that most of the participants are between the ages of 31-50 years old. Apart from that, 9 participants were over 50 years old, and 8 participants were 25-30 years old. Most of the participants (86.17%) aged 31-50 years old were born from 1971 to 1990, which means that most of them are X Generation and Y Generation. X Generation is the generation born from 1965 to 1980. Y Generation is the generation born in the early years of developing technology and information such as PCs (Personal Computers), video games, cable TV, and the internet. Y Generation uses many instant communication technologies such as email, SMS, instant messaging, and others. At the same time, most of the participants' positions are executors as Account Representatives, who in their daily work have a lot to do with taxpayers, so that they have pretty good technical skills.

The most exciting and valuable System Management Learning Menu

In LMS DL Basic Tax Instructor, there are various menus including learning materials for Management of the Implementation of Instruction Activities (MPKP), Instruction Methods and Techniques (MTP), Communication Ability (Kom), Administration and Tax Services (ALP), Introduction of Management Contact center (PMCC), discussion rooms, pallets, and teacher profiles. Participants were asked which menu was the most interesting and useful. Participants' answers are presented in Figure 3.
Advantages of LMS DL Functional Basic Tax Instructor

According to participants, the LMS that has been provided has several advantages, as presented in Figure 4.

In Figure 4, it can be seen that more than 60% of participants said that the LMS made it easier for participants to access and learn the material. Another advantage is that the material is complete, real-time, and easy to update (flexible), as well as a friendly and attractive display. Other participants stated that this application is free, the LMS is creative, and the LMS production looks warm and exciting.

Responses to the use of the LMS DL Functional Basic Tax Instructor

Participants' responses to the LMS weakness are presented in Figure 5.
In general, participants mentioned that this LMS is already good. This opinion was given by more than 50% of the participants. An internet connection is an essential element for participants to access and learn about this LMS. Internet connection is interrupted or slowly becomes an obstacle in the implementation of this PJJ. Some of the participants were not familiar with learning using LMS. Security issues are also a concern for some learners, as LMS uses Google Sites easily accessible to anyone without using a password. Other stated participants include limited storage capacity in Drive, little Google Sites templates, and eye-watering learning.

**Participant graduation**

To show that the learning was successful, it was marked by the pass rate of the participants. The graduation of the participants in this study is as shown in Table 4.

<table>
<thead>
<tr>
<th>No</th>
<th>Graduation Predicate</th>
<th>Pontianak</th>
<th>Manado</th>
<th>Yogyakarta</th>
<th>Jakarta</th>
<th>Amount</th>
<th>Total Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Good</td>
<td>23</td>
<td>30</td>
<td>28</td>
<td>23</td>
<td>104</td>
<td>88.14%</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>9</td>
<td>14</td>
<td>11.38%</td>
</tr>
<tr>
<td>3</td>
<td>Adequate</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>30</strong></td>
<td><strong>32</strong></td>
<td><strong>32</strong></td>
<td><strong>118</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Not Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Not Pass</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td><strong>0.00%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Tax Education and Training Center, 2021

Based on Table 4, it can be seen that most of the participants (88.14%) of participants successfully passed with perfect criteria (score above 90.00), and 14 participants (11.386%) participants gave healthy (score above 80.00 to 90.00). None of the participants did pass. This indicates that the learning outcomes are excellent.
Participants suggestions

The participant's suggestions for the LMS are shown in Table 5.

<table>
<thead>
<tr>
<th>No</th>
<th>Suggestion</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>48.7%</td>
</tr>
<tr>
<td>2</td>
<td>More attractive</td>
<td>18.3%</td>
</tr>
<tr>
<td>3</td>
<td>Always updated</td>
<td>7.8%</td>
</tr>
<tr>
<td>4</td>
<td>Easier access</td>
<td>7.0%</td>
</tr>
<tr>
<td>5</td>
<td>Added some feature</td>
<td>6.1%</td>
</tr>
<tr>
<td>6</td>
<td>Informed to use</td>
<td>4.3%</td>
</tr>
<tr>
<td>7</td>
<td>Accessible all the time</td>
<td>3.5%</td>
</tr>
<tr>
<td>8</td>
<td>To integrated with Learning Center</td>
<td>2.6%</td>
</tr>
<tr>
<td>9</td>
<td>More simplified</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

Most of the participants said the LMS was good. To further refine this LMS, the learning participants suggestions for improving it. Some participants wanted the appearance to be made more attractive. The appearance of the LMS is essential, especially for participants with the visual type of learners; with an attractive appearance, participants with this type are easier to learn the material. Some of the participants suggest constantly updating, accessing, adding some features, informed to use, accessible all the time, integrated with Ministry of Finance Learning Center (KLC/Semantik), and more straightforward.

Most participants of Functional Distance Learning of Basic Tax Instructor in the age range of 25-40 years or classified as Generations Y or Millennials, who are classified as generations can follow the learning by using LMS well, can even facilitate them in accessing and learning materials. On the other hand, Generation X with the age of > 41 years old is not very familiar with LMS and needs information in advance in the use of this LMS, although Generation X participants also feel the benefits of LMS in the form of complete learning materials, realtime and flexible. Overall, the LMS has several advantages: it is easier for participants to access and learn the material; the LMS provides complete, real-time, and flexible material, and has a nice and attractive look; and the LMS is creative, good, interesting, and free. The constraints in the use of LMS is mostly due to internet network constraints, so participants have difficulty accessing or slow and some participants still experience problems and some are worried about security problems. For future LMS enhancements, the LMS display is expected to be more attractive with materials that stay up to date, lighter access, added some feature, accessible for all the time, it integrated with Kemenkeu Learning Center (KLC), and make more simple.

Reference


Relationship Between Knowledge And Perceptions Of Geodiversity, Biodiversity, And Cultural Diversity With The Formation Of Students' Environmental Care Attitudes To The Existence Of The Ciletuh Pelabuhanratu Geopark Area

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Abstract. This research aims to determine the relationship between knowledge and perceptions of geodiversity, biodiversity, and cultural diversity on environmental care attitudes. There is a legal protection that underlies all parties to know and participate in maintaining the preservation of geopark, including students. So that it requires information about knowledge and perceptions about aspects of geoparks (geodiversity, biodiversity, cultural diversity) of students towards the formation of environment care attitudes to participate in the education pillar to protect and preserve geopark. The method in this research is a survey with a quantitative approach. The sample data in this study were collected from 356 respondents with a random sampling technique. Data analysis using SPSS application to find descriptive statistics, bivariate test, and multivariate test. The results show that there is a relationship between knowledge and perception of environmental care attitudes and has an influence of 37.2%.

Keywords: Geopark, knowledge, perceptions, and environmental care attitudes

1 Introduction

_Ciletuh-Pelabuhanratu_ Geopark has extraordinary features because of geological characteristics that are not found elsewhere; it makes _Ciletuh_ a geopark [1]. One of the uniqueness of the _Ciletuh_ Geopark is that it has a geological heritage site of international value in plate collisions between continental plates and oceanic plates during the Karst era. As a result of this event, a complete natural theater was created. The requirements of a geopark must contain three aspects: Geodiversity, Biodiversity, and Cultural Diversity. The primary legal protection in Geopark aims to prevent or prevent natural damage and nature conservation with the main legal task of maintaining legal certainty so that later order and balance in environmental protection and management are guaranteed [2].

There is a legal that underlies all parties, both the government and the community, to know and maintain the _Ciletuh-Pelabuhanratu_ geopark's sustainability. As contained in the Law
of the Republic of Indonesia No. 32 (2009) Chapter I General provisions of article (1), the second point concerning Environmental Protection and Management that environmental protection and management is a systematic and integrated effort carried out to preserve environmental functions and prevent the occurrence of environmental pollution/damage which includes planning, utilization, control, maintenance, supervision and law enforcement [3]. The key to the success of Geopark development and management lies in the role and participation of local communities who are active and understand the meaning of Geopark itself. Unfortunately in the Ciletuh-Pelabuhanratu Geopark area, some people still do not understand the importance of Geopark and still carry out stone mining and forest logging, which are contradictory with sustainable development [4].

Geopark has three pillars: conservation, education, and economic development, so students are required to play a role in the education pillar to protect and preserve the earth park. One of the main steps in inviting students to join in protecting and maintaining Geopark. It requires information about the knowledge and perceptions of students about the Ciletuh-Pelabuhanratu geopark area. The level of teacher knowledge of geoparks as a learning resource is still low. This impacts the common utilization of Geoparks by teachers as a learning resource [5]. Our nation hopes to have the next generation who can save the environment because Indonesia as a country is rich in natural resources [6]. As the nation's generation which is an asset for development actors in the future, it is necessary to instill the proper knowledge so that it can be used as a provider of knowledge, the formation of positive behavior and attitudes that are embedded in them until later stepping into adulthood [7].

It is essential to investigate the relationship between knowledge and perception on the formation of students' environmental care attitudes because perception and cognition (ability) is needed in all psychological activities [8]. Psychological activities mean building a philosophy of caring for the environment among students to maintain the preservation of the Ciletuh-Pelabuhanratu geopark. The caring attitude and culture of the domain from the school community are expected to be transmitted/impact the community around the school to create a community that has the character of caring for the environment [9]. This information data can be used as a reference and government policy to see how the level of knowledge and perceptions of students on the Ciletuh-Pelabuhanratu area.

2 Literature Review

Management and Value of Geopark Areas for the Community

Geopark is a single or combined geographic area, which has valuable sites and landscapes related to heritage, geodiversity, biodiversity, and cultural diversity aspects; it is managed for conservation, education, and sustainable community economic development with the active involvement of the community and local government, so that it can be used to built public understanding and concern for the earth and the surrounding environment.[10].

The geological community in Europe initiated parks in the 2000s. They wanted to protect some critical geological sites in Europe because geological aspects were not too sensitive to changes, so the Geopark was born. All geological phenomena interesting, beautiful, rare, have a tourist attraction can be a geopark. Important geological sites must be introduced to realize the importance of these geological sites and take advantage of their environmental benefits [11]. As a geopark, it must have three main components: geodiversity, biodiversity, and cultural
diversity. These components are interrelated and become the focus for conservation, education, and community economic development.

Geodiversity is a description of the uniqueness of geological components such as minerals, rocks, fossils, geological structures, and landscapes that are the essential wealth of an area and the existence, distribution, and conditions that can represent the geological evolution process of the site [12]. Geological objects consist of mineral elements, rocks, fossils, geological/tectonic/process structures, landscapes. Biodiversity is the wealth of life on earth, millions of plants, animals, and microorganisms, the genetics they contain, and the ecosystems they build into the living environment [13]. Cultural diversity in the past and the present culture, both tangible and intangible [14].

**Relationship between Knowledge and Individual Perception on the Formation of Environmental Care Attitude**

Knowledge is a sensory process, especially the eyes and ears on particular objects. Knowledge is a critical domain in the formation of overt behavior [15]. In the world of education, there are six categories of cognitive processes that are often found, according to Anderson & Krathwohl: Remembering (C1), Understanding (C2), Applying (C3), Analysis (C4), Evaluation (C5), and Creating (C6) [16]. Perception is a process to translate all information obtained from the environment through sight, hearing, appreciation, and feeling [8]. Research on perception has consistently shown that different people may see the same thing but perceive it differently. The reality is that none of us see reality. What they do is interpret what we see and call it reality [17]. Attitude begins with feelings (likes or dislikes) associated with a person’s tendency to respond to something/object. Attitude is also an expression of the values or view of life owned by a person [18]. Various factors that influence attitudes include personal experience, culture, significant other, mass media, educational institutions or religious institutions, and emotional factors within the individual Methodology [19].

### 3 Research Methods

This research is a quantitative approach survey research method. This study aims to reveal the knowledge and perceptions of students about geodiversity, biodiversity, and cultural diversity in the Ciletuh-Pelabuhanratu geopark area. In addition, it also looks for the relationship between knowledge and perception of the formation of attitudes of high school students.

**Population and sampling**

The population comprises elementary units with the same essential characteristics or are considered the same [20], which important factors are reflected in the form of specific measurements. The population of this study was all students in the Ciletuh geopark area, there are seven schools: SMAN 1 Cisolok, SMAN 1 Cikakak, SMAN 1 Pelabuhanratu, SMAN 1 Simpenan, SMAN 1 Ciracap, SMAN 1 Ciemas, and SMAN 1 Surade. The total population is 5,548. While for the research sample, as many as 356 respondents were taken by random sampling technique. This random sampling technique is recommended by Creswell in which every individual in the population has the same probability of being selected [21].
Instrument And Measurement

Measuring students' knowledge about geodiversity, biodiversity, and cultural diversity is done through a test in the form of multiple-choice questions as many as 30 questions. The measurement of students' environmental perceptions and attitudes about geodiversity, biodiversity, and cultural diversity is carried out through a questionnaire using the Likert scale guideline in the scoring.

Data Analysis

All data collected were analyzed through descriptive and statistical tests, including bivariate test using the chi-square formula to find the relationship between variables X1 to Y and X2 to Y, and multivariate test using linear regression. This analysis relates to all statistical techniques that simultaneously analyze several measurements on individuals or objects [22].

4 Result And Discussion

Descriptive statistics

Based on the results of the study, it showed that the level of knowledge of high school students in the Ciletuh Geopark area consisted of five levels including Very Poor as many as 57 respondents, Poor as many as 105 respondents, Fair as many as 56 respondents, Good as many as 109 respondents, and Very Good as many as 29 respondents. More details can be seen in the following diagram.

![Knowledge Level](image)

**Fig.1** Knowledge level of Geodiversity, Biodiversity, and Cultural Diversity
Source: analysis result, 2021
Table 1. Distribution of Respondents Based on Knowledge Level

<table>
<thead>
<tr>
<th>Knowledge level</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Poor</td>
<td>57</td>
<td>16</td>
</tr>
<tr>
<td>Poor</td>
<td>105</td>
<td>29</td>
</tr>
<tr>
<td>Fair</td>
<td>56</td>
<td>16</td>
</tr>
<tr>
<td>Good</td>
<td>109</td>
<td>31</td>
</tr>
<tr>
<td>Very Good</td>
<td>29</td>
<td>8</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>356</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Based on table 1, it can be concluded that the level of knowledge of high school students in the Ciletuh-Pelabuhanratu geopark area based on the order from highest to lowest is in the Good, Poor, Very Poor, Fair, and Very Good categories. Descriptive analysis is also carried out on the level of knowledge of students to find the minimum value, which means the lowest value of the respondent, maximum means the highest value of the respondent, the mean means the average value of the respondent's knowledge. Standard deviation implies the distribution of several data values. Based on the results of descriptive statistics, the mean value is 50.7697 or rounded up to 51. The mean number of 51 means that students' overall level of knowledge is in the fair category.

Meanwhile, the standard deviation of 24.29427 means that it is getting closer to the average. The higher the number, the wider the data range. The following are the results of the descriptive statistical analysis in table 2.

Table 2. Knowledge level descriptive statistics

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>356</td>
<td>7.00</td>
<td>100.00</td>
<td>50.7697</td>
<td>24.29427</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>356</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The research results on the perception category of high school students in the Ciletuh Pelabuhanratu geopark area consisted of four categories, including Poor as many as two respondents, Fair as many as 22 respondents, Good as many as 213 respondents, and Very good as many as 119 respondents. More details can be seen in the following diagram.
Table 3. Distribution of Respondents Based on Perception

<table>
<thead>
<tr>
<th>Perception</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Fair</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>Good</td>
<td>213</td>
<td>60</td>
</tr>
<tr>
<td>Very Good</td>
<td>119</td>
<td>33</td>
</tr>
<tr>
<td>N</td>
<td>356</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on table 3, it can be concluded that the perceptions of high school students in the Ciletuh-Pelabuhanratu geopark area based on the order from highest to lowest are in the Good, Very good, Fair, Poor categories. The descriptive statistics show that the maximum value is 100, the minimum value is 38, the mean value is 76.6320 or rounded up to 71, which means that the overall weight is categorized as good. The standard deviation value is 11.44304, which means that the lower is closer to the average. The following are the results of descriptive statistics on perceptions in table 4.

Table 4. Descriptive Statistics Perception

<table>
<thead>
<tr>
<th>Perception</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception</td>
<td>356</td>
<td>38.00</td>
<td>100.00</td>
<td>76.6320</td>
<td>11.44304</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>356</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the study, it shows that the environmental care attitude of high school students in the Ciletuh Geopark area consists of five levels including Very Poor as many as seven respondents, Poor as many as 27 respondents, Fair as many as 56 respondents, Good as many as 192 respondents, Very Good as many as 106 respondents, and Overall as many as 356 respondents.
as many as 117 respondents, and Very Good 149 respondents. More details can be seen in the following diagram.

![Environmental Care Attitudes](image)

**Fig.3** Student Environmental Care Attitude Of Geodiversity, Biodiversity, and Cultural Diversity

**Table 5.** Distribution of Respondents Based on Environmental Care Attitudes

<table>
<thead>
<tr>
<th>Environmental care attitudes</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Poor</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Poor</td>
<td>27</td>
<td>7</td>
</tr>
<tr>
<td>Fair</td>
<td>56</td>
<td>16</td>
</tr>
<tr>
<td>Good</td>
<td>117</td>
<td>33</td>
</tr>
<tr>
<td>Very Good</td>
<td>149</td>
<td>42</td>
</tr>
<tr>
<td>N</td>
<td>356</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on table 5, it can be concluded that the environmental care attitude of high school students in the Ciletuh-Pelabuhanratu geopark area based on the order from highest to lowest is in the Very Good, Good, Fair, Poor, and Very Poor categories. The results of descriptive statistics show that the maximum value is 100, the minimum value is 10, the mean value is 74.9579 or rounded up to 75, which means that the overall weight is categorized as good, and the standard deviation value is 22.02587, which means that the lower, the closer to the average. The following are descriptive statistics in table 6.

**Tabel 6.** Descriptive statistics Environmental care attitude

<table>
<thead>
<tr>
<th>Environmental care attitude</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>356</td>
<td>10.00</td>
<td>100.00</td>
<td>74.9579</td>
<td>22.02587</td>
</tr>
</tbody>
</table>
Valid N (listwise) 356

**Bivariate Test**

The chi-square test of knowledge and environmental care attitude shows that the value of \( p = 0.000 \). This means that the value of \( p = 0.000 < \text{sig 0.05} \). Based on this value, hypothesis H1 is accepted, and Ho is rejected, or the level of knowledge has a significant relationship with the students' environmental care attitude. For more details, see table 7.

**Table 7. Cross Tabulation of Knowledge and Environmental Care**

<table>
<thead>
<tr>
<th></th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Poor</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>15</td>
<td>41</td>
<td>65</td>
</tr>
<tr>
<td>Percentage</td>
<td>1.5%</td>
<td>3.1%</td>
<td>9.2%</td>
<td>23.1%</td>
<td>63.1%</td>
<td>100%</td>
</tr>
<tr>
<td>Poor</td>
<td>0</td>
<td>6</td>
<td>15</td>
<td>41</td>
<td>52</td>
<td>114</td>
</tr>
<tr>
<td>Percentage</td>
<td>0.0%</td>
<td>5.3%</td>
<td>13.2%</td>
<td>36.0%</td>
<td>45.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
<td>2</td>
<td>15</td>
<td>23</td>
<td>29</td>
<td>71</td>
</tr>
<tr>
<td>Percentage</td>
<td>2.8%</td>
<td>2.8%</td>
<td>21.1%</td>
<td>32.4%</td>
<td>40.8%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Good</td>
<td>3</td>
<td>14</td>
<td>20</td>
<td>31</td>
<td>25</td>
<td>93</td>
</tr>
<tr>
<td>Percentage</td>
<td>3.2%</td>
<td>15.1%</td>
<td>21.5%</td>
<td>33.3%</td>
<td>26.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Very Good</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Percentage</td>
<td>7.7%</td>
<td>15.4%</td>
<td>7.7%</td>
<td>53.8%</td>
<td>15.4%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7</td>
<td>26</td>
<td>57</td>
<td>117</td>
<td>149</td>
<td>356</td>
</tr>
</tbody>
</table>

\( \chi^2 = 42.946 \); \( p \text{ value} = 0.000 \)

The chi-square test of perceptions and attitudes of caring for the environment showed that the value of \( p = 0.727 \). This means that the value of \( p = 0.727 < \text{sig 0.05} \). Based on this value, Ho is accepted, and H1 is rejected, or the perception does not significantly affect the students' environmental care attitude. More details can be seen in the following table 8.

**Table 8. Cross Tabulation of Perception and Environmental Care**

<table>
<thead>
<tr>
<th></th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceptions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Percentage</td>
<td>0.0%</td>
<td>0.0%</td>
<td>50.0%</td>
<td>0.0%</td>
<td>50.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Fair</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Percentage</td>
<td>0.0%</td>
<td>4.5%</td>
<td>22.7%</td>
<td>31.8%</td>
<td>40.9%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
### Good

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2.8%</td>
</tr>
<tr>
<td>16</td>
<td>7.5%</td>
</tr>
<tr>
<td>36</td>
<td>16.9%</td>
</tr>
<tr>
<td>74</td>
<td>34.7%</td>
</tr>
<tr>
<td>81</td>
<td>38.0%</td>
</tr>
<tr>
<td>213</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Very Good

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.8%</td>
</tr>
<tr>
<td>9</td>
<td>7.6%</td>
</tr>
<tr>
<td>15</td>
<td>12.6%</td>
</tr>
<tr>
<td>36</td>
<td>30.3%</td>
</tr>
<tr>
<td>58</td>
<td>48.7%</td>
</tr>
<tr>
<td>119</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Total

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2.0%</td>
</tr>
<tr>
<td>26</td>
<td>7.3%</td>
</tr>
<tr>
<td>57</td>
<td>16.0%</td>
</tr>
<tr>
<td>117</td>
<td>32.9%</td>
</tr>
<tr>
<td>149</td>
<td>41.9%</td>
</tr>
<tr>
<td>356</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\[ X^2 = 8.722 \ ; \ p \ value = 0.727 \]

### Multivariate Test

The steps in the multiple regression test consist of three stages of testing, including the t-test, f test, and the coefficient of determination. The t-test is used to determine whether there is an influence between the Knowledge variable (X1) and Environmental Care Attitude (Y) and the power between the Perception variable (X2) and Environmental Care Attitude (Y). Meanwhile, the f test serves to determine the influence of the three variables, namely Knowledge (X1), Perception (X2), on environmental care attitudes (Y). The coefficient of determination to determine the value of how much influence the variable Knowledge (X1), Perception (X2) simultaneously on the inconsistent attitude of environmental care (Y).

#### Table 9. Multiple regression multivariate test results T-test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>Konstantina</td>
<td>75.356</td>
<td>7.434</td>
<td>10.136</td>
<td>.000</td>
</tr>
<tr>
<td>Knowledge</td>
<td>-0.340</td>
<td>.046</td>
<td>-.375</td>
<td>-7.469</td>
</tr>
<tr>
<td>Perception</td>
<td>.220</td>
<td>.097</td>
<td>.114</td>
<td>2.277</td>
</tr>
</tbody>
</table>

Based on the table, the t-count Knowledge value is -7.469 while the t-table is 1.962 obtained from the formula \( t = (\alpha/2; n-k-1) \), while the knowledge sig value is 0.000. The t-count value for perception is 2.277, and the t-table is 1.962, while the perception sig value is 0.023.

#### Table 10. Multivariate test results F test

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>23840.449</td>
<td>2</td>
<td>11920.224</td>
<td>28.358</td>
<td>.000*</td>
</tr>
<tr>
<td>Residual</td>
<td>148383.919</td>
<td>353</td>
<td>420.351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>172224.368</td>
<td>355</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In table 10, it can be seen that the results of the f test are to determine the effect of Knowledge and Perception simultaneously on the environmental care attitude variable. Based on the table above, the si value of 0.000 is obtained, and for the f table value of 3.04, which is
obtained from the formula $f_{table} = f(k; n-k)$, then $f = 2; 354$. The coefficient of determination test can be shown in the following table 11.

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adjusted $R$ Square</th>
<th>Std. The error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.372a</td>
<td>.138</td>
<td>.134</td>
<td>20.50246</td>
</tr>
</tbody>
</table>

From table 11, it can be obtained that the $R$ square value is 0.372. This value indicates that the influence of knowledge ($X_1$) and perception ($X_2$) variables on environmental care attitudes ($Y$) is 37.2%.

5 Conclusion

Based on the results of the study that the level of knowledge of students about geodiversity, biodiversity, and cultural diversity as a whole is in the fairly good category, while the perception level of students is in the good category, and the environmental care attitude of students in the Ciletuh-Pelabuhanratu geopark area is in good category. The results of the bivariate statistical analysis with the chi square formula showed that there was a significant relationship between the level of knowledge and the attitude of caring for the environment ($p = 0.000 < \text{sig } 0.05$), while for the perception of the attitude of caring for the environment of the students there was no significant relationship ($p = 0.727 > \text{sig } 0.05$). However, the results of the multivariate analysis of multiple regression tests show that there is an effect between knowledge (sig = 0.000) or perception (sig = 0.023) simultaneously on environmental care attitudes.

Knowledge and perception factors simultaneously affect the formation of environmental care attitudes by 37.2%. The other factors that influence the formation of environmental care include personal experience, culture, other people who are considered important (significant other), mass media, educational institutions or religious institutions, and emotional factors within the individual.

References


The Level Of Community Ecological Intelligence And Local Environmental Conditions On The Incidence Of Dengue Hemorrhagic Fever In Tenayan Raya District Pekanbaru City

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Abstract. This study aims to prove the influence of community ecological intelligence and environmental conditions on the incidence of Dengue Hemorrhagic Fever. The recapitulation of the Riau Health Office shows that all areas in Riau are endemic for DHF. Of the 12 districts/cities, the second-highest dengue case was in Pekanbaru City, precisely in Tenayan Raya District. The research method used a case-control design in Tenayan Raya District, Pekanbaru City. The sample consisted of 77 cases and 77 controls. The measuring tools used are questionnaires and observation sheets—data analysis for bivariate with Chi-Square test and multivariate with Multiple Logistics Regression test. The results showed that the dominant ecological intelligence factor associated with the incidence of DHF was the skill variable with mOR value = 80.968 (95% CI: 12,01-545), and the dominant local environmental condition factor associated with the incidence of DHF was house layout with mOR value = 20.453 (95% CI: 8.8-47.5). It is hoped that the community can do community service once a week to maintain the house's cleanliness and the environment.

Keywords. Dengue Hemorrhagic Fever, Ecological Intelligence, Environment

1 Introduction

Humans are an element of the environment. Given the ownership of science, reason, and technology, humans are positioned as one of the most important, even decisive, elements. However, that does not mean that humans can do whatever they want because interference and damage to one element can cause the system as a whole to be disturbed. This is where humans need to have the civility not to damage and harm the environment. Sooner or later, the consequences of human actions will cause humans and other living beings to suffer losses[1]. In order to minimize the losses that occur to humans and other living things, we as humans who have common sense must maintain the ecosystem as a form of symbiotic relationship so as to create a quality living environment.

One of the determining factors so that we can maintain the quality of the living environment is the emergence of significant environmental awareness and healthy individual behavior towards the environment itself [2]. Ecological Intelligence can be formed through both formal and informal education [3]. The main goals of environmental Intelligence are to develop social and ecological responsibility [4],[5] and awareness, critical thinking [6], [7], to pursue
cooperative learning [5], and to bring about behavioral change in the long term. The low level of ecological intelligence in community groups can cause an increase in the number of dengue hemorrhagic fever cases.

Based on the survey results that the authors found in the field in August 2020, that the local environmental conditions in Tenayan Raya District can be classified as unfavorable, here it proves the lack of human civility in acting, or it can be said that ecological intelligence is low. Including the amount of garbage in the gutter, the number of puddles in flower vases, animal drinking. Environmental conditions, as mentioned above, are conditions that cause mosquito breeding and containers, troughs, items around the house that are not well organized, the distance between adjacent houses. nesting. All areas in Riau are endemic for DHF. However, from the number of cases recorded to date, it has not been included in the KLB category. Based on the Riau Provincial Health Office data, it was recorded that 3,375 people had contracted dengue hemorrhagic fever (DHF) during 2019, a sharp increase compared to 2018, which was only 925 cases. To determine an area as an outbreak of dengue fever, the recorded cases must be 51 cases per 100 thousand residents who live. Meanwhile, for the province of Riau itself, there are currently 50 cases of dengue fever per 100,000 residents. The 12 districts/cities, the highest dengue cases were in Bengkalis with 947 people, with nine people dying, followed by Pekanbaru with 417 cases of dengue fever. If we look at the points of DHF and the number of deaths due to DHF for three consecutive years, Pekanbaru City is high. Based on data from the Riau Provincial Health Office, the number of cases spread in several sub-districts including Sukajadi District 16 cases, Senapelan 15 cases, Pekanbaru City 7 cases, Rumbai Pesisir 18 cases, Rumbai 26 cases, Fifty 33 cases, Sail 5 issues, Bukit Raya 47 cases, Marpoyan Damai 56 cases, Tenayan Raya 77 cases, Handsome 68 instances, and Payung Sekaki 49 cases [8]. Based on the data that has been described above, it is one of the reasons the author conducts research so that he can find out the cause of the high number of dengue cases in Tenayan Raya District than other districts in Pekanbaru city.

In addition, several studies have stated a relationship between the environment and the incidence of DHF, and there is a relationship between the presence of TPA and the incidence of DHF [9], [10]. Based on several studies that have been read, there has been no research linking ecological Intelligence with the incidence of DHF, which in some facts, I have known there are several links. For this reason, it is necessary to carry out further studies so that this research can add scientific references and prove the relationship between the level of ecological Intelligence of the community and local environmental conditions to the incidence of Dengue Hemorrhagic Fever in Tenayan Raya District, Pekanbaru City.

2 Research Methods

This research uses a quantitative analytic observational method with case and control design conducted in April-June in Tenayan Raya District, Pekanbaru City. The number of samples in this study was 154 consisting of 77 cases and 77 controls with a ratio of cases and controls 1:1. The types of data collected are primary data and secondary data. The secondary data were cases of DHF taken from medical records at the Tenayan Raya Sub-district Health Center, while the control was a random community in Tenayan Raya District. Primary data collection was done by distributing questionnaires and direct observation to the field. For cases of DHF, an inspection of the presence of mosquito larvae is carried out by observing the TPA see firsthand the presence or absence of mosquito larvae. As for control, they are only distributing questionnaires using google forms, given the limited time and circumstances during this pandemic. Bivariate analysis was performed by chi-square test and multiple logistic regression test with a predictive model for multivariate analysis.
3 Results and Discussion

The results of bivariate analysis on 4 variables of environmental intelligence factors, all variables have a significant relationship with the incidence of DHF, namely know the impact we cause (p value = 0.000), share knowledge with others (p value = 0.000), skills in environmental conservation (p value = 0.000), involvement in various environmental activities (p value = 0.000). Based on the mOR value, the probability that people infected with DHF knows the impacts are 42.462 times lower than people who are not infected with DHF. People infected with DHF have an attitude of sharing knowledge with others which is 27,328 times lower than those not infected with DHF. People infected with DHF have skills in environmental conservation 67,167 times lower than those not infected with DHF. Communities infected with DHF had 11,083 times lower involvement in various environmental activities than those not infected with DHF (see table 1).

The bivariate analysis results on 11 variables of environmental conditions. Only one variable that has a significant relationship with the incidence of DHF is the variable of home arrangements (p-value = 0.000). Substantially, the house distance variable (p-value = 0.061), decorative plants (p-value = 0.062), and the presence of larvae were considered necessary, so they were included in the multivariate analysis. Based on the mOR value, it is 20 times less likely that people infected with dengue have an organized house than people who are not infected with dengue. People infected with DHF have a house distance of < 5 meters, two times less than those not infected with DHF. People infected with dengue have three times fewer decorative plants than people who are not infected with dengue. There is no significant relationship between the presence of larvae and the incidence of DHF because there are larvae in almost every respondent's house, both cases, and controls so that the data obtained are
homogeneous and the p-value does not exist, as well as water reservoirs, humidity, temperature, rainfall received homogeneous data. so that the p-value does not live (see table 2).

The final result of the conditional multiple logistic regression analysis with the predictive factor model of 3 ecological intelligence variables, namely knowing the impact, skills in environmental conservation, and involvement in various environmental activities, the most dominant variable associated with the incidence of DHF is the skill variable in environmental conservation. with p = 0.000 and more = 80.968 (see table 3). House planning variable is a variable that influences the dependent variable because it has a p-value <0.05 and is also the most dominant variable affecting the dependent variable because it has the highest OR value of 20,453 (See table 4).

**Table 1.** Ecological Intelligence Factors Associated with Dengue Hemorrhagic Fever

<table>
<thead>
<tr>
<th>Variable</th>
<th>Case = 77 n (%)</th>
<th>Control = 77 n (%)</th>
<th>mOR (95% CI)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know the Impact We Cause</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>8 (10%)</td>
<td>0 (0%)</td>
<td>42,46 (16.52-109.15)</td>
<td>0.000</td>
</tr>
<tr>
<td>Medium</td>
<td>69 (90%)</td>
<td>65 (84%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0 (0%)</td>
<td>12 (16%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share Knowledge with others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3 (4%)</td>
<td>65 (84%)</td>
<td>27,33 (11.04 - 67.62)</td>
<td>0.000</td>
</tr>
<tr>
<td>Medium</td>
<td>9 (12%)</td>
<td>68 (88%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>11 (14%)</td>
<td>7 (9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skills in Environmental Conservation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>11 (14%)</td>
<td>45 (58%)</td>
<td>67,17 (18.65 - 241.86)</td>
<td>0.000</td>
</tr>
<tr>
<td>Low</td>
<td>66 (86%)</td>
<td>29 (38%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement in Various Environmental Activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>30 (39%)</td>
<td>68 (88%)</td>
<td>11,08 (4.86 - 25.29)</td>
<td>0.000</td>
</tr>
<tr>
<td>Medium</td>
<td>43 (56%)</td>
<td>4 (5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>4 (5%)</td>
<td>9 (12%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.** Factors of Environmental Conditions Associated with DHF

<table>
<thead>
<tr>
<th>Variable</th>
<th>Case =77 n (%)</th>
<th>Control =77 n (%)</th>
<th>mOR (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Distance</td>
<td>68 (88.3%)</td>
<td>59 (76.6%)</td>
<td>2,305 (0.963 - 5,518)</td>
<td>0.061</td>
</tr>
<tr>
<td>Home Arrangements</td>
<td>58 (75.3%)</td>
<td>10 (13%)</td>
<td>20,453 (8,807 - 47,497)</td>
<td>0.000</td>
</tr>
<tr>
<td>Home Humidity</td>
<td>77 (100%)</td>
<td>77 (100%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Decorative plants</td>
<td>71 (92.2%)</td>
<td>63 (81.8%)</td>
<td>2,630 (0.953 - 7,254)</td>
<td>0.062</td>
</tr>
<tr>
<td>Water reservoirs</td>
<td>77 (100%)</td>
<td>77 (100%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Water reservoirs are not for daily use</td>
<td>74 (96.1%)</td>
<td>75 (97.4%)</td>
<td>0,658 (0.107 - 4,051)</td>
<td>0.652</td>
</tr>
<tr>
<td>Natural Water Shelters</td>
<td>69 (89.6%)</td>
<td>69 (89.6%)</td>
<td>1000 (0.355 - 2,816)</td>
<td>1.000</td>
</tr>
<tr>
<td>Presence of Larvae</td>
<td>74 (96.1%)</td>
<td>72 (93.5%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Temperature</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Humidity</td>
<td>77 (100%)</td>
<td>77 (100%)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Discussion
1. The Relationship Between Knowing The Impact Caused With DHF Incidence

Based on the study results, it is known that in the case group, the level of ecological Intelligence, the indicator of understanding the impact, is classified as moderate; as many as 69 respondents (89.6%) and eight respondents (10.4%) are high. No respondents do not know the impact. In the control group, the indicator of understanding the result is high; as many as 65 respondents (84.4%), 12 respondents (15.6%) are moderate, and there are no respondents who do not know the impact. The results of the analysis of the relationship between knowing the effect caused by the incidence of DHF obtained a P-value of 0.000 < 0.05, which means that there is a difference in the possible risk of contracting DHF in people who know the impact caused by people who do not see the effect. The Matched Odds Ratio (mOR) value of 42.462% means that the possibility of people infected with DHF knowing the impact is 42.462 times lower than people who are not infected with DHF.

This is supported by the statement which stated that there is a significant relationship between the level of knowledge and the incidence of DHF in Banjar Pegok, Sesetan Village, South Denpasar District (p=0.036 <a 0.05) [11]. In addition, there was a relationship between knowledge, attitudes, and behavior of the community with the incidence of dengue fever in Medan Sunggal District [12]

2. Relationship Between Share Knowledge With Others With DHF Incidence

Based on the results of the study, it is known that in the case group, the level of ecological Intelligence of share knowledge with other indicators is low, namely 65 respondents (84.4%), and nine respondents (11.7%) moderate, and three respondents (3.9%) high. In the control group, the level of ecological Intelligence of share knowledge with others indicators is high, as many as 68 respondents (88.3%), seven respondents (9.1%) are moderate, and two respondents (2.6%) are low. The analysis of the relationship between share knowledge with others and the incidence of DHF obtained a P-value of 0.000 < 0.05, which means that there is a difference in the possible risk of contracting DHF in people who share knowledge with others who do not share knowledge. The Matched Odds Ratio (mOR) value of 27.328% means that the possibility of people infected with DHF having an attitude of sharing knowledge with others is 27.328 times lower than people who are not infected with DHF.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>B</th>
<th>P-Value</th>
<th>mOR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know the Impact We Cause</td>
<td>3.669</td>
<td>0.001</td>
<td>39,223</td>
<td>4,831 - 318,429</td>
</tr>
<tr>
<td>Skills in Environmental Conservation</td>
<td>4.394</td>
<td>0.000</td>
<td>80,968</td>
<td>12,018 - 545,486</td>
</tr>
<tr>
<td>Involvement in Various Environmental Activities</td>
<td>4,008</td>
<td>0.002</td>
<td>55,023</td>
<td>4,569 - 662,653</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>B</th>
<th>P-Value</th>
<th>mOR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Arrangements</td>
<td>3,018</td>
<td>0.000</td>
<td>20,453</td>
<td>8,807 - 47,497</td>
</tr>
</tbody>
</table>

Rainfall | 0 (0%) | 0 (0%) | - | - |
Several studies state a relationship between attitudes and the incidence of DHF [13],[14] in a study in Denpasar District saying that a person's perspective will affect behavioral tendencies to act.

3. Relationship Between Skills In Environmental Conservation With DHF Incidence

Based on the study results, it is known that in the group of ecological Intelligence, the skills in environmental conservation indicator is low, namely 66 respondents (85.7%) and 11 respondents (14.3%), and none of them has skills in ecological conservation. In the control group, the level of environmental Intelligence of the skills in ecological conservation indicator is high, namely 45 respondents (58.4%), 29 respondents (37.7%), and three respondents (3.9%) low. The results of the analysis of the relationship between skills in environmental conservation and the incidence of DHF obtained P of 0.000 <0.05, which means that there is a difference in the possible risk of contracting DHF in people who have skills in environmental conservation and people who do not have skills in environmental protection. The Matched Odds Ratio (mOR) value of 67.167% means that the possibility of people infected with DHF having skills in environmental conservation is 67,167 times lower than people who are not infected with DHF.

This is supported by the statement which stated that there is a relationship between the health behavior of burying used items with the incidence of dengue fever (p = 0.043) [15] and used goods in the home environment such as plastic, rubber, cans, or ceramics that can accommodate or become a place for the environment will become a breeding ground for mosquitoes later [16].

4. Relationship of Involvement In Various Environmental Activities With Def Incidence

Based on the results of the study, it is known that in the case group, the level of ecological intelligence indicators of involvement in various environmental activities is classified as moderate, namely 43 respondents (55.8%) and 30 respondents (39%) high, and four respondents (5.2%) low. In the control group, the level of ecological intelligence indicator of involvement in various environmental activities is high; as many as 68 respondents (88.3%) and nine respondents (11.7%) are moderate, none have various ecological activities. The results of the analysis of the relationship between the participation in various environmental activities with the incidence of DHF obtained a p-value of 0.000 <0.05, which means that there is a difference in the possible risk of contracting dengue in people who have involvement in various environmental activities with people who do not have involvement in various environmental activities. The Matched Odds Ratio (mOR) value of 11,083 means that the possibility of people infected with DHF having participation in various environmental activities is 11,083 times lower than people who are not infected with DHF.

A study obtained a probability value of p = 0.012 with an alpha value of 0.05. It can be concluded that there is a significant relationship between eradicating mosquito nests and cases of dengue hemorrhagic fever [17]. In addition, the relationship between knowledge and actions to eliminate mosquito nets with the incidence of dengue hemorrhagic fever in Tatelu village obtained a p-value of 0.012 with a significance value of 0.05 so that it can be concluded that there is a relationship between mosquito nest eradication measures and dengue hemorrhagic fever[18].

Local Environmental Conditions

1. Relationship Between House Distance With DHF Incidence

Based on the results of the study, it is known that most of the respondents' houses are 5 meters apart from other houses, with details in the case group 68 houses (88.3%) 5 meters, nine houses (11.7%) > 5 meters. While in the control group 59 houses (76.6%) 5 meters, 18 houses
(23.4%) > 5 meters. The results of the analysis of the distance between houses and the incidence of DHF obtained a p-value of 0.061 > 0.05, which means that there is no difference in the possible risk of contracting DHF in people who have a house distance of < 5 meters and those with a house distance of > 5 meters. The Matched Odds Ratio (mOR) value of 2.3 means that the possibility of people infected with DHF having a house distance of < 5 meters is 2.3 times less than people who are not infected with DHF. This study is by the theory which states that the closer the distance between houses, the easier it is for mosquitoes to spread to the next home [16]. Most of the respondents' houses are not arranged, such as hanging cloth, scattered used goods, and so on, this causes many places for mosquitoes to nest.

2. Relationship Between Home Arrangements With DHF Incidence

Based on the study results, it was known that in the control group, most of the houses were not well organized, with details of 58 (75.3%) and 19 (24.7%) of the respondents' homes being well organized. Most of the houses were well organized in the control group, with details of 67 (87%) respondents' places being well organized and 10 (13%) respondents' homes not being well organized. The analysis of house layout with the incidence of DHF obtained a p-value of 0.000 <0.05, which means that there is a difference in the possible risk of contracting DHF in people whose houses are arranged and those who are not. The Matched Odds Ratio (mOR) value of 20.453 means that the possibility of people infected with DHF having an organized house is 20,453 times less than people who are not infected with DHF. Most of the respondents' homes are not arranged, such as hanging cloth, scattered used goods, and so on, this causes many places for mosquitoes to nest. Refers to a study that says that the habit of hanging clothes is a favorite place for mosquitoes to rest while waiting for the time to lay their eggs, and the site is dark, damp, and a little windy. The Aedes Aegypti mosquito usually lands on hanging clothes and other objects in the house[19].

3. Relationship Between House Humidity With DHF Incidence

After measuring the humidity in the respondent's houses, both cases of 77 places (100%) and control of 77 homes (100%), it was found that the humidity of all respondents' houses was >60%. There is no significant relationship between house humidity and the incidence of Dengue Hemorrhagic Fever because the humidity measurement results at the time of the study were found to be >60% in both the case and control groups data obtained were homogeneous, and there was no p-value. Also supported by the statement which stated that Ae. aegypti mosquitoes at humidity <60% had a short lifespan, could not become vectors, not enough time for virus transfer from the stomach to the salivary glands [19]. So, in general, the humidity of the respondent's house supports the life of the Aedes Aegypti mosquito.

4. Relationship Of Decorative Plants With DHF Incidence

The study results illustrate that most of the respondent's houses, both cases, and controls, have decorative plants in and in their yards, with details of 71 (92.2%) case respondents' houses having ornamental plants, and 6 (7.8%) not having decorative plants. In the control respondents, 63 (81.8%) of the respondents' houses had decorative plants, and 14 (18.2%) did not have ornamental plants. The results of the analysis of decorative plants with the incidence of DHF obtained a p-value of 0.062 > 0.05, which means that there is no difference in the possible risk of contracting DHF in people who have decorative plants and those who do not have ornamental plants. The Matched Odds Ratio (mOR) value of 2.6 means that the possibility of people infected with DHF having decorative plants is 2.6 times less than people who are not infected with DHF.
The bivariate analysis results in a study showed a relationship between the presence of vegetation (p: 0.002). The variable presence of vegetation is a risk factor for the incidence of DHF in this study (OR: 6.017 and CI: 1.98 -18.25), which means that the presence of vegetation inside and outside the house has six times the risk of getting DHF than those who do not have greenery inside or outside the house[20]. This is in line with a research that there is a relationship between the presence of plants around the house and the incidence of DHF in East Purwokerto District with a p-value of 0.016 OR = 2.667 (95% CI: 1.2-5.9) [21]

5. Relationship Between Water Reservoir With DHF Incidence

Based on the data that the authors found in the field, it was found that each respondent's house had a water reservoir. There is no significant relationship between water reservoirs and dengue hemorrhagic fever incidence because almost every respondent's home, both cases, and controls, has a water reservoir. The data obtained are homogeneous, and there is no p-value. The Matched Odds Ratio (mOR) value of 1,000 means that the possibility of people infected with dengue fever having a water reservoir is less than one time compared to people who are not infected with dengue. This statement is supported by research which states that the Ae. Aegypti can thrive in all types of water, both clean and polluted water[22].

6. The Relationship Between The Water Reservoir Not For Daily Needs With DHF Incidence

Based on the results of the study, both case and control groups mostly had water reservoirs, not for daily use, with details of 74 (96.1%) case respondents' houses having water reservoirs, not for everyday use, and only 3 (3.9 %) houses that do not have a water reservoir, not for daily use. There are 75 (97.4%) water reservoirs that are not for everyday use in the control respondent's house, and only 2 (2.6%) houses do not have a water reservoir, not for daily use. The results of the analysis of water reservoirs not for everyday use with the incidence of dengue fever obtained a p-value of 0.652 > 0.05, which means that there is no difference in the possible risk of contracting dengue fever in people who have water reservoirs, not for daily use and those who do not have a shelter. Water storage is not for everyday use. The Matched Odds Ratio (mOR) value of 0.658 means that the possibility of people infected with DHF having a water reservoir, not for daily needs is 0.658 times less than people who are not infected with DHF. The results of this study are by the theory which says that used cans, used tires, and plastic can make a significant contribution to the increase in mosquito larvae which automatically opens up opportunities for dengue fever; used car tires are a major breeding ground for Ae. Aegypti [23].

7. The Relationship Of Natural Water Reservoirs With DHF Incidence

Most of the case and control respondent's houses have natural water reservoirs with details as many as 69 (89.6%) case and control houses are natural water reservoirs. Only 8 (10.4%) of the case and control house respondents did not have a natural water reservoir. There is no significant relationship between natural water reservoirs and dengue hemorrhagic fever incidence because there are natural water reservoirs in almost every respondent's house, both cases and controls. The data obtained is homogeneous, and the p-value does not exist. The Matched Odds Ratio (mOR) value of 1,000 means that the possibility of people infected with dengue fever has one times more natural water reservoirs compared to people who are not infected with dengue. This study is directly proportional to the research in 2007, which said that there was a significant relationship between maintaining good environmental hygiene and the incidence of DHF [24]. In an environment where there are objects that can become nesting places for mosquitoes, such as holes in trees, bamboo, coconut shells, and others scattered around, mosquito breeding places and mosquitoes will increase.
8. The Relationship Between The Presence Of Larvae With DHF Incidence

Based on the study results, there were mosquito larvae in most of the respondent's houses, both cases, and controls, with details of 74 (96.1%) case respondents' houses having larvae, and 3 (3.9%) case respondents' homes not having larvae. 72 (93.5%) of the control respondent's house had larvae, and 6 (7.8%) of the control respondent's house had no larvae. The analysis of the presence of larvae with the incidence of DHF obtained a p-value of 1,000 > 0.05. There was no significant relationship between the presence of larvae and the incidence of Dengue Hemorrhagic Fever because there were larvae in almost every respondent's house, both cases, and controls, so the data obtained were homogeneous, and there was no p-value. This research is inversely proportional to the study, which said a possible risk of developing dengue fever in a home environment with larvae and a home environment without larvae[25]. The difference in the results of this study is because respondents both in the case and control groups are both starting to realize the dangers of DHF disease, but have not carried out 3M activities, namely (Draining, Closing, and Hoarding) the existing TPA so that at the time of observation the presence of larvae in the TPA of case and control respondents almost the same.

9. The Relationship Between Temperature With DHF Incidence

There is no significant relationship between temperature and the incidence of Dengue Hemorrhagic Fever because the results of temperature measurements at the time of the study obtained temperatures in the range of 33˚C -34˚C both in the case group and the control group so that the data obtained were homogeneous and there was no p-value. The results of this study are consistent with the theory, which said that the average optimum temperature for mosquito growth is 25˚C-27˚C. Mosquito growth will stop altogether when the temperature is less than 10˚C or more than 40˚C[16]. It can be concluded that the temperature of the respondent's area does not support the development of the Aedes aegypti mosquito.

10. The Relationship Of Humidity With DHF Incidence

There is no significant relationship between humidity and the incidence of Dengue Hemorrhagic Fever because, from the results of humidity measurements at the time of the study, the number >60% in both the case group and control group, the data obtained were homogeneous so that the data obtained were homogeneous and there was no p-value. In accordance, the research said that the humidity of the air was conducive to the development of Ae. aegypti in nature, which is between 60%-80% [26].

11. Relationship Between Rainfall With DHF Incidence

In the respondent's area, both cases and controls, there was no rainfall classified as high; all respondent areas had rain>100 mm, and <300mm, so that it was classified as moderate rainfall. This does not support the growth of mosquitoes, where mosquitoes grow and develop in the rainy season/in areas with high rainfall. The statement endorses this stated that the increase in the population of Ae. aegypti occurred in November-December 2015 when the rain was high. Where the high rainfall, according to BMKG, is rainfall with an average of (300-500 mm)/month. [27].
4 Conclusion

The dominant ecological intelligence factor related to the incidence of DHF is the skills in environmental conservation with a value of $mOR = 80.968$, meaning those who do not have skills in ecological protection have a 67 times greater risk of contracting DHF compared to those who are not used to hanging clothes and environmental conditions. The dominant local factor associated with the incidence of DHF is the housing arrangement variable with a value of $mOR = 20.453$ (95% CI: 8.8 - 47.4), meaning that those who have a house that is not well organized have a 20 times greater risk of contracting DHF than those who have a place that is not well organized. With those who have managed homes.

Acknowledgments. Special thanks to Dr. H. Mamat Ruhimat, M. Pd and Dr. Iwan Setiawan, S.Pd., M.Si. for his guidance during the preparation of this article.

References

Improving School Quality Through Featured Program in Madrasah Ibtidaiyah Tarbiyatul Islamiyah Winong

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Abstract. This research was conducted to find out about the featured program for improving the quality of schools in Madrasah Ibtidaiyah Tarbiyatul Islamiyah Winong, Pati, Central Java, Indonesia. The school has now succeeded in becoming one of the best schools in Winong sub-district because it has qualities that is shown by its achievements and have been recognized by the surrounding community. The data was obtained through the qualitative method with a case study approach include interviews, observation, and documentation. The results show that school quality improvement occurs when the school held some featured programs such as (1) the tahfidz Al-Qur'an featured program, (2) the varies of the extracurricular program, and (3) interest and talent assessment for pre-students at the school.

Keywords: School Featured Program, School Quality, Madrasah Ibtidaiyah Tarbiyatul Islamiyah Pecangaan Winong Pati

1 Introduction

Education is one of the important things to improve the quality of human resources. In meeting educational needs, schools become one of the places in facilitating students to gain knowledge and develop their skills. The implementation of education based on Government Regulation Number. 17 of 2010 is an activity about implementing components of the education system which is divided into several levels such as primary, secondary, and junior college to achieve national education goals. Primary education levels in Indonesia include Elementary School and Madrasah Ibtidaiyah. Elementary School according to Government Regulation Number. 17 of 2010 is an educational unit that organizes formal education with the aim to the public and implemented under the Ministry of Education and Culture, while Madrasah Ibtidaiyah is an educational unit that organized by public education with Islamic religious orientation and implemented under the auspices of the Ministry of Religion [9]. Education through schools is expected to make Indonesia able to compete globally, this can be done through the improvement of existing human resources.
The education unit will be able to develop human resources if the institution itself has a good quality. Based on research, the quality of the school is important because it relates to one's future economic income after they having a job [4]. In addition, despite affecting one's income when they have a job in the future, the quality of school at the elementary level will influence the performance of students later when students are in the upper secondary level, which means students who receive good quality learning at the elementary level, they will be easy and able to face and overcome obstacles in the upper secondary level [8]. This quality of schools will be obtained by students depending on their respective schools, both public and private schools.

Private schools are considered to have their own attractiveness because they have better quality than public schools [5]. It is also shown from the research that the market demand to choose schools with good quality ultimately makes many private schools appear because it is considered to have better quality than public schools, in addition, private schools sometimes have their own specificities such as schools with religious curriculum, so this attracts the interest of the public or parents to send their children to the place [22]. The quality of the school can be seen from the excellent program they have. Each school certainly has a different program that becomes an icon and a characteristic that distinguishes it from each other schools. Examples of programs owned by schools are child-friendly programs that based on research have an influence on improving the quality character of early childhood [17]. Based on this research, the school's program will certainly have an impact on the resources and quality of the school.

One of the private schools that has good quality and becomes a favorite institution for parents to send their children is MI Tarbiyatul Islamiyah (Taris) in Winong Pati Subdistrict, Central Java, Indonesia. This school, able to improve the quality of what was originally a normal school became one of the best quality schools in Winong subdistrict, Pati. The curriculum applied is a religious-based curriculum such as MI in general. However, MI Taris remains the choice of the community to send their children to this school. Mi Taris' programs are one of the factors in improving the quality of schools so that they can become excellent schools that excel. Researchers want to know the program that changed MI Taris which was an ordinary MI into a superior MI school in Winong sub-district.

The purpose of this study is 1) Analyzing the flagship program owned by MI Taris Winong. 2) Analyzing the quality improvement obtained by MI Taris Winong through the featured program applied. And of course, this research has benefits such as 1) Theoretical benefits, can contribute theory and provide references for other schools able to implement excellent programs in schools. 2) Practical benefits, this research can be used to provide input to schools to be able to improve their quality and values by organizing excellent programs in schools. Based on this research, it will be explained that the quality improvement of schools that were ordinary schools became good quality schools through the featured program at MI Taris Winong, Pati.

2 Research Methods

This study was held using a qualitative research method with a case study approach. Qualitative research aims to understand phenomena by focusing on the overall picture and understanding the
situation in depth [1]. Qualitative research has tentative and temporary properties, it’s meant that when researchers are having a research in the field, the focus will be developed because it will meet and get things more in-depth than before [23]. The case study approach is qualitative research that focuses on one thing such as focusing on one individual, group, organization or focus on a program with the aim to obtain a description and understanding of a situation [1].

Data collection in this study was conducted by interviewing techniques, documentation, and observation to the school directly [13]. The research instrument that was used is the researcher himself. The object of the research is Madrasah Ibtidaiyah Pecangaan Winong, Pati by involving the principal as a key informant and additional informants are teachers. Then, researchers collect the data and analyze it. The process of data analysis is carried out through several stages of data collection, data reduction is necessary to sort the data results from the collection to be researched, presentation of data, and describe it in an understandable conclusion [19]. Therefore, in this research will be conducted in-depth and at the end of the research will be presented in the form of images, tables, or graphs.

3 Results and Discussion

After interviewing the principal and teachers, it was informed that MI Tarbiyatul Islamiyah Pecangaan Winong school was founded in 1962. At that time the school was only the place to learn Al-Qur'an recitation, then developed its students and it stood as Madrasah Ibtidaiyah Tarbiyatul Islamiyah Winong. In 2005, the state of the classroom only had 4-5 students in a class. Teachers need the effort to go around looking for children from one house to another in order to get students who want to study at the school. This happened because the surrounding people in the community was hardly interested and does not have the trust to send their children there. MI Taris was untrusted by the community and this was exacerbated by the building at that time that was not feasible.

The year 2007 was the turning point of MI Tarbiyatul Islamiyah Winong where at that time the management agreed to create a different program from other general MI in the sub-district. The course of the program provides good results for the school. This can be seen from the increasing number of students, based on documentation data in the school year 2020/2021 the school has about 370 students, this figure is quite significant compared to the situation in 2007.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Grade</td>
<td>63</td>
</tr>
<tr>
<td>2nd Grade</td>
<td>56</td>
</tr>
<tr>
<td>3rd Grade</td>
<td>53</td>
</tr>
</tbody>
</table>

Table 1 : Number of students for the 2020/2021 school year
In addition, based on the observations of researchers in the school, MI Taris now has a very decent building and adequate school facilities. When the researchers made observations there, the school building consisted of two floors and stood firm without visible flaws, a clean schoolyard, and available facilities for students such as libraries, student health unit, canteens, volleyball courts, and other student learning support facilities that are quite complete.

Fig. 1. School Facilities

MI Taris also has many achievements, based on the results of documentation of achievements that have been achieved are as follows:

a. Academic achievements in recent:

Academic achievement in 2020:

1. Gold for MIPASA (Mathematic, Science, Social Science, and Islamic Science) in national level
2. Silver and bronze MIPASA (Mathematic, Science, Social Science, and Islamic Science) national level, Central Java & Yogyakarta
3. Silver and bronze PPO (Science Olympiad Builders Association), Central Java & Yogyakarta

Academic achievement in 2021:

1. MIPASA National in 2021 got silver and bronze
2. Bronze for social science national level MIPASA 2021
3. Bronze for Banin Olympiad of Science Central Java and Yogyakarta

b. Non-academic achievements in recent:

Non-academic achievements in 2019:

1. 3rd place MTQ (Al-Qur'an Recitation) Porsema Central Java Province in 2019
2. 1st winner of MTQ Student XXV branch of SD/MI (Elementary School) Pati District Level in 2019
3. 3rd winner man for general tilawatil qur'an MTQ (Al-Qur'an Recitation) XXVIII Pati District in 2019
4. Pandhawa championship for man class I in 2019
5. Silat championship

Non-academic achievements in 2020:

1. 1st winner tilawah (Al-Qur'an Recitation) Pati District 2020
2. 2nd place adzan and iqamah National level 2020

![Fig.2. Photo of MI Taris Winong Pati student’s achievement](image)

In 2021, MI Tarbiyatul Islamiyah managed to get the rank of 6th place of achievements in Central Java from 225 MI schools who participated in the program by obtaining academic achievements about 28, non-academic achievements about 4 with a total of 32 achievements. This can be seen in the MI achievement list in figure as follows:
In addition, based on the results of interviews with the principals and teachers, MI Taris was able to develop itself to be able to improve the quality of the school by creating several excellent programs that proved effective in bringing MI into an outstanding and good quality school. The featured programs include:

1. Tahfidz Al-Qur'an School Program

MI Taris became a great quality school because of the excellent program that is tahfidz Al-Qur'an program. According to Farid Wadji, tahfidz is a process or activity carried out to memorize the Qur'an so that the reading in the holy verses of the Qur'an can be remembered outside the head, as for the person who memorizes the Qur'an is called al-hafiz [11]. MI Taris in 2007 began to organize tahfidz programs for children around the school who want to learn and memorize the Qur'an.

Tahfidz school program in MI is divided into two programs, namely regular program and cottage program. For regular programs carried out like normal schools in general, like an entering school at 07.00 and returning at 15.00 with a percentage of general learning 50% and religious learning 50% while for tahfidz programs in the cottage is carried out within 24 hours every day with a percentage of 70% religious learning and 30% general learning. Since the tahfidz program was...
implemented, schools have seen an increase in the number of students quiet drastically. In the 2020/2021 school year in one level, there are two classrooms with a total of 26-27 students per class.

If we look at the population statistics, Indonesian society is dominated by Muslims. While in Pati, Central Java in 2015 based on data from the Central Java Provincial Statistics Agency there were as many as 1,173,337 people who counted as Muslims, this shows that Muslims in Pati have a considerable number [2]. Based on the data is not wrong if the public is interested in the school program tahfidz. Moreover, according to Islamic beliefs by memorizing the Qur'an there are its virtues, the virtues of memorizing Qur'an are as follows [18]:

1. Memorizing the Qur'an will get a great reward
2. Increase one's faith
3. Allah will elevate the degree of readers of the Qur'an
4. The best busyness is when one reads the Qur'an
5. Always accompanied by angels
6. The Qur'an will be a helper on the Day of Resurrection
7. Parents who have the children that memorizing the Qur'an will be crowned on the Day of Resurrection

In addition to some of these things, there are other benefits in memorizing the Qur'an that will have an impact on the psychological reader such as will gain peace of mind, as a remedy and anxiety in the self, and memorization of the Qur'an can prevent delinquency in adolescents [15]. With some wisdom obtained from the memorization activities, in the end, the people who follow the religion of Islam will be interested in sending their children to school with a program tahfidz Al-Qur'an.

Based on interviews with principals and teachers in MI, since the Qur'an tahfidz program was implemented, the enthusiasm of the community, especially the parents of students, is very great to be able to send their children to MI Taris. Every year when the registration is opened, MI always gets many new students even the quota more than enough. This proves that tahfidz's featured program can be an attraction and can improve the quality and quantity of the school.

2. Extracurricular Program

In addition to the tahfidz program, another interesting activity of MI Taris is the existence of varied extracurricular programs provided by the school. Extracurricular programs are activities related to learning and are usually carried out after lesson hours with the aim to develop students' interests and talents related to sports, skills, art, scouting, and others [24]. Research shows that extracurricular programs can improve achievement and positive impact on school students [6]. According to Bowen and Greene stated that extracurricular activities such as sports can be a place for people to gathering as well as a place to socialize [3]. In addition, extracurricular activities such as joining the club, occupying leadership positions in schools, leading orientation, and conducting other extra non-academic activities have a positive impact on academic performance, even have
great achievements in graduation, as well as get a high GPA [25]. This is also supported by other research on extracurriculars that have a positive and consistent impact on student outcomes including social and academic [16].

In MI Taris, the extracurricular program is divided into two:

a. Academic extracurricular programs: that is to provide Olympic programs that can help academic students such as mathematics and science.

b. Non-academic extracurricular programs: such as extracurricular art of reading the Qur'an, drum band, martial arts silat, karawitan (Java Music), scouting, dance, tennis, and badminton.

This extracurricular program is quite interesting for the public to enroll their children in MI. Extracurriculars in the school are pretty much and one of them is religious extracurricular programs such as the art of reading the Qur'an. Research said that the implementation of religious extracurriculars can have a positive impact on learners so that they can live the value of Islam and prevent them from bad influences [10]. The benefits of extracurricular implementation are that it can help students in socializing such as adding friendships with other students, developing self-skills, and increasing academic potential [14]. The benefits will help students in improving hard skills and soft skills and these are important for student's needs in the future in living real life and having a job.

With the implementation of extracurricular programs, MI Taris obtained various achievements from the sub-district to national levels in the academic and non-academic fields. The results certainly improve the quality of the school and become the attraction of the community to send their children to get positive activities while in school.

3. Interests and Talents Test Program

For the elementary school level, the talent interest test conducted by MI Taris aims to map students according to their abilities or potentials. This talent interest test is rarely known to be done by primary schools in general. In fact, the role of this test of interest and talent is important to help students explore and pursue their potential. The test of interest and talent will make students know their potential both from their advantages and disadvantages [26]. There is research that shows that learning interests and talents have an influence on students' learning outcomes [7]. Based on other research also explained that the high interest of students towards something such as students' interest in learning will contribute to the academic performance of students [12]. Therefore, by understanding more deeply, the teacher will know to direct students according to their abilities and interests. With students interested and able, this can affect academic and non-academic achievements in their learning activities in school.

The interviews results with teachers, interest and talent tests conducted for all new students, it is important to know what action will be taken next to the potential of the students. The test is conducted through questionnaires and interviews to parents to be able to provide explanations and pictures of children thoroughly. After the process of filling out questionnaires and interviews,
students are grouped and directed according to their potential. This action is expected to support students to get achievements according to their abilities. Based on the three programs, this research can be summarized into the chart as follows:

![Diagram](image)

**Fig.4. Improving School Quality Through Mi Taris Winong's Featured Program**

MI Taris Winong Pati has changed and improved the quality of schools from 2007 until grow as today. The improvement of quality is seen from adequate facilities and infrastructure, as well as the number of students who increase even each level has two classes from grades 1-6. In addition, MI Taris also obtained many achievements from academic achievements and non-academic achievements. In 2021 MI Taris managed to get 6th place out of 225 MI who participated in the program at the Central Java level with 28 academic achievements and 4 non-academic achievements so as to get a total of 32 achievements. This quality improvement occurs because since 2007 the school began to improve the quality through the procurement of excellent programs such as tahfidz program or memorization of the Qur'an which is divided into two different programs, namely regular programs and cottage programs. This tahfidz program becomes schools' featured program and is able to bring schools into schools that are favorited by the community in Winong Sub-district. This is supported by the majority of people who are Muslims so that interest in religious programs is also high.

In addition, another program available in schools is the after-school program or extracurriculars where students can follow according to their wishes and potentials. The extracurricular consist of activities related to academic and non-academic fields. This extracurricular program is useful to help students can interact with their friends as to help students in building social potentiality and also able to grow the skills and hard skills of students. Because of these extra activities, schools often get achievements both at the local and national levels.

The latter program is a talent interest test for the new students. This aims to map the potential and ability of students so that teachers can direct students to be able to excel according to their field. This talent and interest test are conducted on parents of students through interviews and
questionnaires. After the test, the next step is to be given action by grouping and directing students according to their potential.

Through the featured programs, MI Taris is able to bring itself into a school that has its own value rather than the surrounding schools so that many people are interested in sending their children to school in MI. The value of this school is one of the differentiation strategies in marketing concepts that are rarely used by education management in schools [20]. Since it has a competitive advantage, MI has increased the quality, the number of students, achievements and also get many opportunities to improve the quality of infrastructure facilities in schools.

4 Conclusion

To improve the quality of schools, a strategy is needed through excellent programs that distinguish schools from others. This excellent program is considered effective in MI Taris Winong because the previously ordinary school and lack of adequate facilities can turn into a good quality school, this is shown from the increase in the number of students, the public interest to send their children there, and also the achievements of students both academic and non-academic. Improving the quality of schools occurs through the school's featured program, namely tahfidz (memorization of the Al-Qur'an), extracurricular class programs, and interest and talent test programs for the new students at MI Taris Winong. Based on the research, it can be concluded that to achieve quality, value is required thing that makes the school has a different advantage than other schools. By having differentiation programs, the school will attract people to study there. This research can be an insight for other private and public schools that want to organize education through excellent programs.

References

Level of Knowledge and Attitude Achievement of Vocational High School Students in Blended Learning Implementation in The New Normal Era

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Abstract. This research aims to vaccinate the level of knowledge and attitude achievement of students of State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta on the implementation of blended learning. The research method used mixed methods sequential explanatory, research samples 83 respondents and 6 interview informants. Data collection techniques in the form of tests, observations and interviews. The validity test was conducted by experts and tested to 30 respondents. Test questions in the form of multiple choice that refers to the syllabus, while the observation of attitude consists of eight aspects, namely discipline, responsibility, honesty, cooperation, creative thinking, courtesy, self-reliant and confident. The results showed that the level of student knowledge achievement in the implementation of blended learning by 77% of the category is quite good and the achievement rate of student attitude in the implementation of blended learning by 83% of the category is very good.

Keywords: Knowledge, attitude, blended learning, new normal

1 Introduction

Indonesian education is faced with many challenges and opportunities to adjust to the demands and dynamics of changes that will and are taking place. The 21st century demands quality human resources and is able to be globally competitive. Indonesian education must always prepare the skills needed to face every 21st century education revolution [1], [2]. XXI century or technology century requires many knowledge workers with various basic skills as follows: (1) critical thinking and problem solving, (2) innovation and improvement, (3) flexibility and adaptability, (4) leadership and initiative, (5) productivity and accountability, and (6) research and learning skills [3]. The rapid development of innovation and technology encourages education in various countries to analyze and find the type of learning that suits the demands of the 21st century.

Effective Vocational Education should take into account the formation of student competence and its application. According to Catts, Falk, & Wallace(2011, p. 7)"We contend that effective vocational learning comprises two equally important dimensions: (a) learning as the acquisition of vocational knowledge and (b) learning as the contextualized (socio-political and cultural) application of that knowledge[4]". Revitalization of Vocational high school (VHS) No. 9 of 2016 in order to improve the quality and competitiveness of Indonesian human resources. The challenges of the global and industrial era 4.0 make all stakeholders of
DUDI must be involved. However, based on the data listed in the Central Statistics Agency (BPS) shows the open unemployment rate of vocational schools is still the highest among other education levels, which is 8.49%. Currently the world is facing the Corona Virus Disease 2019 pandemic.

The COVID-19 pandemic requires working, studying, and worshipping from home. COVID-19 is a virus that attacks the respiratory system [5]. This pandemic period resulted in a change in especially the implementation [6] and education in parts of the world is experiencing a crisis 33.1% of the world's student population is affected by school closures resulting in 579 million students dropping out of school and 35 countries affected by school closures [7]. However, since the beginning of June 2020, the Government has directed to enter a new life order during the COVID-19 outbreak, namely New Normal [8]. The ideal learning model in the middle of the pandemic according to Minister of Education Nadiem Makarim is Blended Learning. Blended Learning is a learning that combines the application of traditional learning in the classroom with online learning that utilizes information technology and is flexible, salain that the use of e-learning or online learning is one form of flexible learning examples in the Blended Learning method [9]. This model can improve participants' professional knowledge and the efficacy of personal teaching related to creativity instruction [10].

The blended learning type consists of synchronous and synchronous types. Blended learning types are out of sync, learning is done with the occasional teaching presence and combined electronic communication. There are no provisions for face-to-face learning or e-learning. Meanwhile, in blended learning type synchronous learning provisions are 50/50 meaning 50% offline and 50% done online, or 75/25 means 75% offline learning and 25% online, and can be done 25/75 means 25% offline and 75% online [11]. Blended learning has three different combinations: a combination of different media, combining different teaching methods and strategies, and a combination of face-to-face and online learning [12] with the implementation of blended learning is expected that students can understand the material better and be more active in following the learning, so as to improve student learning outcomes. Blended learning has three approaches used in the blended learning process including: face-to-face (formal), face-to-face (informal), virtual synchronous, virtual asynchronous, self-learning, and performance support. The various approaches of Blended learning such as behaviorism, constructivism, kognitivism with the aim to produce an optimal learning achievement with or without learning technology.

Competency knowledge aims to adjust the latest education, i.e. nouns turn into verbs. Knowledge competencies include cognitive spheres including: remembering, understanding, applying, analysing, evaluating, and creating [13]. Cognitive levels are described as follows.

![Fig. 1. Cognitive Domain](Atherton (2013))
Cognitive thinking ability is further studied that thinking activities are distinguished into 2 namely: Lower Order Thinking / LOT and Higher Order Thinking / HOT. The related cognitive realms of remembering, understanding and applying to Bloom taxonomy are part of LOT, while analyzing, evaluating and creating are part of HOT [14]. Aspects of knowledge on competencies for precision machining certification schemes include: 1) knowing work safety procedures, 2) knowing the requirements of procedures and product quality in meeting the required specifications, 3) knowing the working principles and how to use measuring instruments and their maintenance, 4) knowing how to read the images on the picture 5) understand the mathematical calculation formulas required in precision machining, e.g. on the determination of cutting parameters, 6) know the function of cutting tools according to their type, 7) know the working principles and operating procedures of tooling machines (lathes, frais, grinding and CNC), and 8) know the order of work so that the machining process runs effectively, efficiently and safely [15].

The affective realm of bloom taxonomy consists of: receiving, responding, appreciating, organizing, and characterizing according to value [16]. The affective level is described as follows.

Aspects of attitudes to competence for precision machining certification schemes include:

a. Comply with work safety procedures against self, tools/machinery and workpieces, b. Comply with quality procedures during the preparation, implementation and post-machining process, c. Careful in reading working pictures, d. Be thorough in using measuring instruments and measuring scales on machine eretan, and e. Be careful and careful in using hand equipment in accordance with its functions [15].

Regulation of the Minister of Culture and Education No. 66 of 2013 describes the techniques and instruments used for knowledge competency assessment: a. The writing test instrument is a question of multiple choice, stuffing, short answers, right-wrong, matchmaking, and description. with scoring guidelines, b. Oral test instruments are a list of questions. c. Instrument assignment in the form of homework and/or projects carried out individually or in groups in accordance with the characteristics of the task. While the technique of assessment of attitude competency include: a. Direct or indirect observation, b. Self-assessment, with techniques to assess or expose from the less, c. Media with related requests and assessments, with which it is achieved and which are used to assess, d. Jurnal is an educator's record that contains observational information related to attitudes and behaviors.

Based on the results of a survey conducted by the Organisation for Economic Cooperation and Development (OECD) in 2015 using the Programme for International Student Assessment (PISA) test that the thinking ability of Indonesian learners is in the low category of level 2.
The statement was also supported by the Deputy Minister of Education and Culture that the quality of interpretation, exploration, and material proficiency of Indonesian students in the lower level. Another statement that the literacy ability of Indonesian students ranks below that of other countries [18].

In the industrialized world employers are increasingly complaining about the number of graduates who can not be faced with new challenges in the world of work, because of the large number of graduates lacking mastery of knowledge and skills [19]. Vocational Education graduates have not been able to adjust to the changes and developments in science and technology. Learners need superior skills and mastery of knowledge and attitude to get a decent job [20].

To be able to work well in the industry, especially the machining industry that uses advanced machines over time, namely optimization using CNC machines, the need for mastery of CNC competencies (Computer Numerical Control).

The capabilities of CNC machines are very complex and able to make a part or workpiece quickly and even complex workpieces can be made easily in large quantities. The demands of consumers who want the quality of workpieces that are precise, equally good quality, in a short time and in large quantities, will be easier to work with CNC machines. CNC machines are machines that can work through programming done and controlled through a computer. CNC machines can work automatically or semiautomatically after being programmed first through an existing computer.

The programming function in CNC is to create workpieces that have been planned or pre-designed. Before the workpiece is executed by a CNC machine, the program must be checked in advance so that the program is completely in accordance with the desired form of workpiece, as well as completely workable by the CNC machine.

Students should at the time of learning is expected to focus on listening to the delivery of materials from educators and leave other activities that interfere with concentration during learning. Students are required to be active, creative, innovative so that at the time of graduation the school obtains knowledge and skills that should be in accordance with the SKL, in order to be applied in the world of work.

Based on previous research, several studies have been conducted related to the implementation of blended learning [21]–[25] Blended Learning is used to improve critical thinking skills, increase motivation and level of understanding of learners, logical thinking, mastery of concepts, learning activities and learning outcomes [26]–[29]. The quality of learning of learners, one of which can be achieved if applying the right learning model. But there are also students unable to adjust to new learning methods. Children who are at the education level are particularly vulnerable in case of not getting the same study material [30]. Therefore, in this study, the author wants to analyze the level of knowledge and attitudes of students in Class XII Machining Engineering Subjects NC/CNC and CAM State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta which have implemented blended learning.

2 Research Method

2.1 Types of Research

The type of research used mixed method sequential explanatory model. Sequential explanatory model of the first order with quantitative method, and second order qualitative
method. This model is characterized by data collection and data analysis in the first stage of quantitative and the second stage of qualitative data collection, so that the data will be clearer and complementary to strengthen the results of quantitative research [31].

This study uses descriptive research types. Descriptive research is research that describes phenomena happening in real, realistic, actual because this research to make descriptive, picture or painting factually, systematically, accurately about the facts, properties and relationships between phenomena investigated [32]. This type of research does not hold manipulations or changes from the actual [33].

2.2 Research Location and Time

The research site was conducted at State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta. The event was held in November 2020- January 2021.

2.3 Population Research

Population is the overall target that should be studied, and in that population the results of the study will be applied but if the population is too wide, then researchers must take a sample (part of the population) [34]. The population in this study is Class XII Learners of Machining Engineering Skills Competency.

<table>
<thead>
<tr>
<th>Table 1. Blended Learning Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
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<tr>
<td>----</td>
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<tr>
<td>1</td>
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<tr>
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<tr>
<td>2</td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

2.4 Research Samples

Samples are part of the number and characteristics that the population has. The sample taken must represent [35].

2.4.1 Quantitative Sampling Techniques

Sampling techniques in this study probability sampling using simple random sampling. To determine the sample size is by slovin formula. Slovin formula is used as determining the minimum sample size (n) if known population size (N) at the level of significance of α. The significance level used is 0.10 with the formula as below:

\[ n = \frac{N}{1+N\alpha^2} \]

<table>
<thead>
<tr>
<th>Table 2. Quantitative Sampling Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
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<tr>
<td>-----</td>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
</tr>
</tbody>
</table>
2.4.2 Qualitative Sampling Technique

The sampling technique used was non-probability sampling with purposive sampling. Purposive sampling is a sampling technique of data sources with a certain balance [35], namely students who are considered capable in that field.

<table>
<thead>
<tr>
<th>Table 3. Qualitative Research Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
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<tr>
<td>----</td>
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<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

2.5 Variable Operation

The operational definition of the variable used in this study is an independent variable. Independent variables are variables that stand alone without comparison or linking with other variables. The independent variables in this study:
1. Knowledge ($X_1$)

   There are four aspects of competence related to intellectual learning outcomes, namely: understanding, applying, analyzing, and evaluating.

2. Attitude ($X_2$)

   Competence related to a person's attitudes and values. Aspects that include: discipline, responsibility, honest, cooperative, creative, polite, independent, and confident.

2.6 Data collection technique

Data collection techniques are data collection in terms of ways/methods/techniques to collect data [36]. Data collection techniques used include:

2.6.1 Tes

Data collection techniques with tests to evaluate the knowledge of Class XII students when learning NC/CNC and CAM Machining Techniques by implementing blended learning. The test scale uses the traditional Guttman scale, which is a scale that gets answers to questions right or wrong. The assessment of the multiple choice test is below:

<table>
<thead>
<tr>
<th>Table 4. Test Rating Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer Category</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Right</td>
</tr>
<tr>
<td>Wrong</td>
</tr>
</tbody>
</table>

Below is the analysis syntax of the achievement of the test results.
Table 5. Test Analysis Alternative Syntax

<table>
<thead>
<tr>
<th>Predicate Value Range</th>
<th>Predicate Value Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>89 – 95</td>
<td>A</td>
<td>Very good</td>
</tr>
<tr>
<td>82 – 88</td>
<td>B</td>
<td>Good</td>
</tr>
<tr>
<td>75 – 81</td>
<td>C</td>
<td>Pretty good</td>
</tr>
<tr>
<td>68 – 74</td>
<td>D</td>
<td>Not good</td>
</tr>
<tr>
<td>≤67</td>
<td>E</td>
<td>Very Not Good</td>
</tr>
</tbody>
</table>

(Sourc: [37])

2.6.2 Observation

The type of observation used was non-participant, namely the researcher was not involved and only as an independent observer with structured observation techniques, namely engagement and observation design, used with a systematic design. The assessment technique for observation is the Likert scale. The alternative observation syntax is as follows:

Table 6. Alternative Syntax of Observational Analysis

<table>
<thead>
<tr>
<th>Skor</th>
<th>Value Range</th>
<th>Alternative Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>&gt;75 – 100</td>
<td>Very Good</td>
</tr>
<tr>
<td>3</td>
<td>&gt;50 – 75</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>&gt;25 – 50</td>
<td>Not Good</td>
</tr>
<tr>
<td>1</td>
<td>0 – 25</td>
<td>Very Not Good</td>
</tr>
</tbody>
</table>

(Sourc: [37])

2.6.3 Interview

The interview used is an unstructured interview, this type of interview is often used in more in-depth research on respondents [35].

Table 7. Grid of Semistructured Interview Guidelines

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Indicator</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Knowledge</td>
<td>1. Types and functions of cutting tools on a CNC lathe&lt;br&gt;2. Simulation of CAM milling program&lt;br&gt;3. Work steps in making workpieces using a CNC milling machine</td>
<td>3</td>
</tr>
<tr>
<td>c. Attitude</td>
<td>1. Contribution to learning&lt;br&gt;2. Friends attitude</td>
<td>3</td>
</tr>
</tbody>
</table>
2.7 Validity Test

Validity testing is carried out by experts in the field of Machining Engineering. After testing the construction from the experts, then the learning achievement test is testing content validity with instrument testing. The instrument was tested outside the sample to be studied. The number of samples used is 30 respondents. After being tabulated, it was continued to correlate the scores of instrument items using SPSS Version 23 software for windows. The following are the validity results obtained:

<table>
<thead>
<tr>
<th>Table 8. Validity Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

(Source: Data Analysis Results, 2021)

Based on the table above, it is known that the number of questions is 50 questions. After testing the respondents, 40 questions with a percentage of 80% were declared valid because the index results items 0.281 with a valid category.

2.8 Reliability Test

Testing the reliability of the instrument to determine the level of consistency of the test questions. The test is declared reliable if it has a high interpretation of 0.60 – 0.79. Instrument reliability testing was carried out internally using the Spearman Brown (Split half) formula. Spearman Brown's formula is as follows:

\[ r_i = \frac{2r_p}{1+r_p} \]

Information:

- \( r_i \) : internal reliability of all instruments.
- \( r_p \) : Product moment correlation between the first and second hemispheres [35].

Based on the results of the analysis of multiple choice items in the NC/CNC and CAM machining engineering subjects, it was found that 50 multiple-choice test items obtained a test reliability result of 0.71. So it can be concluded that the reliability of the multiple choice test subjects of NC/CNC and CAM machining techniques has a high interpretation because it is included in the test reliability of 0.60 - 0.79.
2.9 Data analysis technique

Data analysis techniques in quantitative research are activities after data from all respondents or other data sources are collected. Activities in data analysis are carried out in several stages, namely: analyzing the results of test instruments, continuing to analyze interviews and documentation, tabulating data, presenting data and performing calculations to answer problems [35]. The analytical technique used is descriptive statistics. Descriptive statistics that discuss ways of collecting, summarizing, presenting data so that information is obtained that is easier to understand [36]. Descriptive statistics (including mean, median, standard deviation, frequency, and range) were calculated for all demographic questions and variables [38].

3 Results and Discussion

Implementasi blended learning pada Vocational High School of Mechanical Engineering harus adanya capaian terkait pengetahuan dan attitude peserta didik. Pengetahuan adalah modal intelektual yang dapat bermanfaat melalui perspektif manusia, struktural, dan relasi. Manfaat pengetahuan dalam perspektif manusia ialah pengetahuan yang mencakup keterampilan (keahlian seseorang dalam suatu bidang) dan sikap (tangungjawab, visioner, kejujuran, disiplin, ulet, kooperatif, dan tidak mudah menyerah) [39]. Adapun aspek pokok yang difokuskan dalam pemetaan ini bahwa kompetensi sumber daya manusia mengacu pada aspek knowledge dan attitude. SDM tanpa knowledge tidak akan punya dasar ilmu bertindak dan SDM tanpa attitude tidak mampu berperilaku kerja sesuai etika.

3.1 Knowledge

Based on the results of knowledge research in both State VHS 2 Yogyakarta and VHS Muhammadyah 3 Yogyakarta, quantitative analysis shows that the level of knowledge achievement of students is quite good, seen from the percentage of knowledge test results as follows.

![Fig. 3. Research Finding](image-url)
Table 9. Knowledge Test Results of State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>State VHS 2 Yogyakarta (%</th>
<th>VHS Muhammadiyah 3 Yogyakarta (%)</th>
<th>Mean (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analyzing the CAM Milling program through a simulation process</td>
<td>77</td>
<td>75</td>
<td>76</td>
</tr>
<tr>
<td>2</td>
<td>Evaluating the G Code program</td>
<td>85</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>3</td>
<td>Understand the command function modify G Code</td>
<td>69</td>
<td>78</td>
<td>73</td>
</tr>
<tr>
<td>4</td>
<td>Understand the transfer of G Code to CNC Milling</td>
<td>78</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>5</td>
<td>Operate the program on the CNC Milling machine</td>
<td>78</td>
<td>75</td>
<td>76</td>
</tr>
<tr>
<td>6</td>
<td>Understand Computer Aided Manufacturing (CAM) for process Lathe</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>7</td>
<td>Understand the types of cutting tools and their parameters for CNC Lathe</td>
<td>87</td>
<td>79</td>
<td>83</td>
</tr>
<tr>
<td>8</td>
<td>Understand the command function for facing</td>
<td>75</td>
<td>68</td>
<td>71</td>
</tr>
</tbody>
</table>

(Source: Data Analysis Results, 2021)

Based on the table above, the level of knowledge achievement of students from both Vocational Schools is quite good in the basic competencies of understanding the transfer of G Code to the CNC Milling machine, evaluating the G Code program, understanding the types of cutting tools and their parameters for CNC Lathe, analyzing the CAM Milling program through a simulation process, understanding transfer of G Code to the CNC Milling machine, as well as operating the program on the CNC Milling machine, while the basic competencies of students in understanding the command function to modify G Code and understanding the command function for the facing process are in the poor category. The following table shows the average percentage of VHS.

Table 10. Vocational High School Knowledge Achievement Level Results

<table>
<thead>
<tr>
<th>No</th>
<th>School</th>
<th>Mean (%)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State VHS 2 Yogyakarta</td>
<td>78</td>
<td>Pretty good</td>
</tr>
<tr>
<td>2</td>
<td>VHS Muhammadiyah 3 Yogyakarta</td>
<td>76</td>
<td>Pretty good</td>
</tr>
<tr>
<td></td>
<td>Amount</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Percentage</td>
<td>77</td>
<td>Pretty good</td>
</tr>
</tbody>
</table>

(Source: Data Analysis Results, 2021)
The table above states that the level of knowledge achievement of students with the test technique is 77% which is included in the pretty good interpretation. While the qualitative analysis with interviews stated that students of State VHS 2 Yogyakarta were able to answer questions well, seen from the explanation of the mention of the G code command function, program simulation and work steps in detail and precisely. Meanwhile, from VHS Muhammadiyah 3 Yogyakarta, the informants answered questions in a fairly good category because the answers explained were not detailed enough so that some were missed. There are several factors obtained by the researcher, namely according to the informant's statement that the teacher is not fully ready to implement blended learning seen from: first, the readiness of the lesson plans which still use the old format, which should use 1 sheet. RPP should also always be improved, namely in terms of form, content, and usefulness in meeting learning achievements. Second, the learning atmosphere is less interesting so that the topics to be delivered have not been able to build students' interest in learning, third, the time allocation has not fully improved the quality of learning, and fourthly the many obstacles from the network, web errors, unclear delivery, old teacher responses, and so on during online and offline learning, and also the lack of student interest in learning.

Aspects of knowledge (knowledge) based on competence include: 1) knowing occupational health and safety procedures, 2) knowing the requirements of procedures and product quality, 3) knowing the working principles and how to use measuring instruments and maintenance of measuring instruments and machines, 4) knowing how to read drawings 5) understand the mathematical calculation formulas needed in precision machining, 6) know the functions of the types of cutting tools, 7) know the principles and working procedures of CNC machines, and 8) know the work steps so that the machining process runs effectively, efficiently and safely [40].

2.2 Attitude

The results of the attitude achievement level of State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta through quantitative observations are as follows:

![Fig. 4. Overall Results of Attitude Observations at State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta](image)

Judging from the percentage of observations, it can be concluded in accordance with the order of the highest aspect values with very good categories, namely polite attitude, discipline,
cooperation, confidence, honesty, and responsibility. Meanwhile, the lowest aspects with good categories are (1) independent aspects, one of the objectives of implementing blended learning is so that students are able to learn independently [41] and, (2) creative thinking aspects, Creative thinking is an activity that generate new and innovative ideas. One of the indicators is the creation of new ideas that can solve problems and develop abilities [42] and (2) The following is a diagram of the results of observing student attitude achievements.

![Achievement of Student Attitude VHS](image)

**Fig. 5.** Overall Results of Achievement of Attitude of Vocational Students

It can be seen from the diagram above that the highest achievement of students' attitudes at State VHS 2 Yogyakarta and VHS Muhammadiyah 3 Yogyakarta is the same, which is 83%. The average achievement of the two schools is 83% in the very good category. Meanwhile, the attitude assessment between colleagues through interviews, stated that the attitudes of students with aspects of discipline, responsibility, cooperation and creativity were included in the good category. Based on the informant's statement that colleagues do assignments on time, maintain the cleanliness of the school environment, obey the rules of coming and going home from school according to the specified time, able to condition the class, dare to admit mistakes, dare to submit input or suggestions, and accept opinions from friends.

The 2013 curriculum requires teachers to conduct affective assessments. Affective assessment in the 2013 Curriculum is found in social attitudes, namely discipline, honesty, caring, self-confidence, courtesy and responsibility. It is important to do this regarding the affective assessment information of students with observation, so that teachers produce information that is biased in affective assessment. The social attitudes of students in the learning process can influence or improve student learning outcomes, and vice versa [43]. Purwanto (2011), says that attitudes always have a certain relationship with the object, the attitude is formed, studied or changed with respect to a certain object that can be formulated clearly [44].

Attitude has a motivational aspect and a feeling aspect, a natural trait that distinguishes people's attitudes, skills or knowledge. The positive attitude of students can be stimulated by interesting learning by providing innovations in media, methods, and assessments. A positive attitude that appears in students will provide good motivation, so students will excel. Attitude is an important aspect in life, especially in education, by having a positive attitude, it will make a person better in learning [45].

From the results of the two quantitative and qualitative data collection techniques, it was stated that the attitude level of the students of Vocational High Schools of Yogyakarta Province from the eight aspects, namely: discipline, responsibility, honesty, cooperation, creative thinking, polite, independent and confident was 82.4% very good category, and supported by qualitative results of assessment interviews between friends that students have good discipline, responsibility, cooperation and creativity.
4 Conclusion

The conclusion of this research is: First, the level of knowledge achievement of students in the implementation of blended learning at State VHS 2 Yogyakarta is 78% good category and at VHS Muhammadiyah 3 Yogyakarta is 76%. Overall, the level of knowledge achievement of students from the two VHS is 77% with a fairly good category. There are several factors causing the lack of maximum knowledge of students in the implementation of blended learning, namely: a. lack of teacher readiness in terms of lesson plans, time allocation, and learning atmosphere, b. the application of blended learning in CNC and CAM subjects increases the level of learning difficulties of students, c. there are obstacles during online and offline learning, as well as d. lack of interest in students to learn. Second, the level of achievement of students’ attitudes on the implementation of blended learning at State VHS 2 Yogyakarta is 83% and at VHS Muhammadiyah 3 Yogyakarta is 83%. Overall, the attitude achievement level of students of Vocational High Schools in Yogyakarta Province is 83% with a very good category, and based on peer assessments that students do assignments according to deadlines, maintain the cleanliness of the school environment, obey school rules, come and go to school on time, able to condition the class, dare to admit mistakes, dare to give input or advice and receive opinions.

Acknowledgments. The researcher would like to thank colleagues who have helped in completing this article, and the researcher would like to thank the UMP for being willing to accept this article to be published in the EAI CCER Indexed in Scopus proceedings.

References


Development Design of Ecological - Contextual based Learning for Prosocial (ECOPS) in Social Studies Subject in Junior High School in Cimahi

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Abstract. The currently occurring environmental problems are essentially consequences of individuals' disregard of their environment. Through social studies contextualizing ecological issues, efforts to nurture environmental awareness can be made through lessons in schools. This study aims at describing the development of a conceptual learning model dubbed Ecological-Contextual based for Prosocial (ECOPS) in order to foster prosocial behavior of junior high school students in Cimahi as an alternative for social studies learning. This study is a qualitative descriptive study in which interviews are conducted as means of data collection. The objects of this study involved the social studies teachers of junior high schools in the city of Cimahi. The findings of this study indicate that according to the data obtained, there was no learning model employed in social studies that was based on ecology as an attempt to foster students' prosocial behavior. Therefore, an ecology-based learning model for social studies is needed with the purpose of fostering a sense of prosocial behavior in order to maintain sustainability. The Ecological-Contextual based for Prosocial (ECOPS) model can be used as an alternative for social studies teachers so as to foster students' prosocial behavior. The ECOPS model is an environmental-based social studies learning model that focuses on social interaction to foster the students' caring attitude towards their social environment. Hence, every action and behavior will be by environmental and social sustainability.

Keywords: social studies, prosocial, ecology.
1 Introduction

Nature and humans are two inseparable entities. Humans need nature to fulfill their needs and to support their existence. Likewise, nature needs humans to maintain environmental sustainability and harmony. Nature provides diverse resources needed by humans such as water, air, soil, plants, animals, fossil fuels, and others [1]. Therefore, preservation is necessary to maintain the sustainability of the environment so that humans can benefit from nature to meet their needs without overexploiting it. Consequently, all forms of destructive activities must be avoided at all costs. That way, these actions of showing environmental awareness are a form of tolerance which is part of social concern [2].

Unfortunately, as time passes, the harmony between the environment and humans begins to subside. This can be seen from many natural incidents that occurred, one of which was the discovery of various plastic waste as much as 5.9 kilograms inside the stomach of a dead whale in Wakatobi on November 19, 2018. The waste comprised plastic bottles, drinking cups, plastic packaging for instant noodles, bottle caps, plastic sandals, plastic bags, and tarpaulin bags. This phenomenon shows the lack of concern for the environment.

Arne Naess in Mulyana [3], an ecologist, revealed that the current environmental crisis could only be overcome by making fundamental and radical changes in humans' perspective and behavior towards nature. One way to change said behavior is through education, namely school.

Why school? Because school is a place where interactions between teachers and students occur, the transfer of values appears in the learning process. Therefore, if ecological intelligence values are embedded in the learning process, students are expected to have high environmental awareness. Supriatna [4] stated that individuals' ecological intelligence stems from knowledge, understanding, and life skills in harmony with natural sustainability.

Through social studies contextual about ecological issues, efforts to nurture environmental awareness can be made through lessons in schools. Various studies in the field of social studies concerning ecology can be found. Unfortunately, based on the results of in-depth interviews conducted in this study, it was revealed that there was no learning model in social studies that was based on the environment with the aim to foster students' prosocial behavior. Therefore, an ecology-based learning model for social studies is needed with the purpose of fostering a sense of prosocial behavior in order to maintain sustainability.

This study aims at describing a learning design in social studies dubbed the Ecological-Contextual based for Prosocial (ECOPS) model as an alternative in social studies learning for developing ecological material while simultaneously fostering prosocial behavior.

2 Literature

2.1 Social Exchange Theory

The social, philosophical foundation used in developing the ECOPS model is George C. Homans' social exchange theory, which Peter M. Blau later refined. This theory suggests that social interaction has similarities with economic transactions. However, in terms of social exchange, the
exchange is the trade of goods for money and a dialogue between the tangible and the intangible. Social exchange theory is the social, philosophical foundation in developing the ECOPS model. In learning social studies with the ECOPS model, social interactions occur between students and teachers and between students and other learning models, in this case, guest teachers, scavengers/garbage collectors, and donation recipients.

2.2. Social Constructivism

Vygotsky's theory of social constructivism states that students construct knowledge through social interactions with others. Vygotsky considers the social environment crucial for learning; he suggests that social interactions alter or transform learning experiences [5]. Through Vygotsky's social constructivist paradigm, a student's interactions with the environment can help the learning process run better and will undoubtedly affect the student's learning outcomes. Vygotsky's social constructivism emphasizes that teachers must create many opportunities for students to learn with teachers and peers in constructing shared knowledge [6].

Vygotsky's social constructivism can be used as a basis for developing learning models, especially in social studies. This is because IPS (Ilmu Pengetahuan Sosial - social studies) is a field of study that learns, examines, analyzes social symptoms and problems within society by reviewing various aspects of life or a combination [7]. In other words, social studies learning emphasizes the social environment in which Vygotsky's social constructivist theory applies, constructing knowledge through social interaction with others.

According to Vygotsky's theory of social constructivism, students are encouraged to construct knowledge through interaction with the environment. This is in line with what the researcher will conduct, for in the learning that will be carried out, students are involved in ECOPS learning model that is related to the environment where they live, about concern for the environment and the surrounding community by using a learning media that has been previously designed.

2.3. Progressivism Theory

Progressivism is one of the theories in modern educational philosophy which leads to the pragmatism philosophy introduced by William James (1842-1910) and John Dewey (1859-1952). They share the same belief in pragmatism that the human mind is particularly active and seeks to explore, not passive continuously, and does not just accept particular views before empirical proofs [8].

About education in schools, the principle of progressivism can be implemented by making schools a means of revitalization for human progress to facilitate progress-oriented learning. One form of progress in education is using a new learning model, which is a product of creative thinking, in this case, the ECOPS learning model that the researcher has designed. As a result, the learning will be more meaningful for students if the materials provided are contextually relevant to their lives. Contextual Teaching Learning (CTL), which is essentially an actual development of progressivism, designs the ECOPS model. This is related to social studies learning materials regarding environmental care and social care using the environment where students reside.
2.4. Ecological Intelligence

The ecological philosophical foundation used in the ECOPS model is the theory of environmental intelligence by Goleman, which emphasizes that ecological intelligence describes a person's ability to understand the natural system by combining cognitive skills with empathy for all creatures. Furthermore, Goleman [9] listed five things to be developed informing ecological intelligence as a way of affirming the relationship between the intelligence above, namely:

1. Developing empathy for all forms of life
2. Embracing sustainable living with the collective ability to work together to preserve that sustainability
3. I am living in harmony with the environment to understand time, space, and its impact.
4. Anticipating various consequences caused by humans and predicting the possibilities that may occur
5. Understanding how nature sustains life is crucial for students in shaping a community that takes future generations and sustainable living into consideration.

The next theory that serves as the basis for developing the ECOPS model is the theory of ecological evolution proposed by Bronfenbrenner, which states that the environment influences human development as the reciprocal relationship between an individual and the background will shape the individual's behavior [10]. Furthermore, ecological theory views child development from three environmental systems, namely microsystem, ecosystem, and macrosystem [11].

Through social studies learning with the ECOPS model, students are directed to analyze environmental problems around them and use them as a drive-in nurturing social care for others.

3. Research Methods

In a qualitative study, data collection is conducted in a natural setting. Data in this study were obtained by means of observation and interviews. Observation means paying attention to phenomena at the site of the study through the five senses, often with instruments or devices, and recording them for scientific purposes [12]. On the other hand, interview is a technique to obtain information from the informants through questions inquired by the interviewer.

In a qualitative study, the instrument of the study is the author him/herself (human instrument). A qualitative study as human interest functions to determine the focus of study, select informants as data sources, collect data, assess data quality, analyze data, interpret data and make conclusions on findings. Data collection methods include observation, interviews and documentation studies. In-depth interviews were conducted with six social studies teachers at a public junior high school in Cimahi. [13] explains that in the perspective of a qualitative study, the point of view of the problem is holistic in nature (comprehensive, cannot be separated), hence qualitative researchers will not determine their studies solely based on variables of the study, but also on the overall social situation being studied that is based on aspects such as place, actor, and activity that interact synergistically.
4. Results and Discussion

4.1. Social Studies Learning Materials Regarding Ecology and Prosocial Behavior in Junior High School in Cimahi

Based on the data obtained through interviews with 6 social studies teachers at SMP Kota Cimahi, 83% of them stated that a social studies curriculum concerning ecology had not been specifically present in social studies learning. The ecological theme that was not specifically written in the Basic Competencies (KD), added with the absence of the obligation of the curriculum, caused social studies teachers not to further develop ecology-related materials. Social studies material with ecological content is only presented in a global context. It is a similar case with materials related to prosocial behavior. 66% of the informants said that these materials were not specifically written to be studied, but were given to sociology materials with the theme of social interaction. This was because prosocial behavior appears in the material regarding social interaction. Additionally, from the results of interviews with social studies teachers, it was also found that activities that are based on ecology and prosocial behavior were more encouraged in activities outside of class hours.

Further information regarding ecological learning resources was that 83% of the respondents claimed that the development of facilities and infrastructure would be carried out if materials concerning ecology and prosocial behavior are developed in social studies learning. This indicates that the use of a learning model that is based on ecology and prosocial behavior have the potential to get supports from school, one of which is in form of the provision of facilities and infrastructure.

In addition to the information mentioned above, it was obtained that 100% of respondents claimed that they had never used a learning model in social studies learning that is based on ecological intelligence in order to foster prosocial behavior. 33% of respondents admitted that they had used an ecologically based learning model, but not for the purpose of fostering prosocial behavior. On the other hand, 50% of respondents claimed to have used learning models that aim to foster prosocial behavior although they were not based on ecology.

Therefore, this study aims at providing an alternative social studies learning based on two things at once, namely ecology and prosocial behavior, in which ecology is used as learning material with the aim of fostering students’ prosocial behavior. The model offered is called Ecological-Contextual based for Prosocial (ECOPS) model which has philosophical foundations in educational, ecological and prosocial theories.

4.2 Ecological Contextual Based for Prosocial (ECOPS) Model Syntax

Syntax in the ECOPS model is divided into five phases: stimulation, response, knowledge construction-confirmation, analysis, and application communication. The initial model of the syntax of Ecological Contextual Based for Prosocial (ECOPS) is shown below:
Students are given a stimulus at the stimulation stage, either in the form of a video or a learning model (modeling) that is related to the environment presented by the teacher in the classroom. The provision of this stimulus aims to trigger students' critical thinking about the learning materials that will be studied. At the response stage, students are allowed to express their opinions regarding the given stimulus. This stage can reflect the students' reaction towards the given stimulus. At the knowledge construction-confirmation stage, the teacher explains the learning materials. This is done to avoid misunderstanding the concept of learning objectives and students' perceptions. At this stage, the teacher accommodates the students with opportunities to ask questions. By this, there a lively discussion between teachers and students is conducted. At the analysis stage, students are given exercises, either in the form of questions or a project assigned to measure the extent of their comprehension of the learning materials. At this application-communication stage, the students express their views on the questions/projects/problems presented. This is done to communicate the final actions that students will take in dealing with the social problems that have been introduced in the form of questions and projects. Several methods are employed in the ECOPS model, namely lecture, question and answer session, discussion, and cooperative learning. As for the assessment, the ECOPS model assesses several aspects, namely attitude, knowledge, and skills. Evaluation of attitude is carried out using a checklist with adjusted categories for each meeting. The knowledge aspect is measured using written and oral tests and assignments; meanwhile, the element of skills is measured by assessing the students' performances, including students' participation throughout the learning process.

5. Conclusion

Social studies learning as an attempt to foster students’ prosocial behavior by means of caring for the environment has not been optimally developed in schools. Normally, the focus of social studies only relies on one concern without combining the concerns; ecological and prosocial. Based on the obtained data, it is evident that ecological competence and prosocial behavior have not become the main focus in social studies learning in junior high schools, resulting in the absence of
a learning model that is specifically used during learning that is related to ecology and prosocial behavior. However, if we take a closer look, materials related to ecology and prosocial behavior can be used as a special topic by adapting or developing it based on the existing Basic Competencies (KD) of Social Studies subject in junior high school. To make these ecological and prosocial materials more meaningful, the selection of learning models is key. In addition, the selection of a suitable learning model can enable easier process in achieving learning objectives. Therefore, the ECOPS model can be used as an alternative in social studies learning in relation to ecology and prosocial behavior. The ECOPS model is an environmental-based social studies learning model that focuses on social interaction to foster the students’ caring attitude towards their social environment. Hence, every action and behavior will be by environmental and social sustainability.

References

Culture-Based Education Improves National Insight

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Abstract. This article aims to describe the concept of culture based education at SMP Negeri 3 Banguntapan based on the Yogyakarta government education regulation. Culture-based education is needed for the continuity of the educational process and cultural preservation. Culture-based education is integrated into all activities in schools. The integration of culture-based education is based on the DIY Regional Regulation Number 5 of 2011 concerning the Management and Implementation of Culture-Based Education and the DIY Governor's Regulation Number 66 of 2013 concerning the Culture-Based Education Curriculum. research at SMP Negeri 3 Banguntapan. This research is descriptive research with a qualitative approach. The research subjects were stakeholders, teachers, and students. Data collection techniques in this study used interviews, observation, and documentation. The method of checking the validity of the data is using triangulation. Analysis of research data using inductive techniques with data collection, data reduction, data presentation, and conclusions. The application of culture-based education in increasing national insight through teaching and learning activities in the classroom, habituation, and extracurricular activities.

Keywords: education; culture-based education; national insight.

1 Introduction

National education aims to develop capacities and shape the nation's character and culture while also educating the nation's life and developing students' potential from a national perspective. Supporting this statement, [1] education will create morality engraved in oneself and is a person's inner strength. But to realize this noble goal is not easy. Various ways are done to make it happen. In response to this, the government seeks to realize the goals of national education through various means, among others, by perfecting the National Education system. An essential aspect of the national education system is the guideline in educational activities and institutions to achieve academic goals. Several learning experiences are communicated that reflect and are absorbed from people's lives. Learning in schools is developed by the conditions of the education unit, regional potential, and students. Based on this, the Yogyakarta government sees excellent potential in perfecting national education. Therefore, based on the high cultural potential, the Yogyakarta Government issued the Yogyakarta Special Region The Management and Implementation of Culture-Based Education Regulation No. 5 of 2011 and the Governor of the Special Region of Yogyakarta Regulation No. 68 of 2012, Concerning the Use of Noble Cultural Values in Educational Management and Implementation.

The creation of these regulations is because education and culture are closely related and cannot be separated. In essence, education is a civilizing process to live a decent and valuable life for himself and the life of his community and have a national insight to maintain the integrity
of the Indonesian nation. Education is a process to bring about the desired changes in human behavior—education is a deliberate endeavor to maximize a student's potential. As a result, education is a process of cultural transmission to students as the nation's next generation. Culture and education are two elements that support each other so that both play an essential role in advancing a country, by combining culture and education is a very vital factor in efforts to educate the nation's life. The use of culture in education in Yogyakarta is an attempt to generate national values. National values are generally found in the cultural values of the people in Yogyakarta. These values become the rope of unity for the community. This national insight is essential for the current generation to make Indonesia safe, fair, prosperous, and face the challenges of globalization. Planting cultural values with national wisdom is the right step.

To achieve this goal, culture-based schools need to meet the leading indicators, namely culture-based pedagogy, culture-based curriculum, participation, and culture-based student performance assessment methods [2]. Culture-relevant pedagogy provides learners with a way to succeed in learning to maintain their cultural integrity and competence [3]. Students pride in their cultural heritage becomes a catalyst for lesson planning. A culturally responsive curriculum increases academic engagement, positive grade points, and artistic image. Values, norms, knowledge, beliefs, practices, experiences, and language, which are the basis of culture, are used in the teaching and learning of students in culture-based education [4].

Culture is formed over a very long period and is a gradual process. A culture can maintain its existence and be handed down from one generation to the next, so it is necessary to have a cultural intermediary between ages. One way that can be done is to carry out the process of inculcating cultural values in the field of education both in informal, formal, and nonformal education [5]. Various educational reforms around the world have been carried out to conquer globalization's, worldwide competition's, technical progress's, and societal transformation's challenges [6]. Education must strive for equality and make concerted efforts to address the cultural needs of students in balancing the existing ethnic diversity [7]. As a result, culture-based education is a mechanism that allows everyone to learn about science and technology throughout their lives. Based education is the foundation for teaching and learning about culture's values, norms, knowledge, beliefs, practices, experiences, and languages to pupils. The emergence of a culture-based education paradigm emphasizes modernism's assumption, This necessitates democracy in all aspects of human life. As a result, education must be managed optimally by providing the community with the broadest possible place for local values as part of the educational aims and contents. Citizens and the government collaborate in the planning, implementation, maintenance, and development of educational activities in this framework.

Schools need autonomy so that schools can control substantial changes and challenges to the global economy [8]. Stated that the higher the level the provision of school autonomy, which allows schools and instructors to teach a varied range of kids, is seen to benefit students [9]. Culture always exists in schools, as explained by culture invites to know together with how to be, understand, and do [10]. Culture-based education is the foundation for teaching and learning kids about indigenous culture's values, norms, knowledge, beliefs, practices, experiences, and languages. Culture-based educational strategies influence socio-emotional development and educational outcomes. Culture-based education strengthens community and is inherently between disciplines and local resource-based projects [11].

In this competitive era, the world of education, teaching, and learning must keep up with the times but must still instill cultural values in students. Based on this, culture-based schools are encouraged to promote curriculum changes that are supported by pedagogical abilities in the classroom [12]. In this context, the principal becomes an important aspect that facilitates the decentralization process in developing a culture-based curriculum [13]. When the leader's vision
is well articulated to reach a common objective, it is vital to influence others. In addition, the principal has a significant influence in fostering culture-based schools and the professional development of teachers.

Culture-based schools are built to create and instill actual values and the spirit of nationalism in all school members, including making character education programs or policies, forming cultural schools, communicating them to all schools, maintaining cultural values, and respecting each other's achievements. parties in the school [14]. Cultural education can promote equality in diverse schools by recognizing and addressing imbalances through culturally responsive teaching [15]. Through a long process of forming culture, it is hoped that it will be able to form orderly community obedience and create a physically and mentally prosperous society. The aim of reforming the culture-based school curriculum is to develop cultural, pedagogical teachers to improve teaching and learning approaches and kids with the attitudes, knowledge, and skills they'll need to meet future problems [16].

The above description illustrates that education and culture are critical and cannot be separated so that a culture-based curriculum is created to perfect the national education system. The implementation of the culture-based curriculum itself has not been implemented thoroughly in various regions. Yogyakarta is one of the regions that has implemented a culture-based curriculum. It is hoped that implementing this culture-based curriculum can be helpful to add national insight to students and be a good step for the preservation of Indonesian culture.

2 Research Methods

This type of research is descriptive research using a qualitative approach. Qualitative research is used to investigate and comprehend the meaning of a number of individuals or groups of people who are thought to be involved in social or humanitarian concerns. This approach was chosen because this research intends to understand the notion of culture-based education in promoting national insight by SMP Negeri 3 Banguntapan, which has been predicted as a culture-based school. In this study, the objects or circumstances, and phenomena described are culturally based educational concepts developed to improve nationality insights in the classroom's learning process and activities. According to the explanation, presented in the background of the problem, the implementation of the research was conducted by collecting responses, opinions, and information from related parties and collecting documents related to cultural-based education at SMP Negeri 3 Banguntapan.

Purposive sampling is a strategy that is used to collect data with a specific goal in mind for finding and determining informants employing researchers selecting certain people who are considered to be able to provide the following necessary data based on data or information obtained from previous informants, researchers can determine other informants who are deemed to provide more complete data. The stages that the researchers used in the data collection technique in this study were as follows:

a) In-depth Interview Method

Interviews are conducted to obtain information directly from the subject being studied. The discussion aims to explore information about the concept of culture-based education used in SMP Negeri 3 Banguntapan as a culture-based school to improve nationality insights in students.

b) Observation Method
Observations are carried out by looking carefully and in detail at matters related to culture-based education at SMPN 3 Banguntapan ranging from actions, behaviors, speech, work processes, situations, and conditions created during the activation process.

c) Documentation Methods

This documentation is done to complete the information obtained in interviews and observations in the research. Documentation is done by collecting data sourced from archives and documents that have a connection to the investigation. Researchers use documentation techniques in this study to obtain biological data in documents, photos, written rules, etc. This data further strengthens the data obtained from interview techniques and observations.

3 Results and Discussion

3.1 cultural-based education planning

Culture-based education in improving students’ nationality insights implemented by SMPN 3 Banguntapan combines with the school’s vision, mission, and objectives. This is done so that the school has a clear foundation related to the strategy that will be implemented. This stage of planning becomes the primary basis of culture-based education. Various kinds of program planning applied SMPN 3 Banguntapan by the theory that planning is a concept of how an activity will occur [17]. The regulation of the Province of Yogyakarta Special Region No. 5 of 2011 concerning the Management and Implementation of Culture-Based Education, as well as the regulation of the Governor of the Special Region of Yogyakarta No. 68 of 2012 concerning the Application of Noble Cultural Values in the Management and Implementation of E-Learning, govern the planning phase conducted by SMPN 3 Banguntapan. The details of the program to be implemented have been well prepared by a special team assigned as coordinators of cultural-based education programs.

<table>
<thead>
<tr>
<th>Program</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated into all subjects</td>
<td>All subjects are required to integrate the noble values of culture and national insight</td>
</tr>
<tr>
<td>Local content and peculiarities learning</td>
<td>1. Local content that is Javanese</td>
</tr>
<tr>
<td>Extracurricular activities</td>
<td>2. The individual lessons of karawitan, batik, and dance.</td>
</tr>
<tr>
<td>Habituation program (hidden curriculum)</td>
<td>Extracurricular activities integrated into national insight</td>
</tr>
<tr>
<td>1. Habituation of greetings in Javanese</td>
<td>2. Habituation of unggah-Canggu to older people and compassion</td>
</tr>
<tr>
<td>Visualization</td>
<td>1. Bell change of lesson hours in the form of gamelan music</td>
</tr>
<tr>
<td></td>
<td>2. Ornaments and Javanese decorations such as batik motif paintings on school walls</td>
</tr>
</tbody>
</table>

Culture-based education at SMPN 3 Banguntapan is implemented through five planned programs, the first integrated into all subjects. The integration of national wawasam in learning responds to several weaknesses in eroding the love of the homeland due to globalization and the replacement of local culture with modern culture. The integration in question includes
implementing learning activities that facilitate the practice of values in each activity inside and outside the classroom for all subjects. All subjects are also assumed to have a mission in building the national insight of learners [18].

Second, local content and distinctive learning are curricular activities that help students build competences that are adapted to the region's qualities and potentials, such as regional excellence or debating with local wisdom. The target of learning local knowledge is the advancement of cultural values cultivation. Honesty, accountability, discipline, environmental sensitivity, and cooperation are examples of cultural values. The planting of these values is included into the conditioned learning process so that these values might become attitudes and behaviors in everyday life. The local content applied by SMPN 3 Banguntapan is Javanese language learning. In addition, local content and peculiar learning can be done by giving teachers tasks in groups observing and identifying the culture or resources that exist in the residential environment.

Third, Extracurricular activities are one of the potential media for developing a student's character and improving their academic performance. The process of a habit developed by SMPN 3 Banguntapan in extracurricular activities is to require students to choose and participate in cultural-based extracurricular activities, including karawita extracurikuler, batik, traditional dance, and Pencak Silat. Cultural-based extracurricular activities can reflect cultural values to students and play a role in improving national insight in preserving the nation's culture.

Fourth, the hidden curriculum program. In the framework of culture-based education can be integrated through daily habituation in schools. Habituation activities in students can be done with various kinds such as through multiple programs, and conducive school culture will internalize cultural values in students. Habituation activities are carried out through the hidden curriculum, an educational unit activity that is general and not directly related to a subject to help the development of learners according to their needs, potentials, talents, and interests. Thus these activities are expected to have a meaningful contribution to students' success in schools, especially for the success of cultural-based education.

Fifth, the visualization of a culture-based school is visualized by creating a school branding that shows the school has uniqueness, distinctiveness, and excellence. Branding is a way of distinguishing one school from another and the message recorded in one's memory about a school. School branding demonstrates the strength and excellence of schools based on the potential, environment, traditions, and support of the community and all school residents. The branding of a culture-based school conducted by SMPN 3 Banguntapan is reflected in the school's appearance, atmosphere, and achievements in academic and non-academic fields. School branding at SMPN 3 Banguntapan visualizations such as walls painted batik motifs, displaying puppets, mottos, and moral messages using Javanese characters and languages, and school bells that use instruments and sing the Javanese language. The school's branding will be able to develop the uniqueness, excellence, and competitiveness of the school as a characteristic of the school. School branding is also able to improve the positive image of the school to increase the support of school residents and the community.

3.2 Culture-Based Education at SMP Negeri 3 Banguntapan

The application of culture-based education in SMP Negeri 3 Banguntapan produces students who have broader national insight in addition the cultivation of cultural values can be achieved through various means, namely through the refraction of cultural values, moral knowledge, feelings and love for cultural values, moral actions, and civility [19]. Analysis of the results of
the implementation of culture-based education at SMP Negeri 3 Banguntapan based on school observations, interviews with stakeholders and students, and documentation about the school.

Culture-based education is defined as an education that is organized to meet national educational standards and is enriched with excellence based on noble cultural values so that students can actively develop their potential to become superior human beings, insightful nationalities, intelligent, visionary, and sensitive to the environment of cultural diversity, as well as responsive to the development of culture. Quality standards of culture-based education include content standards; process standards; competency standards of graduates; standards of educators and educational personnel; standard facilities and infrastructure; management standards; financing standards; and education assessment standards (P.P. No. 19/2005).

First, content standards: contains a basic framework and structure of a culture-based educational curriculum that integrates noble cultural values with science, education, technology, humanities, arts, sports, and social activities. Second, the standard of the process: promoting the active participation of learners by paying attention to personal uniqueness, the value of freedom of creativity, decency, order, happiness, togetherness, justice, and mutual respect. Third, SKL: Graduate competency standards include attitude, knowledge, and skills. The Governor's Regulation governs further provisions on attitudes, knowledge, and abilities. Fourth, the means Educators and educational professionals must adhere to the professional code of conduct and comprehend the noble value of culture; they must also develop an understanding of and application of civilization's noble ideals. Educators and academic personnel who do not carry out the obligation to build awareness and use noble values are subject to administrative sanctions. Fifth, surpass standards: covering the SNP as a minimum service standard coupled with infrastructure and facilities that facilitate the implementation of culturally centered education. The provision of samples is the responsibility of the Local Government to support the implementation of cultural-based education in international school start-ups, international schools, and special education. The local government helps providing infrastructure and facilities to aid in the implementation of culture-based education. The provincial government supervises the assistance of facilities and infrastructure.

Sixth, education management standards: education management standards are used for the basic framework of educational governance on a formal, nonformal, and informal cultural-based path. The management of legal pathway education units is carried out through primary and secondary education levels by implementing school-based leadership. The management of nonformal pathway education units is carried out by implementing community-based management. Informal education management is managed independently by families or the community.

Seventh, the financing standard: the financing standard consists of investment costs, operational costs, and personal costs. The local government is responsible for financing to support the implementation of special service education by its authority. The provincial government helps finance implement culture-based education in education units in formal, nonformal, and informal channels organized by the community. The local government supervises financing assistance. Eighth, assessment standards: educational assessments include: mechanisms, procedures, and assessment instruments of learners' learning outcomes. Assessment is carried out with a continuous evaluation approach. Culture-based Learning in Improving the Quality of Education in Schools and authentic evaluation using various methods. Continuous evaluation is the evaluation of learning outcomes followed by follow-up. Data of learning evaluation results are used as materials to improve the learning program, improve learning weaknesses, and tutor students who need it.
The integration of culture-based education is integrated into learning in the classroom—teachers, in carrying out the learning process, insert material about nationality insights in students. In addition, teachers also apply a culture of habit to students. This integration aims to improve the nationality and culture of students, increase students' awareness to improve manners, and upload in daily life in the community. The existing theory that learning by applying a culture-based curriculum is an absolute thing at any level of education [20]. The idea is appropriate because education without being based on cultural values will not create students who are national and cultured. Therefore, culture-based education in SMP Negeri 3 Banguntapan as a culture-based school is the right step.

The purpose of implementing culture-based education at SMP Negeri 3 Banguntapan is to improve national insight and change the attitudes and behaviors of students to be more positive. The application of a culture-based curriculum can expand students’ knowledge. Students will know the cultural excellence in the community, understand various aspects related to culture. Students will be able to process materials and participate in various activities linked to creative brilliance in order to maintain cultures, traditions, and resources that can compete nationally and internationally. Students are required to love their homeland, have faith in the future, and desire to develop the potential of existing cultures so that the region can grow in line with the needs of globalization and the evolution of the times as a result of the application of culture-based education.

Fig.1. Development of Culture-Based Education in Improving National Insight

Cultural-based education applied in SMP Negeri 3 Banguntapan uses a curriculum that is oriented towards preparing graduates who are national and cultured. That is, each graduate can display behaviors according to the cultural values that develop in society. The culture-based curriculum at SMP Negeri 3 Banguntapan is also a form of curriculum innovation that prioritizes the development of student potential, civilized and dignified, and this culture-based curriculum is associated with the order of humanitarian values prevailing in the community. Local culture or wisdom is traditional customs and customs carried out by people until now still maintained by the community.

In addition, the existence of a culture-based curriculum that is integrated into learning and daily activities in schools is expected to prevent students from entering into the poor cultural environment of the community and have a role in the preservation and development of culture. The hope is that in local culture or wisdom, there is a science that can be used in the development of the country to support national action to be more efficient. Local insight shows the identity of the community's local culture, which is then developed for the community's welfare [21]. Comprehensively the culture-based curriculum combines academic, cognitive aspects with non-academic aspects. Based on the explanation, the basis of integrating a culture-based curriculum in SMP Negeri 3 Banguntapan is the privilege and wealth of values contained in cultural assets.
that include the following. First, noble values are expressed in various artistic expressions placed in every corner of the school, such as hamemayu hayuning Bawana, golong gilig, sawiji, greget, sengguh, ora mingku; and noble values such as spiritual values, personal moral values, social values, and nationalism values are applied in school activities. Second, cultural products or artifacts in the form of cultural artworks and other works are loaded with noble values, including local physical architecture rich with the value of harmony, beauty, and robustness. Third, cultural activities are applied continuously, such as attending cultural festivals and commemorating Pahing Thursday.

The cultural values contained are used to give meaning to a concept and importance in communication between members of the community. Cultural-based learning that is so important in people's lives requires a culture to be a source of values from cultural education and the nation's character. The cultural-based education curriculum is expected to be able and commits to the following, namely, able to identify the right and affordable cultural elements to be an integrated part in education that is managed, design, and implement in earnest a culture-based education curriculum that is by the learners, monitor, assess, and control continuously and the effectiveness and quality of implementation, as well as the results, achieved a culturally-based education curriculum.

4 Conclusion

Culture-based education refers to the juridical basis of cultural education issued by the Yogyakarta Special Region Government, namely Yogyakarta Special Region Regulation No. 5 of 2011 concerning the Implementation of Culture-Based Education and Regulation of the Governor of the Special Region of Yogyakarta No. 68 of 2012 concerning the Application of Noble Cultural Values in the Management and Implementation of Education that serves to preserve the noble values of culture and national insight as most valuable in realizing more meaningful learning and teaching. Efforts to realize a culture-based curriculum as a capital in learning are carried out through various provisions and strategies that ensure the effectiveness of integration of culture-based curriculum must meet several prerequisites, namely the existence of a conducive school climate and the teacher's view that all students can inherit the noble values of culture. While the strategy used in culture-based education at SMP Negeri 3 Banguntapan is implemented through five planned programs, firstly integrated in all subjects, the second is applied in local learning, third, extracurricular activities, the four hidden curriculum programs within the framework of culture-based education can be integrated through daily habituation in schools. fifth, the visualization of a culture-based school is visualized by creating a school branding that shows the school has the uniqueness and excellence of the school.

Acknowledgments. The author would like to thank Dr. Mukhamad Murdiono, M.Pd as a supervisor who patiently and kindly gave direction and guidance for the author in completing this paper. The authors also thanked Yogyakarta State University Postgraduate Program for providing support for the publication of this paper.

References
Strengthening the Character of Independence through Learning Citizenship Education in Networks During the Covid-19 Pandemic

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Abstract: The COVID-19 pandemic has changed various aspects of human life today, especially in the world of education. This requires all elements of education to adapt and continue learning online, especially in PPKn learning. The purpose of this study is to provide an overview of online-based PPKn learning in fostering independent character during the COVID-19 pandemic at Yasmida Ambarawa Middle School. Online learning is an effective solution to reviving classrooms even though learning is not carried out typically, as is usually the case considering the time and place to be at risk during this pandemic. However, it is essential to evaluate this PPKn learning technique according to local conditions. Online learning does not necessarily have adverse effects however, are also positive sides. This is in terms of the independence of students in participating in online-based CPC learning in schools. This study uses a descriptive method with a qualitative approach which, will be reviewed from how to foster an independent character in the Covid-19 pandemic era at Yasmida Ambarawa Middle School.

Keywords: online learning, independent character, pandemic COVID-19

1 Introduction

Coronavirus Disease 2019, also known as COVID-19, has infected millions of people in over 200 countries and caused widespread devastation. The disease, caused by the Severe Acute Respiratory Syndrome Coronavirus 2 or SARS-CoV-2, was first diagnosed on December 31, 2019 in Wuhan, Hubei Province, China, with unexplained pneumonia (Lee, 2020). This case was brought on by the Coronavirus, also known as the COVID-19 is a virus that infects people (Corona Virus Disease-2019). The rapidity with which this virus spreads is one of its characteristics. Based on WHO data, it was found that COVID-19 has become a global pandemic with 29,500,000 confirmed positive cases in 216 countries worldwide (Update: 16-05-2021). Since early March, the Coronavirus has ravaged Indonesia, with 2,120, 000 confirmed positive cases scattered throughout 34 provinces and 415 districts/cities as of September 16, 2020. (Task Force for the Acceleration of Handling COVID-19 Indonesia, 2021). The impact of the COVID-19 pandemic on
several facets of human life has changed, including the current state of schooling, as well as education (Ustin et al, 2016).

In most nations, the situation induced by covid-19 has resulted in the curtailment of activities at all levels of education, forcing residents to retreat to their homes (Faura: 2020). The COVID-19 epidemic necessitates distance learning, which has never been done at the same time. (Sun et al., 2020) for all aspects of education, including students, teachers, and parents. During the COVID-19 epidemic, there were practically universal online learning tendencies (Goldschmidt & Msn, 2020). This is enforced so that all Indonesians can decrease their interactions with one another and maintain a safe distance ( Agustino, 2020; Ahidin. 2020) for all aspects of education, including students, teachers, and parents. During the COVID-19 epidemic, there were practically universal online learning tendencies (Goldschmidt & Msn, 2020). This is enforced so that all Indonesians can decrease their interactions with one another and maintain a safe distance ( Agustino, 2020; Ahidin. 2020), one of which is the disciplined personality. According to this definition, a person with character is someone who strives to improve himself as an individual, as a member of society, as a religious creature, and in connecting with nature. Character is a system for communicating character ideals to the community in general and to students in particular Character education.

The government is responsible for instilling national character values, but all parties, especially formal educational institutions that play a larger role in education, are equally responsible. Given the importance of character development in children, there is a need for character education that is done correctly and responsibly in light of present circumstances. given the current situation Furthermore, educational institutions, particularly schools, are viewed as critical sites for shaping character.

Even if educators and learners are in separate locations, online learning is effective for implementing learning. This may be a solution to the problem of pupils' slow learning. According to Faura (2020), the demands of students with social difficulties or who are in a perilous scenario, such as at this moment, must be met by doing research. Prevention, evaluation, intervention, and follow-up are all part of the process, which is coordinated with educational and community resources. Teachers, students, and parents, on the other hand, have numerous challenges in learning PPKN subjects that are conducted online.

Given SMP Yasmita Ambarawa's location, which is remote from urban regions where the network is difficult to detect, as well as other challenges, By examining the current state of online learning, such as whether online learning, particularly at SMP Yasmita Ambarawa Pringsewu Lampung, can guarantee the formation of an independent character, a number of questions arise, such as whether online learning, particularly at SMP Yasmita Ambarawa Pringsewu Lampung, can guarantee the formation of an independent character? However, in a pandemic like the one we're in today, online PPKn learning is thought to be quite useful. One of them is the development of a self-sufficient personality. Students must be able to complete school tasks and study material on their own at home. Students confront a variety of challenges when carrying out individual work, one of which is difficult to comprehend. Another barrier to online learning is that students are often affected by laziness, causing assignments to be neglected. As a result, teachers must take an active part and fully implement online learning. During this pandemic, students' independence cannot be denied, and the home setting and family environment also have an impact on online
learning performance. The sound of a crowded and noisy house makes it difficult for students to comprehend and absorb the teacher's information.

2 Research Methods

This research employs a descriptive strategy in conjunction with a qualitative approach. In the Covid-19 Pandemic Era, this article shows how Online-based PPKn Learning can help Yasmida Ambarawa Middle School cultivate an autonomous character. This study took place in SMP Yasmida Ambarawa in Lampung's Pringsewu Regency. This study was carried out in the midst of the Covid-19 pandemic that is currently ravaging the homeland. As a result, it was done remotely via an internet technique. The study's research topic was chosen with care, and it was tailored to the study's aims (Sugiyono, 2013: 301).

Teachers of Pancasila and civic education, school principals, and students participated in the study. The data for this study was gathered through interviews and documentation. Primary and secondary data sources were used in this study. The primary data source for this study was data from interviews with informants at Yasmida Ambarawa Middle School, including school principals and PPKn teachers. The participants in this study were eighth-grade students at SMP Yasmida Ambarawa.

3 Results and Discussion

Strategy social removing or physical separating

To utilize Limiting the spread of Coronavirus energizes all components of instruction to actuate classes despite the fact that schools are shut. Shutting schools is the best moderation measure to limit the spread of the plague to youngsters. The arrangement offered is to carry out learning at home by using different supporting offices.

During the Coronavirus pandemic, learning at home or online is an answer for proceeding with the semester, particularly in the PPKn subject, which requires kids consistently to be autonomous. Web based learning is characterized as an information move experience utilizing video, sound, pictures, text correspondence, programming (Basilaia and Kvavadze, 2020), and web network support (Zhu and Liu, 2020).

Offices that help free internet learning through different conversation rooms, for example, Classroom, Whatsapp, Smart Class, Zenius, Quipper and Microsoft (Abidah et al., 2020). Whatsapp highlights incorporate Whatsapp Gathering, which can send instant messages, video pictures, and documents in different configurations to all individuals (Kusuma and Hamidah, 2020). Google Study hall likewise permits instructors and educators to foster inventive learning than the school site. Today, numerous schools are effectively acting by making free advancements by making learning support media in the time of the Coronavirus pandemic.

Based on interviews conducted with resource persons, namely teachers of Pancasila and citizenship education subjects of SMP Yasmida Ambarawa, coded A1, information was obtained that the school implements online learning using school web media specifically designed to make
it easier for students to receive material or as a means of assessment or assessment. For final assessments such as UTS or UAS, the school uses offline media using students going to school but only to take question sheets from Pancasila and citizenship education teachers for the next process to be carried out using online media again. This is done by the school because, according to B1, the school feels important for teachers and students to meet occasionally. Besides that the question sheets given by students can make it easier for the assessment process because the results will be in the form of a photo of the question sheet, which is named along with the students' answers. This is also done to minimize cheating. And According to the resource person A1 in the era of the Covid-19 pandemic, it is very good and effective in implementing an independent character because students are obliged and required to always be accustomed to working on their own at home, with this long process, according to him the independent character will be attached to students then become the character of students the. The school completely upholds this internet learning action for ordinary wellbeing.

Individual B's asset also discovered that the shrewdness underlying the Coronavirus flare-up could act on children's individuals, specifically autonomous individuals, but remember to always keep up with the advancement of understudies in internet comprehension so that qualities are not harmed. Pancasila's worth and character are not forgotten, and the school expects instructors to play an active role in all learning activities, Especially when it comes to learning Pancasila and community training. Educators should deal with their activities in arranging with the multi-skilled and instructional direction group, evaluating the demand and most appropriate mediation modalities for each circumstance. (2020, Faura) However, to ensure that the features and characteristics of Pancasila are not lost, the school requires that instructors have an active role in all learning, particularly in learning Pancasila and urban training. Here, instructors should organize their actions with the multi-skilled and instructive direction group, surveying for each situation the need and most fitting mediation modalities (Faura: 2020) however remember to consistently go with the advancement of understudies in web based realizing so the qualities and characters of Pancasila are not lost, the school requests educators to assume a functioning part in all learning, particularly in learning Pancasila and urban training. Instructors here should deal with their activities in planning with the multi-proficient and instructive direction group, surveying for each situation the need and most suitable mediation modalities (Faura: 2020)

Eye to eye conversations and information move resemble meeting through different free video chat video stages like Zoom and Google Meet. The stage permits instructors and understudies to meet and communicate basically with text offices and show exercises (Wiranda and Adri, 2019). These different administrations can be utilized to help the exchange of information to conversations in regards to learning content. This is additionally done by using all nearby assets broadly, for example, TV slots for schooling (Zhou et al., 2020). In Indonesia, TV on the TVRI channel is utilized to communicate instructive substance broadly. The substance broadcast is arranged dependent fair and square of schooling as per the educational plan in Indonesia.

Media for online learning is used at Yasmida Ambarawa Middle School using the school website, namely and using group WhatsApp and other media such as google classroom. In online learning, there are many obstacles faced by teachers, especially PPKn teachers subjects. According to source A1, the obstacles in online learning are related to the signal network because 70% of Yasmida Ambarawa Middle School students live far from cities so that it is difficult to get a signal network. teachers must be required to be patient and always do the best In online learning,
teachers face many obstacles, especially PPkn subjects. According to source A1, the obstacles in online learning are related to the signal network because 70% of Yasmida Ambarawa Middle School students live far from cities so that it is difficult to get a signal network. So that teachers must be patient and always do the best. In online learning, there are many obstacles faced by teachers, especially teachers in Pancasila and civics education subjects. According to source A1, online learning is related to the signal network because 70% of Yasmida Ambarawa Middle School students live far from cities, it is difficult to get a signal network. So those teachers are required to be patient and always do their best.

Another obstacle or other constraint in online learning, according to resource person B1, is related to data packages (internet quota). The school once provided a free quota of 20GB to students, but it was only given two times due to school funds constraints. The results of the interviews conducted with C1 showed that initially, there were learning difficulties in online learning because learning was ineffective because it was only done on virtual media. Moreover, there is confusion among students in doing their tasks. However, this has become a habit for students to always be independent and explore the material. Students have more time at home with their families to develop an independent character through homework borne by these students. Students independence can be seen in various aspects such as be to do assignments and study material on their own, being able to accommodate time, and being able to organize themselves in order to avoid feeling lazy and always actively accepting material independently. According to Online-based PPkn learning in fostering an independent character in the Covid-19 pandemic era

Character is a unique personality possessed by a person informing mental, moral, and moral values with good character and full of responsibility (Hidayullah. 2010: 14), (Wibowo. 2012: 73). The formation of independent character in students' souls, in essence, can be developed through solid discipline, enthusiasm in carrying out routines and being severe, based on mature religious values by promoting a spirit of togetherness that is full of compassion, simplicity, honesty and a spirit of sincerity (Mangun Budiyanto and Imam Machali. 2014: 108). There is a spirit that is accompanied by self-discipline in accomplishing something with a sense of responsibility for the love and awareness that exists within a person, resulting in the person being deemed to have a good character or personality.

The value of independence is very important to be applied today because if there is no independence of students, students will feel stressed by the pressures they face in line with Mahapatra and Sharma's research (2020) which states that students who are under high pressure are known to face normative stress the ongoing academic demands of the pandemic. The stress experienced by students can disturb and harm the students themselves The value of independence is very important to apply today because if there is no independence of students, students will feel stressed by the pressures they face in line with Mahapatra and Sharma's research (2020) which states that students who are under high pressure are known to face normative stresses. The ongoing academic demands of the pandemic. The stress experienced by students can disturb and harm the students themselves The value of independence is very important to be applied today because if there is no independence of students, students will feel stressed by the pressures they face in line with Mahapatra and Sharma's research (2020) which states that students who are under
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pandemic occurred. The stress experienced by students can disturb and harm the students
themselves.

There are various characters in students. One of the important characters to improve is an
independent character because instilling an independent character from an early age will form
students independent and confident in facing difficulties. Menur Baba (2020), people who are
accustomed to developing with themselves will easily complete lessons quickly and appreciate
themselves more. Jossberger (2011: 22) in his research on independence, said that students who
have independence would succeed in learning. Independent students will be able to plan,
determine, and evaluate learning during theoretical and practical learning so that students are able
to improve their learning performance and be able to achieve good learning achievements
(Rochmah, 2015). Susanto in Rochmah (2015), explains that the success of a child is undergoing
the education process is not determined by IQ (Intelligence Quotient). There are many factors that
influence it, one of which is the student's independent character. Independent students will be able
develop and organize themselves so that the goals they want can be achieved.

Agus Wibowo (Kurniawan Syamsul, 2014: 31) characterizes character training as schooling
that ingrains and creates honorable characters in understudies so they have these respectable
characters, apply and practice in their lives, regardless of whether in the family, as citizenry and
residents. The characters created by the Service of Public Instruction (2010: 9-10) are arranged
into 18 characters. These characters comprise of of Religious, Honesty, Tolerance, Discipline,
Hard Work, Creative, Independent, Democratic, Curiosity, National Spirit, Love the Fatherland,
Respect for Achievement, Friendly / Communicative, Love Peace, Love to Read, Care for the
Environment, Care Social, Responsibility.

In line with him (Parker. 2005: 226). Emotional independence that can control emotions, both
in economic and intellectual independence as well as in social independence. (Sri Arfiah. 2017:
77). The attitude of independence in students will impact changes in attitudes, behavior, and
personality under the demands and needs based on religion. (Yusutria. 2013: 158). So that
independence is an attitude, action and behavior that will bring confidence in your ability to face a
problem and not depend on other parties.

Based on eighteen values of strengthening character education, namely independent character.
Anita Lie and Sarah Prasasti (2004: 2) suggest that independence is the ability to carried out daily
activities or tasks on your own or with a little guidance, according to the stage of development.
During this pandemic, student independence can be seen from how students can complete learning
activities that were originally at home then must be carried out at home and how students can
interpret this independent character according to Hanna Widjaja (Nandang Budiman, 2006: 84), to
handle difficulties without requiring special assistance from others, aversion to being governed by
others, ability to carry out activities alone. The concept of independence, according to Lerner (Nandang Budiman, 2006: 84), comprises the freedom to act, not relying on others, not being influenced by the environment, and being free to handle one's own needs.

This concept is in line with that put forward by Watson and Lindgren (Nandang Budiman, 2006: 84) that independence is the freedom to take initiatives, overcome obstacles, be persistent in business, and do everything by yourself without other people. Meanwhile, Knowles (Syamsul Kurniawan, 2013: 133) explains that students who learn independently should not rely on the assistance, supervision and direction of others, including teachers/instructors continuously.

Thusly it ought to be executed autonomously anyplace, remembering for schools. With the goal that understudies have their imagination and drive and can chip away at their own, alluding to the direction they get. Given that time, area and distance are presently huge issues (Kusuma and Hamidah, 2020). So that distance learning turns into an answer for defeat troubles in executing vis-à-vis learning. Covids are a huge group of infections that cause sickness going from gentle to extreme side effects. Something like two kinds of Covid known to cause sicknesses that can cause serious manifestations like Center East Respiratory Disorder (MERS) and Extreme Intense Respiratory Condition (SARS).

Normal signs and indications of Coronavirus contamination incorporate intense respiratory issues like fever, hack and windedness. The normal hatching period is 5-6 days with the longest brooding time of 14 days. (Yurianto, Ahmad, 2020) The spread of the Covid at first significantly affected the slow monetary world, however presently the effect is likewise being felt by the universe of schooling. The arrangements taken by numerous nations, including Indonesia, by shutting all instructive exercises have made the public authority and related organizations present an option instructive cycle for understudies and understudies who can't do instructive foundations' instructive interaction.

The public authority has spoke to work, study and love from home to lessen the quantity of patients presented to Coronavirus. Minister Nadiem Anwar Makarim gave Roundabout Letter Number 3 of 2020 to the Instruction Unit and Number 36962/MPK.A/HK/2020 concerning Execution of Training in the Covid Illness (Coronavirus) Crisis Period, so learning exercises are done online with regards to anticipation the spread of Covid infection (COVID0-19). (Minister of Education, 2020) With the rise of the Coronavirus pandemic, educating and learning exercises that were initially completed in schools have now become learning at home through on the web. Internet learning is completed by means and models of every one of the approaches set up by the school.

Web based learning can utilize advanced innovation, for example, google classrooms, study houses, zoom, video change, phone or live talk Tnd others. In any case, what should be done is the task of tasks through the checking of tutoring by the educator through the WhatsApp bunch so the youngsters eally learn. The instructor likewise telecommutes in a joint effort with guardians, either through video calls or photographs of youngsters' learning exercises at home to guarantee there is a cooperation between the educator and guardians. A few schools that have not had the option to coordinate web based instructing and learning exercises can foster educator imagination to exploit elective learning media as long as understudies learn at home.

They can utilize existing learning assets, specifically understudy books by the topics instructed by a foreordained timetable. Online-based learning shows consented to arrangements. According to Vicky and Putri, after participating in online learning-based learning, understudies
are more enthusiastic about learning (Wicaksono and Rachmadyanti, 2016). The use of Google Homerooms in elementary schools while keeping traditional learning in mind.

This is a benefit of mixed realizing, which consolidates two traditional and web based learning techniques to cause understudies to feel good and dynamic in building their insight. The review led by Lenny N Rosalin, Deputy Minister of PPPA for the Child Development Sector, likewise showed kids’ assumptions regarding the learning program at home. Youngsters who took an interest in the overview from 29 areas trusted that schools would not give such a large number of tasks and that two-way correspondence among instructors and understudies was felt to be more compelling. (Ade Nasihudin Al Ansori, 2020)

Online learning can be done anywhere and can be done at any time because learning is carried out at home and in the community. Therefore online learning can be carried out properly with adequate facilities such as a stable internet network. The teacher is an important element in boosting the success of online learning by fostering independent learning habits to foster independent character. The current pandemic situation is very meaningful for educators, especially PPKn teachers it is not directly possible for educators to directly develop an independent character in students through independent assignments given by the teacher. Instructors and teachers, as fundamental components in teaching, must embrace an uncommon monstrous turnaround from traditional training, such as eye to eye schooling, to online or distance schooling (Bao, 2020; Basilaia and Kvavadze, 2020), which is supported by sufficient innovative improvements in the current time of mechanical unrest 4.0 (Bao, 2020; Basilaia and Kvavadze, 2020).

4 Conclusion

Online learning is learning carried out online, where students carry out the learning process at home. Online learning can also affect the characterization of students, one of which is an independent character. From the results of the research conducted by researchers, it can be concluded that learning at home or online has many obstacles, namely: the internet network is less stable, the lack of parental attention in guiding the children's learning process at home, the lack of adequate facilities for students and educators, and the lack of qualified innovation for an educator in teaching online. In fostering an independent character, the researcher concluded a strong influence in online learning at home because students were accustomed to working independently at home. With various habits carried out by students at home, the independent character is inherent in the students.

References


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The Quality of Geography Learning during Covid-19 Pandemic in Public Senior High School in Bandung

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Abstract. This paper aims to describe the quality of geography learning during covid-19 pandemic. In covid-19 pandemic period there was transformation of offline learning to be online. Teacher is not only able to teach offline learning, better if they could teach online and also be adapted by students condition. The researcer should look at learning plans, learning implementations, and learning outcomes to measure the quality of geography learning. This research used survey method and statistic presentage. Samples were 8 geography teachers and 94 students 2th grade at social major in 8 public senior high schools in Bandung. The result are 75% school have a high quality, and 25% have a medium quality. In addition, 50% of the learning outcomes have passed and 50% still poor. Development of high quality education must be evaluated by educational units indefinitely. Therefore every teachers have to realize and develop their skills.

Keywords: Education, Learning Quality, Online Learning.

1 Introduction

Learning system in Indonesia is used to have face-to-face meeting between teacher and students. This learning is not only the process of giving knowledge, but also it can be collaborated with the various technologies such as: 1) audio visual, 2) power point, 3) props, 4) printed media, etc [1]. It does not mean offline learning is better than online learning. There needs to be an in depth study of all the participants readiness in do that process. All of the choiches have positive and negative impact for everything. So, it is highly recommended for the government, school, teacher, and parents to always support the government programme or policy especially in the education sector[9].

The education transformation has been changed from offline learning into online learning. In the fact, it has created the extraordinary euphoria[8]. Given the accessibility of technology and information on internet, it becomes an opportunity to optimize the learning that has stopped by Pandemic of Covid-19. Online learning makes a great use of technology and information. Students are given the freedom to study the material independently without going to school[2]. This
advantage should be maximized by students to make online interaction with teacher or their partner to discuss the material without thinking about the location for discussing [4].

However, in the implementation, it has problems, especially in geography subject. According to this research about The Immediate of Covid-19 Postsecondary Teaching and Learning (2020) state that[3]:

“Online assessment can help predict final grades, with a statistically significant correlation between online quizzes taken throughout the course and invigilated final examinations in some cases. There's no evidence that students use emergency situations to get special treatment”.

Directly, students become an object of the success of learning processes that are carried out by teachers during Covid-19 Pandemic [3]. The statement is appropriate that teachers are demanded to be able to fulfill the students’ needs in optimizing their knowledge [6]. The optimizing of learning objectives is used to make the teacher improve their learning quality. The learning quality is the way to reach the expected learning objectives. On the other hand, the learning quality refers to a good and standardized learning experience [10]. According to this research about Developed An Analysis of Teaching as International Action, state that [7]:

“That a teaching action consisted of three steps: (a) selecting a learning to promote; (b) devising a plan to promote that learning; and (c) implementing that plan”.

The statement above become the basic theory of the learning quality. So that, it can be assumed that the learning quality is a learning that is done consciously by paying attention to all inputs, starting from planning according to the context variables, then process variable, and the result of the learning process. So, the assessment will be achieved such as knowledge, skills, and attitude that is in accordance with the standards [10].

2 Research Methods

This research is quantitative with used the descriptive analysis method. Descriptive research is is the research method that pointed for describing real phenomena, in the present or in the past [5]. In the other hand, this research conducted by means of survey, which is one of collecting information about some phenomena that has been occurred in the social area [12]. In carrying out the research of the Geography learning quality during Covid-19 pandemic in Public Senior High School in Bandung, there are three steps that will be implemented by researcher, such as: (1) planning step, (2) survey step, (3) result and analysis step.

Location of this research is Bandung city where has a good developing process in education. The Bandung Government is fully committed in each aspect of education for both students and teacher can be meet their needs. According to the spatial data dissemination of the list of mayoral regulations about PPDB 2016 for Senior High School level, there are consist of 8 zonation, such as:
This reasearch population is according to 8 regional zoning from the whole Public in Senior High School in Bandung. Then, from the whole school, the reasercher determine the student from social major in 2th grade according to each regional zoning to become an reaserch object. The sample is the geography’s teacher and the students. Used the Puropsive sampling technique, which is technique to determine partisipants with some considerations [11]. The following distribution sample of the research:

<table>
<thead>
<tr>
<th>Area Zoning</th>
<th>Teacher Sample</th>
<th>School Name</th>
<th>Student Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Bandung 15 SHS</td>
<td>12</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>Bandung 10 SHS</td>
<td>12</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>Bandung 3 SHS</td>
<td>12</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>Bandung 11 SHS</td>
<td>12</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>Bandung 4 SHS</td>
<td>11</td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>Bandung 13 SHS</td>
<td>11</td>
</tr>
<tr>
<td>G</td>
<td>1</td>
<td>Bandung 12 SHS</td>
<td>12</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>Bandung 23 SHS</td>
<td>12</td>
</tr>
</tbody>
</table>

Variable in this reasearch is used single variable. Sub variable that has determined is according to content standards and curriculum proses standards in the Regulation of the Minister of Education and Culture No. 22 2016. Every school units in Indonesia should has the learning plan. Implementation learning process, also evaluation of learning process, which is used to develope the efficiency and efectivity achievement of expected sincerity competence.
Collecting data technique in this research consist of questionnaire and study documentation. Then, analysis data technique followed by data processing procedures according to approach used. The procedure that used are: (1) checking data, (2) classification data, (3) verification data, (4) analysis data. Then, the research will be used analysis data for statistic percentage test. The value of the percentage will be interpreted by the research by used average percentage conversion according to determine of the scale range by calculating the number of ideal score in each indicators.

Then, the planning classification of learning and the implementation have score range with divided into maximum score and minimum score. These categories, can be showed in this table:

<table>
<thead>
<tr>
<th>Category</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Quality</td>
<td>143 – 210</td>
</tr>
<tr>
<td>Medium Quality</td>
<td>79 – 144</td>
</tr>
<tr>
<td>Poor Quality</td>
<td>13 – 78</td>
</tr>
</tbody>
</table>

The next activity value will be categorized as assessment of the result recapitulation documents collecting mid test scores and final test scores of the students by the geography’s teacher where classify the study completeness according to the average of minimum completeness criteria in the group of Social subject which is 75. The classification consists of categories, that will show below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Average Test Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passed</td>
<td>&gt; 75</td>
</tr>
<tr>
<td>Fair</td>
<td>75</td>
</tr>
<tr>
<td>Poor</td>
<td>&lt; 75</td>
</tr>
</tbody>
</table>

So, we could see from the table about the learning quality that has given by the geography teacher to the students. According to the result of determination scale range about the geography learning quality, there are obtained the average percentage conversion, it will show below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Quality</td>
<td>577 – 786</td>
</tr>
<tr>
<td>Medium Quality</td>
<td>367 – 567</td>
</tr>
<tr>
<td>Poor Quality</td>
<td>157 – 366</td>
</tr>
</tbody>
</table>

3 Results and Discussion

Lesson Planning
According to findings result that has given to 8 geography’s teacher, the research has been classified based on score quality of lesson plan (LP), teaching materials (TM), work sheets (WS), learning media (LM), assessment sheets (AS). It will be shown in the figure below:

![Lesson Planning](image)

**Fig. 2. Lesson Planning.**

**Learning Implementation**

According to findings result that has given to 8 geography’s teacher, the research has been classified based on the score quality of introduction activities (IA), core activities (CA), and closing activities (LA). It will be shown in the figure below:

![Learning Implementation](image)

**Fig. 3. Learning Implementation.**

**Learning Outcomes**

According to findings result that has been done to 94 students in 2nd grades Social Major from 8 schools, the researcher has been classified based on the average scores quality of mid test (MT) and final test (FT). It will be shown in the figure below:
Learning devices planning in this research is used to collect the document of learning devices that has been used by teacher in prepare the learning, after that conducted an assesment based on questionnaire. There are (1) lesson plan, (2) teaching materials, (3) work sheets, (4) learning media, (5) assesment sheets. It will be shown in the figure below:

![Quality of Geography Lesson Planning](image)

Obtained the average score of learning planning from indicators, that has a whole result 185. It means that learning planning by geography’s teacher in Public Senior High School in Bandung has been made with the best categories. A whole teacher could make lesson plan especially in Covid-19 Pandemic with a whole by these has been used components and systematic. Teaching Materials are up to standards based on book standards that has been used by education units. The whole teachers are using printed book and online book or e-book. All of the media has been accordance with the students condition, but only one teacher could engage the students for
implementing the study. Whereas in learning planning, all of the teacher has been accordance the content standards, and the process standards by Permendikbud (2016).

The information of the whole learning devices planning documents by geography's teacher in Public High School Bandung has a high quality. It means that the teacher professionalism in Public Senior High School in Bandung has accomplishments 100%. There are able to make designing of learning devices which is adapted to school and students conditions. Even though, it must be evaluated because the online learning still not finish. It is better to reconsider the learning innovation for online learning. So, the students always be motivated and minimize the boredom when studying in home without give the same material as the offline study.

**Geography Learning Impelmentation in Public Senior High School in Bandung during Covid-19 Pandemic**

The implementation of the learning in this research is doing the questionnaire distribution about implementation of learning that has been implementated by the teacher in achieved the teaching and learning process which is effectively land efficiency. Then, conducted an assessment in each points of questionnaire such as: (1) introduction activities, (2) core activities, (3) closing activities. It will be shown in the figure below:

![Quality of Geography Learning Implementation](image)

Obatined the average of score the geography learning implementation from indicators, and get result 456. It means that learning implementation by geography teacher to students in Public Senior High School in Bandung that has been done with a good categories. There are dominantly geography teacher who has implementated the preliminary activities with sistematic and paying attention to the self readiness and to the students. In addition, half of geography's teacher has been done with core activities. They implementation the 4C learning and an ideal scientific approachement. The last, there is most of the geography's teacher who has been done with closing activities. They are paying attention to the reflection and evaluation.

The information from the whole sequences of implementation learning activities geography's teacher in Public Senior High School in Bandung is 75% has a high quality. It means that still needed in a depth about teaching methode in 21st century, as well as the teaching experience to be
able to adopt openness from the evaluation in the last year. So, it could be expected that 25% teachers who are not optimal in online teaching, they would be always improved their skills and professionalism. Even though, in Covid-19 Pandemic the process of teaching and learning is doing by online. The Learning still should be developed effectively and efficiency in each school especially in Bandung.

The Student's Learning Outcomes in Geography Subject during Covid-19 Pandemic in Public Senior High School in Bandung

The learning outcomes in this research is collecting the documents of mid test and final test from the students in geography subject that has been recaptitulated by geography's teacher. It is for measuring the learning successful. Then, it has been done the classification in each values average from the Senior High School students, it will be shown in the figure below:

![Fig. 7. Quality of Geography Learning Outcomes.](image)

Obtained the average grades of each students which is: the evaluation of mid test and final test from the students in Public Senior High School in Bandung has been obtained the score in a good categories. In addition, obtained the average grades of mid test and final test which is down. Previously, the result of mid test that has been known has average score is 78, than the average score for final test is 74. So, this indicates a decreasing grade by students has been lost for 4 digits. The result has directly proportional to the condition of Covid-19 Pandemic. Whereas the students still have feeling more obstacles in the online learning. The whole information from the learning result of geography subject in Public Senior High School in Bandung has 50% passed and remaining 50% of it has poor. It means that the teacher professionalism should be improved especially in the teaching process. So, it will be expected half of students who is not optimized in learning will improve their ability by the teacher. In addition, the mid test and final test grades that has been decreased should be evaluated for next year. The teacher could minimize a decreasing grade or they will be able to improve student learning outcomes, particularly in geography subject.
4 Conclusion

Learning plans and Learning implementations is one of the unity in measuring the learning quality that has been given to the students. When combining both of quality and integrity, every teachers is expected to not only give the study, but also they can improve their teaching ability and their skill. It means that the 21st-century teachers should have increase and improve their knowledge in this millenniel era. In this research is obtained the information of the 75% geography's teacher in Public Senior High School has a high teaching quality. While 25% has a medium quality of teaching.

Geography study is the result of their final achievement in learning quality based on their grade average. Where the students learning outcomes is reflected to the teacher in their successful teaching process. Characterized by their attitude changes, such as cognitive aspect, psychomotor, and affective. The changing process could be occurred from the simple thing into complex. This research is obtained the information about 50% of the learning outcomes has passed. While the remaining 50% of the learning outcomes has a poor. The development of learning still have to evaluated by educational units. So that, the every teacher should realize and would like to improve their skills to reminder that they have the important position in the learning quality.

References

The Effect Of Technological Pedagogical Content Knowledge (Tpack) On The Geographic Skills Of Bandung City Senior High School Students

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Abstract. The Education is a means to increase the level of human resources; education itself cannot be separated from the role of the teacher as the spearhead to carry out teaching activities. The teacher himself is a significant factor in determining the success or failure of the teaching activity, primarily to determine whether students get the essence of the learning carried out or vice versa. Application of Technological Pedagogical and Content Knowledge (TPACK) is knowledge about facilitating student learning of specific content through an academic approach and technology. TPACK is the knowledge needed so that a prospective physics teacher can use the right technology, which is based on an analysis of the character of the material and an analysis of the pedagogical aspect. TPACK can improve students' skills to enhance geography skills acquired in the learning process based on research. Hence, TPACK is an essential supporting factor in determining whether or not students' geography skills are good. The population in this study was 105 teachers who teach geography in Bandung City Senior High School, using a random sampling technique. The analysis of hypothesis testing that has been carried out results in the finding that TPACK has a positive and significant effect on students' geography skills. These findings can be interpreted that the application of TPACK can improve students' geography skills in the learning process carried out on high school students in the city of Bandung.

Keywords: Technological Pedagogical an

1 Introduction

Geographic thinking competence, especially among formal people who receive geography education, namely students, needs to be carried out and research. The study results will be beneficial for mapping geographical thinking skills among students and are expected to be used as a database for policy formulation, especially geography education policies concerning curriculum and teacher competency standardization. There are four thinking skills (Krulik and Rudnick, 1999, pp. 138-145), namely recall thinking, essential thinking, critical thinking, and creative thinking. Based on the Pedagogical Content Knowledge framework by Shulman (1986, p. 9), TPACK is considered to have a role in advancing the quality of education and knowing the implications of TPACK in the world of education.

Technological Pedagogical and Content Knowledge (TPACK) is knowledge about facilitating student learning of specific content through pedagogic approaches and technology (Mishra and Koehler, 2006; Cox & Graham, 2009; Harris, 2009). TPACK is a complex form of knowledge and is very important for teachers. TPACK is the knowledge needed so that a prospective physics teacher can use the right technology, which is based on an analysis of the character of the material and an analysis of the pedagogical aspect (Mishra and Koehler, 2006). TPACK requires unique multi-interactions and synergies between materials, pedagogy, and technology (Mishra et al., 2008).
2 Literature Review

TPACK is a framework that integrates technological knowledge (Technological Knowledge), pedagogical knowledge (Pedagogy Knowledge), and content knowledge (Content Knowledge) in a learning context (Ariyana, 2018). Content knowledge (Content Knowledge = CK), pedagogical knowledge (Pedagogical knowledge = PK), and technological knowledge (Technological knowledge = TK) in a TPACK framework each have complex interactions. TPACK) (Nurdiani, 2019).

Assessing the TPACK of a teacher in designing learning with technology, an instrument has been developed that includes five indicators (Nurdiani, 2019), namely:
1. Topics to be taught with the help of technology must be identified first, which issues are challenging and easy to teach effectively in class.
2. For learning to be understood by students, teachers must identify which content is challenging to support in traditional ways.
3. Identify teaching strategies that are difficult to implement in traditional ways.
4. Use effective teaching strategies and be able to choose the right computer equipment.
5. Able to combine selected technologies that make learning

The study of geography also provides opportunities for learners to develop their general intellectual skills for lifelong learning and general skills such as critical thinking, communication, information processing, problem-solving, decision making, etc. (Bulter, 2013 p.19). Such concepts and skills are combined in geography for life: National Geographic Content Standards (1994), with an updated 2nd edition released in 2010. Studying the spatial relationships between human and physical systems components is enhanced by using the latest geographic information and the most reliable technology available. Opportunities for students and geographers to observe, synthesize, and present areas and utilize geographic information such as potential areas in the spread of disease, identify market areas, production centers, centers of economic growth, and so on.

In the context of the curriculum, it is known as the geographic approach (Parjito, 2015 p. 248). There are five geography skills, which are intended by the book, namely:
1. Skills in asking geographic questions (asking geographic questions).
2. Skills in obtaining geographic information, visible skills in getting geographic information including finding and collecting data, observing and systematically recording information, reading and interpreting maps and other graphical representations of space and place, interviewing, and using methods statistics.
3. Skills in managing or organizing geographic information.
4. To analyze geographic information, students must examine maps to find and compare spatial patterns and relationships.
5. Ability to answer geographic questions (answering geographic questions).
6. The ability to communicate or inform geographic data (sharing geographic information), that is, students must also understand that there are alternative ways to reach generalizations and conclusions.

3 Results and Discussion

The research method used in this research is to use two research methods, namely descriptive and verification methods. According to Sugiyono (2017:35), verification research is a study aimed at testing theories. The research will try to produce new scientific information, namely the status of the hypothesis in the form of a conclusion, whether an idea is accepted or rejected. The verificative analysis is used in this study to identify and examine the third problem formulation, namely, how much influence the geography teacher's understanding of TPACK has on the students' geography skills.

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. **Technological Pedagogical Content Knowledge (TPACK)**
   (Puspitarini, 2013, hlm. 3)

   1) Topics to be taught with the help of technology must be identified first, which issues are challenging and easy to teach effectively in class.
   2) For learning to be understood by students, teachers must identify which content is challenging to support in traditional ways.
   3) Identify teaching strategies that are difficult to implement in traditional ways.
   4) Use effective teaching strategies and be able to choose the right computer equipment.
   5) Able to combine selected technologies that make learning easier.

2. **Keterampilan Geografi**
   (Irawan, 2019, hlm. 46)

   1) Students’ skills in identifying problems Asking geography questions
   2) Students can collect data, including observations and measurements of geographical phenomena.
   3) Students can organize and process geographic data.
   4) Analyze geographic information to answer questions.
   5) Answering geography questions or solving problems.
   6) Ability to communicate geographic data to friends.

Researchers used the solving method to determine the number of samples to be studied. The method of determining the sample size using the solving method is as follows:

\[
n = \frac{N}{1 + Ne^2}
\]

Where:
- \(n\) = Sample size
- \(N\) = Population size
- \(e^2\) = Error tolerance limit (error tolerance)

Population \(n = 142\) assuming the error rate (e) = 5%, then the number of samples that must be used in this study is:

\[
n = \frac{142}{1 + 142(0.05)^2} = 104.78 \sim 105
\]

Based on the calculation above, it can be obtained the size (n) in this study as many as 105 people will be used as the sample size in the study.

**Hypothesis Testing**

The hypothesis test referred to in this study is to determine whether or not there is an influence on the geography teacher's understanding of TPACK on the students' geography skills. The hypothesis test for this correlation is formulated with the null hypothesis (H₀), and the alternative hypothesis (H₁), the formula for the idea is as follows:

Simultaneous hypothesis testing or F test is used to determine the effect of all independent variables on the dependent variable. The F statistical test shows whether all the independent variables included in the model have a combined effect on the dependent variable. The hypothesis put forward can be described as follows:
H0 There is no effect of understanding the geography teacher's TPACK on students' geography skills in Bandung City High School.
H1 There is an influence on understanding the geography teacher's TPACK on students' geography skills at SMA Bandung City.

Based on these calculations, the distribution of F will be obtained with the numerator (K) and the denominator (n-k-1) with the following conditions:
If Fcount > Ftable, then Ho is rejected, and vice versa, H1 is accepted.
If Fcount < Ftable, then Ho is accepted, and vice versa, H1 is rejected.

4 Conclusion

Based on descriptive analysis, the TPACK variable has an average total in the range of 2.60-3.40, so it can be seen that the TPACK variable is in the poor category, or it can be interpreted that the TPACK framework applied by geography teachers in Bandung City is still in the poor class. In unfavorable conditions, the application of the framework has not been maximally used to learning. Based on the descriptive analysis of the geography skills variable having a total average in the range of 2.60-3.40, it can be seen that the geography skill variable is in the poor category, or it can be interpreted that the geography skills of students in the city of Bandung do not understand and can apply learning that has been given to the way of thinking about geography as a whole and in detail so that students' understanding is more in general terms and is less able to analyze geographic data further. The results of hypothesis testing that have been carried out can be seen that the TPACK framework has a significant and significant effect on students' geography skills in Bandung. This can be interpreted that the TPACK framework used by the teacher in teaching can affect the results of the geography skills of the students taught by the teacher, this condition can mean that if the teacher's TPACK framework is good, the student's geographic skills can give good results and vice versa. Based on the calculation of the coefficient of determination, the TPACK framework's influence is 35% on students' geography skills. It can be said that with this percentage, the TPACK's influence on students' geography skills.

References


Abstract. It is known that regions in Indonesia are still struggling with funding for the handling of road infrastructure. In this case, the company can carry out its social responsibility to the environment through its Corporate Social Responsibility (CSR) program for road infrastructure. The purpose of this study is to identify the factors that support the creation of the company's CSR on regional roads and subsequently compiled them into a model for implementing CSR factors to improve regional routes in the company's environment. The method used is a literature review method that contains information, theories, and concepts. Data collection through questionnaires and the results of the questionnaires are identified using SEM-PLS and subsequently can be helpful to assist in the implementation of CSR.

Keywords: Corporate Social Responsibility, CSR, Road Infrastructure, Implementation Strategy

1 Introduction

One of the problems faced by local governments related to road infrastructure today is funding for road infrastructure development. According to Machmud [1], the pattern of regional development financing still relies on budgets sourced from conventional funds such as taxes and levies. The government still relies on increasing local revenue (PAD) in overcoming the limited development funds. This shows that the provincial government has not been able to finance it. CSR can be used as alternative funding for road infrastructure in the region to overcome this problem of funding road infrastructure.

Corporate Social Responsibility (CSR), according to ISO 26000 in Purnama's [2] link, is the responsibility of an organization for the impact of its decisions and activities on society and the environment, which is manifested in the form of transparent and ethical behavior that is consistent with sustainable development and public welfare; taking into account the interests of stakeholders, by applicable law and consistent with international norms; and integrated into all organizational activities, both activities, products, and services. Meanwhile, Suharto states that CSR is a business operation committed to increasing company profits financially and the region's socio-economic development in a holistic, standardized, and sustainable manner.

The author has conducted a preliminary survey to respondents, namely representatives from the Department of Public Works and Public Housing as a local government, regarding which factors support the implementation of CSR on regional roads.
areas have received CSR funds for road infrastructure. Respondents who have received CSR are described in the table below.

Table 1. Results of a preliminary survey of road lengths funded by CSR.

<table>
<thead>
<tr>
<th>District Code</th>
<th>Island Name</th>
<th>Length of Road Funded by CSR (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>District A</td>
<td>Sumatera</td>
<td>18</td>
</tr>
<tr>
<td>District B</td>
<td>Sumatera</td>
<td>12</td>
</tr>
<tr>
<td>District C</td>
<td>Sumatera</td>
<td>1</td>
</tr>
<tr>
<td>District D</td>
<td>Jawa</td>
<td>1</td>
</tr>
<tr>
<td>District E</td>
<td>Jawa</td>
<td>7.7</td>
</tr>
<tr>
<td>District F</td>
<td>Jawa</td>
<td>3</td>
</tr>
<tr>
<td>District G</td>
<td>Jawa</td>
<td>4.6</td>
</tr>
<tr>
<td>District H</td>
<td>Kalimantan</td>
<td>39</td>
</tr>
<tr>
<td>District I</td>
<td>Sulawesi</td>
<td>4</td>
</tr>
<tr>
<td>District J</td>
<td>Kalimantan</td>
<td>300</td>
</tr>
</tbody>
</table>

Based on the above background, the authors would like to research the strategy for implementing CSR factors on regional roads in Indonesia by taking case examples from 10 regions that have managed CSR programs for road infrastructure.

2 Research Methods

2.1 Research Process

The first research process is a literature study. The variables obtained by the researchers from the results of the literature study were submitted to experts/experts for verification, clarification, and validation. Experts are asked to write comments, responses, and input and add or subtract the proposed variables. The results of the initial expert validation carried out data analysis phase 1 using descriptive analysis. The next stage is data collection. Data collection is done by distributing questionnaires to correspondents regarding the factors in creating road management programs and CSR for regional roads that have been verified, clarified, and validated by experts. This questionnaire will be analyzed using SEM PLS and then produce a model of CSR implementation of companies in Indonesia and the dominant factors of CSR implementation.

2.2 Modelling

The flow of the research process is described in the figure below.

[Diagram of research process flow]

Fig. 1. Phase 1 analysis research process flow.
3 Results and Discussion

3.1 Factors supporting the company’s road handling program and Corporate Social Responsibility (CSR)

Based on the results of expert validation on the factors of creating road infrastructure handling programs and the implementation of CSR, the following results were obtained:

<table>
<thead>
<tr>
<th>Road Management Program Factors</th>
<th>Characteristics</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road conditions</td>
<td>There is a cracked road</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>There is a grooved road.</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>There is a collapse</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>There is a pothole</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>Heavy vehicles (buses, trucks)</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>Two-wheeled motor vehicle (motorcycle)</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td>Policy</td>
<td>Musrembang Kecamatan</td>
<td>Trissiyana [4]</td>
</tr>
<tr>
<td></td>
<td>Musrembang Kabupaten</td>
<td>Trissiyana [4]</td>
</tr>
<tr>
<td>Land Use</td>
<td>Support for agriculture and plantations</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>Education support</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>Support for trade and services</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td></td>
<td>Social and cultural support</td>
<td>Wiyono, Widodo, &amp; Maryuni [3]</td>
</tr>
<tr>
<td>Fund</td>
<td>Budget allocation</td>
<td>Fatan, Purnawan, Patri [5]</td>
</tr>
<tr>
<td></td>
<td>Non-adhesive spills such as oil, wastewater, water, etc. on the pavement surface</td>
<td>Munggarani, N. A &amp; Wibobo, A [6]</td>
</tr>
</tbody>
</table>
### Table 3. Results of CSR factors.

<table>
<thead>
<tr>
<th>CSR Factors</th>
<th>Characteristics</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation</td>
<td>Government regulations</td>
<td>Machmud [1]</td>
</tr>
<tr>
<td></td>
<td>Company regulations</td>
<td>Machmud [1]</td>
</tr>
<tr>
<td>Institutional</td>
<td>Institutions from the government</td>
<td>Aulya, Suryono, &amp; Prasetyo [7]</td>
</tr>
<tr>
<td></td>
<td>Institutional from the company</td>
<td>Aulya, Suryono, &amp; Prasetyo [7]</td>
</tr>
<tr>
<td></td>
<td>Institutions from the community</td>
<td>Aulya, Suryono, &amp; Prasetyo [7]</td>
</tr>
<tr>
<td>Partnership and</td>
<td>Between Government and Companies</td>
<td>Pamungkas [8]</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Between Government and Society</td>
<td>Pamungkas [8]</td>
</tr>
<tr>
<td></td>
<td>Between Companies and Society</td>
<td>Pamungkas [8]</td>
</tr>
<tr>
<td></td>
<td>Transparency of the Company's CSR program policy plans to the Government and the</td>
<td>Majer, M [9]</td>
</tr>
<tr>
<td></td>
<td>Community.</td>
<td></td>
</tr>
<tr>
<td>CSR Program</td>
<td>The geographical location of an area</td>
<td>Sagitaningrum [10]</td>
</tr>
<tr>
<td>Preparation</td>
<td>Social aspects of society</td>
<td>Sagitaningrum [10]</td>
</tr>
<tr>
<td></td>
<td>Community economic aspects</td>
<td>Sagitaningrum [10]</td>
</tr>
<tr>
<td></td>
<td>Cultural aspects of society</td>
<td>Sagitaningrum [10]</td>
</tr>
<tr>
<td>Corporate</td>
<td>Corporate responsibility for the economy of a region</td>
<td>Yakovleva, N &amp; Vazquez, D [11]</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Corporate responsibility to the environment</td>
<td>Yakovleva, N &amp; Vazquez, D [11]</td>
</tr>
<tr>
<td></td>
<td>Company responsibility to the law</td>
<td>Yakovleva, N &amp; Vazquez, D [11]</td>
</tr>
<tr>
<td>Socialization</td>
<td>Socialization about CSR</td>
<td>Pamungkas [9]</td>
</tr>
</tbody>
</table>

#### 3.2 Modeling between road management programs and the Company's CSR towards improving local road handling

The questionnaire results were processed using the SmartPLS application, and the results formed a model of the existing factors. Following are the results of this research modeling using SmartPLS.
Fig. 3. Modeling between road management programs and the Company’s CSR towards improving local road handling.

3.3 The dominant factor of the company's CSR implementation on improving road handling

From the T-test using the SmartPLS application, it can be concluded that the order of factors that influence the implementation of CSR from the most influential is as follows.

1. Institutions from the community
2. Partnership and collaboration between the company and the community
3. Teamwork and cooperation between Government and Companies
4. Company regulations
5. Institutional from the company

4 Conclusion

The T-test and the direct effect test on the SmartPLS application show that the road infrastructure handling program variable significantly affects the road holding improvement variable. Furthermore, the CSR implementation variable has a significant influence on the road infrastructure taking program variable. Meanwhile, the CSR implementation variable has an insignificant effect on the road handling improvement variable.

So this research shows that the implementation of CSR does not need to be made a special regulation by the government. But suppose the government wants to implement CSR to improve road handling. In that case, the government can apply the dominant factors for the creation of
CSR in this research, including create institutions of the community, build partnerships and collaborations between companies and communities, build partnerships and cooperation between the government and companies, make local government regulations and organize the institutions of the company. Suggestions for further research is that the company can be used as a point of view in future research.

References

Character Education Model In Indonesian History
Learning At Islamic Boarding School

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Abstract. The character education model in pesantren-based schools integrates religious values in learning Indonesian history. The purpose of learning Indonesian history is to develop behavior based on values and morals that reflect oneself, society, and the state. In line with this goal, Islamic boarding schools aim to form moral character so that character education is carried out through school culture and classroom culture with the support, cooperation, and commitment of all school members. Character education in learning Indonesian history uses the learning model interactive learning model by discussion, role model (wah) from the Prophet Muhammad using STAF character values (Shiddiq, Tabligh, Amanah, Fathonah), the habituation model (ta’widiyah) refers to the habluminallah habluminannas essential in the form of religious attitudes (relationship with God), responsibility (relating to others), independence (relationships with oneself), and story models (qishshah) contain specific character values according to the material at that time being taught.

Keywords: character, model, education, history learning.

1 Introduction

The development of an increasingly modern era demands changes in human resources, which must also increase. Quality improvement can be seen from the element of competition and one's personality. One way to improve this quality can be pursued through education. By the definition of education that has been formulated in Article 1 of the The National Education System (Sisdiknas) Law of the Republic of Indonesia Number 20 of 2003 is a conscious and planned effort to create a learning environment, the learning process by students actively to develop the potential that exists in himself, and has strength in self-control, personality, intelligence in noble character—then balanced with other skills needed by himself, society, and the economy.1

Therefore, education is designed to produce human resources that are superior in cognitive aspects and excel in behavior with a good spiritual balance. If viewed from this definition, legally formal in the national education system has been designed to educate students and shape their personality and character. Through the 2003 National Education System Law, it is this which then triggers education in Indonesia to form a generation of

people who breathe noble values and religion. Noble values and religion are summarized in a Character Education Program that is packaged lightly in schools.

Generations that excel in intellectuals and religion, need to be prepared carefully. The Character Education Program began with the holding of a workshop on January 14, 2010, which carried the theme "Education for Culture and National Character" as a national movement and, through deliberation, produced an institutional Character Education Program (PPK) that needed to be accommodated in the school system. Character education is accomplished through instilling values in students' behavior through the teaching and learning process in schools, either directly in the classroom or beyond the classroom.

The introduction of character values in the classroom is in one of the subjects, namely Indonesian history. The purpose of learning Indonesian history is to develop behavior based on the values and moral character of self, society and country. Therefore both have the same goal. While the introduction of values outside the classroom is in the school culture. Pesantren-based school culture has advantages, because the knowledge taught to students is given comprehensively which includes cognitive, affective, psychomotor aspects balanced with spiritual excellence. This is reinforced by the opinion that since the character is re-emerged as the main basis of education, the education model in Islamic boarding schools has become the concern of many parties.

Until now, many Islamic boarding schools have officially established schools, such as the Nurul Huda Pringsewu Foundation in Lampung, which has established several schools, including Madrasah Diniyah (MADIN) Nurul Huda, Madrasah Santawiyah (MS) Nurul Huda, Madrasah Aliyah (MA) Nurul Huda and the Nurul Huda Vocational High School (SMK). The goal is to balance developments in education, not to leave when they want to receive an education at a state school level.

The curriculum content that has been specified in the Regulation of the Minister of Religion of the Republic of Indonesia number 13 of 2014 concerning Islamic Religious Education distinguishes learning in Islamic boarding schools from learning in public schools. In addition, the background of the students is also a student. Another element that distinguishes it is the location of the character in particular that is highlighted, namely morals more than others, etiquette towards teachers, clerics, discipline, responsibility, karma whose patterns have been formed and trained in the cottage, will be sharpened again at school through all subjects in class. This is repeated until it forms a unique model.

Interest in studying character education models in Indonesian history learning, especially in pesantren-based madrasas because the dimensions of learning require character values originating from Islamic boarding schools combined with school character policies in subject units. On the other hand, there are indications that the goals of Islamic boarding schools with the aim of learning history both lead to the formation of attitudes and morals of students. For this reason, character education in history learning that is carried out correctly at MA Nurul Huda will give birth to a unique model.

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3 Research Methods

The sort of research used in this study is descriptive. Descriptive study is research that identifies and describes a phenomenon. This study aims to produce an overview of a problem, phenomenon, mechanism of a process and explain a set of images in various aspects. This research uses a qualitative approach. The qualitative method is a research method that generates descriptive data in the form of written or spoken data from people and observable behavior. Qualitative descriptive research aims to dig deeper into information because researchers are the main instrument to obtain and explore data broadly and deeply.

Located at MA Nurul Huda Pringsewu Lampung. The research was conducted from October to December 2020. The data collection techniques in this study consisted of observation, interviews, and documentation. To test the validity of the data in this study using the degree of trust (credibility) and transferability. The data analysis technique used refers to the concept of Milles & Huberman, namely the interactive model in three steps, namely data reduction, data presentation, and conclusion drawing.

4 Results And Discussion

The definition of character in the Big Indonesian Dictionary is psychological, moral, and character traits that distinguish one person from another, both in character and character. Thomas Lickona's concept of character relates to a dependable inner inclination to respond to situations in a morally desirable manner. Then Lickona noted that character, as defined, is made up of three interconnected parts: moral knowing, moral feeling, and moral behavior, implying that character is made up of three aspects: moral knowledge, moral emotions, and moral activity.

Throughout history, essentially, the whole world views education as having two goals: helping humans become intelligent or intelligent (smart) people and helping humans become good people (sound). To make humans clever or intellectual can be easy to do, but making humans into someone excellent and wise seems much more difficult or even very difficult. For this reason, it is necessary to design and stimulate in realizing intelligent people and good people.

To make someone's character good, then Ki Hajar Dewantara also teaches the Tri-Center Education system, namely schools, families, and communities. The concept of the Tri-Center cannot be ignored because the national education system is not placed only in the school environment but also participates in the community that shapes the success and failure of national education. Democracy education is left to teachers and the environment because

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proper teaching sharpens intellectuals and children's mental and spiritual health and physical health scales.\(^\text{11}\)

In line with this opinion, character education occurs in three pillars of education, namely in the education unit, family, and community. In each post of education, there are two types of learning experiences built through intervention and habituation. The intervention develops an atmosphere of learning interaction designed to achieve character building by implementing a structured learning experience. At the same time, habituation creates situations and conditions that allow students to get used to behaving according to their character values. Therefore, pesantren-based education is considered to have fulfilled these elements. Islamic boarding schools provide educational services in terms of religion and become a strategic place to develop character education. Character education in pesantren places more emphasis on building religious character based on the Qur'an and Hadith as well as the role model of the Prophet Muhammad.

A. Character education at MA Nurul Huda

Implementation of character education at MA Nurul Huda through school culture and classroom culture. Modern boarding school-based school culture has the main characteristics that mix and match the two systems. Akhlakul Karimah Education (PAK) coupled with the Strengthening Character Education (PPK) program will create a unique and distinctive model. PAK will look at aspects of worship, aspects of muamalah, educational aspects that are juxtaposed and balanced with the PPK program whose student achievement will be measured intellectually which leads to academic measures.

On PAK, aspects of worship in MA Nurul Huda's culture include congregational prayers for students, duha prayer in the morning during recess, recitations, and other religious activities. The muamalah aspect can be seen from the ukhuwah between students and students, students and teachers, teachers and teachers, teachers and school residents, students, and school residents. The aspect of muamalah in question is related to everything related to the way of life of each other. In addition, the activities of Muslim dress, discipline, social control and speech, set meal times, picketing, sanctions are not spared from a move that will eventually turn into a habit. It shows the details that are designed from the small to the extensive and comprehensive.

The deeper layer is partly in the form of norms of behavior desired and applicable in society, both written and unwritten. Some of the beliefs attached or occurring naturally, such as dishonest words, will result in losing other people's trust. Therefore, understanding a school culture needs a unique approach.

The link between school culture and character education creates a school culture that requires cooperation and is aware that it is not aware of applying character values. This can be seen from the behavior of students both verbally through direct disclosure and in writing. Non-verbal behavior is expressed in behavior such as courtesy, cooperation, harmony, environmental care, honesty, and so on. The implementation of character education through classroom culture is applied through subjects. If viewed specifically, class culture will be formed if the learning carried out occurs in a conducive manner. The implementation of character values in the classroom is contained in activities that can be observed at once but are integrated into several other subjects.

The learning process demonstrates the culture of the class. Indonesian history is one of the subjects that contains character values. Because of Minister of National Education Regulation Number 22 of 2006 addressing content standards, Indonesian history disciplines are also deemed strategic for instilling character qualities, learning Indonesian history has a strategic meaning in character building, nationalism, and patriotism. Starting from the disciplined attitude of entering class, it already reflects a character value inherent in a student because, in a boarding school-based school, a child must be able to manage time from getting up, eating and bathing, waiting for their turn and queuing, so they have to work time to be on time, at school.

This habit will then be brought into the classroom when learning Indonesian history. The process often carried out is that the teacher provides opportunities for students to discuss; in this case, students can apply their time management in processing assignments. This condition can also describe honest, independent, democratic, hard-working, creative, and responsible students and their groups.

The values in the learning opening include religious, disciplined, creative, independent, and communicative. The character values that appear in the processor core of learning carried out in Indonesian History subjects include creative, separate, communicative values, responsibility, curiosity, hard work, tolerance, democracy, and love of reading. Character values that appear in the closing of Indonesian history learning include independence, creativity, task, responsibility, and religious values.

Based on these results, learning Indonesian history has relevance to the objectives of PAK and KDP. This is because learning Indonesian history from opening to closing is a representation of the value of both.

B. The Learning Process of Indonesian History, which contains Character Values

Character education in schools is more related to the cultivation of noble character values. To achieve integral growth in character education, it is necessary to consider various models more effective and efficient. The model of character education in learning is the integration of character values in each subject. Character integration is also referred to as enriching subjects with character values either implicitly or explicitly.

In the 2013 curriculum, history lessons are included in the group of compulsory subjects and specialization. History as a mandatory subject is now labeled "Indonesian History". This Indonesian history subject contains a lot of character values. As emphasized by Permenteknas No. 22 of 2006 concerning the standard content of Indonesian history subjects, Indonesian History subjects have a strategic meaning in shaping the character and civilization of the nation so that it is dignified and forming a sense of nationality and nationalism. In addition, there are many materials containing values and norms that are expressed in the context of everyday life.

Since 2010 the government has implemented character and cultural education programs through the world of education. One of the essential tools in implementing character education is the Indonesian History lesson, according to the 2013 Curriculum. In this scenario,

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Indonesian history has a strategic position that serves as a vehicle in the formation of a noble national character and civilization as well as in the construction of Indonesian people who have a sense of nationality and personality—a love for the homeland.\(^\text{14}\)

Indonesian history learning can be said as a process of activities that encourage and stimulate students to reconstruct and gain historical knowledge, which then occurs a process of internalizing values relating to various aspects of social life, society, and finally bringing students to behavioral changes as a process of developing personality and character.

The method used by the Indonesian history teacher at MA Nurul Huda in integrating character values in learning begins with the preparation of learning tools that contain character values. Carry out teaching and learning activities in the classroom by opening opportunities for the emergence of character values. Teachers also teach their students about social skills, moral discourse, and moral issues in the surrounding environment to increase students' knowledge and analytical abilities.

Based on the observation and analysis of Indonesian history learning tools documents conducted at MA Nurul Huda, the 18 character values will be reflected in the learning process from beginning to end. By the concept of the model, "according to Kesuma et al. in their book "Character Education for Theory and Practice Studies in Schools," in general, there are two models of character education that educators have widely used, namely, substantive and reflective learning. Substantive learning is learning whose substance is directly related to a specific value, while reflective learning is a value that is integrated and attached to the subject.

For this reason, in learning Indonesian history, there is a substantial learning model that starts from the opening of learning that contains religious, discipline, democratic, independent, communicative, responsible, and creative values. The core of education has creative values, curiosity, independence, communication, responsibility, curiosity, hard work, love of reading, tolerance, and democracy. It contains values of autonomy, creativity, love of reading, responsibility, respect for achievement, and religion to close the lesson.

As for some character values, they are not directly in learning Indonesian history, but these values are obtained as wisdom after studying history itself or, in other words, as implied values or reflective models. The form is in the form of moral messages, examples, and also the meaning behind events such as the spirit of nationalism, nationalism, love of peace, care for the environment, care for cleanliness, and care for society.

The researcher wrote down the process, or stages of learning carried out by Indonesian history teachers along with the character values contained in them in outline as follows: (1) the character values contained in the opening of the learning were religious values, disciplined, creativity, creative, self-reliant and communicative; (2) the character values contained in the core of learning are creative, independent, communicative, curiosity, responsibility, hard work, tolerance, democracy, and love to read; (2) the character values contained in the closing of the lesson are independent, creative, reading, responsibility, and religious values.

C. Character Education Models in Islamic Boarding Schools

The model is the implication of a system that describes the actual situation in the sense that the pattern is defined more broadly than the idea of something that has been created or produced in a field of science. So the intended model in this study refers to the shape, design, pattern to present the object of research that can be used as a reference in various activities.

In boarding schools, the character education model applied is closely related to the typology of pesantren—the most prominent education and teaching system in modern Islamic boarding schools in the classical model. The application of the classical model pattern is by establishing schools, both in special groups for learning about religious sciences and sciences that are included in the general category, namely the disciplines of kauni or ijtihad sciences, in the sense that these sciences are the result of the human acquisition and are different from religious knowledge which is tauqifi. In the mind that it is directly determined from the teachings that come from the Qur'an. 

In general, two models in character education have been widely used by educators. The models are substantive learning and reflective learning. Substantive learning is learning whose substance is directly related to a specific value. In contrast, reflective learning is a value integrated and attached to subjects or fields of study at all levels of education. In addition, there is a character education model that can be applied in academic units, namely by habituation, for example, fostering discipline for all school members, giving and punishing, and carrying out learning with various approaches as needed. So the model of character education in schools will be different according to the characteristics and needs of the school.

A model is a form of representation of a particular object or the embodiment of the ideas of a specific phenomenon. The model of character education in Islamic boarding schools is closely related to the typology of Islamic boarding schools, namely the modern Islamic boarding school Nurul Huda Pringsewu. The education and teaching system applied to modern Islamic boarding schools refers to two systems: the school system and the boarding school system. However, formally and non-formally, it leads to the provision of students who have good morals.

The Indonesian history learning model at MA Nurul Huda is interactive learning which refers to discussions During the learning process, students should share and collaborate. Interactive learning promotes debate in order to achieve learning outcomes through interactions between students and teachers, as well as students and students. The interactive model attempts to boost student engagement in learning as well as social understanding between students and their surroundings.

Exemplary is something that deserves to be followed because it contains human values. In essence, humans are leaders or role models who should be imitated and imitated. Exemplary in various aspects, including in worship and general matters. When viewed from the school's perspective as a forum for developing students' character, the teacher is the best figure in the view of students. Exemplary is also supported based on one's awareness of obeying and following what has been taught, exemplified, and carried out by other more influential people. One of the achievements of character education is strongly influenced by the role of the teacher, namely being exemplary behavior, behavior that students will imitate.

This exemplary model includes the behavior, attitudes of all school members in providing examples of good actions so that they are expected to be role models for their students. If teachers and other educators want students to have good character, then teachers and other educators are the first to set an example of behaving and behaving by these values. The specialty of boarding schools based on Islamic boarding schools is that there are examples of Kiai and clerics who influence students' character development. In addition, through this

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exemplary model, the character values of Islamic boarding schools can be integrated by laying the foundations of attitudes consisting of four characters in learning Indonesian history. The character values are sidiq, Amanah, fatonah, and tabligh, which are examples of the perspective of the Prophet Muhammad.

Good *ta’widiyah* (habituation) will forge someone to have noble character. Habituation is something that is deliberately done repeatedly so that something can become a habit. Habituation means experience; what is accustomed is something that is practiced. *Bima karimal* morality is a method of habituation with commendable morals that will bring these hobbies and habits into an inseparable activity from a person and attached to his personality. Habituation carried out at MA Nurul Huda is a scheduled activity or a routine plan divided into daily, weekly, monthly, and yearly activities. Some activities are carried out spontaneously but have been considered as habits, such as visiting sick friends, smiling and greeting, bowing and bowing when walking in front of elders, applying the pesantren tradition, which requires simplicity in appearance, good language, politeness. Polite and so on. Figures that significantly affect habituation in schools are all relevant school members, especially teachers.

The nuance and climate of the pesantren that supports this model is the habituation of good morals which has been stated in the *Santri Trilogy*, namely, *habluminallah* morality to Allah SWT. *Hablumminannas* is morals to others and the environment. To form a religious attitude, responsibility, and independence.

*Qishshah* or stories contain meaning in conveying the subject matter carried out chronologically about the plot. For this reason, stories that are integrated into subjects sourced from the Qur'an and hadith are critical education. The story is adjusted to the theme or chapter of the material to be studied.

Based on the results of observations of these models, the implementation of character education is carried out through three steps, namely through school culture, classroom culture and community cooperation as a support the implementation of character education. Application of character education in Islamic-boarding school are in line with the vision and mission of the cottage by combining the two systems curriculum namely public school curriculum (based on government regulations) and a special curriculum (based on the regulations of the Islamic boarding school). Both of them combined because it leads to the same goal, namely to form good morals good for students. It's just that a model is needed in the application both at MA Nurul Huda.

**5 Conclusion**

The implementation of character education at MA Nurul Huda is carried out through school culture, classroom culture, and community-based. The process of learning Indonesian history contains character values. If analyzed by implementing the opening of learning, core learning, and closing of education, Indonesian history learning has 18 character values substantively and reflectively. The values emphasized by the Indonesian history subject teachers refer to the santri trilogy, namely religious values, responsibility, and independence. The character education model in learning Indonesian history at MA Nurul Huda consists of an interactive learning model through discussion, example (*uswah*), habituation (*ta’widiyah*), and stories (*qishshash*).
Reference

Implementation of Scientific Approach with Video Media in Learning Social Sciences in Elementary Schools

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Abstract. This study aims to develop a lesson plan on the material of economic activities through a scientific approach with video media and explain the influence of the scientific approach on student learning outcomes. The research method used a pre-experimental design with a one-shot case study design. This study’s target was 21 fourth-grade students in Public Elementary School 2 of Tanggeran, Kebumen. For sampling, the purposive technique was employed. The data collection was then conducted through observation, documentation, and written tests. Besides, the data analysis technique utilized descriptive and inferential statistical analysis. This research produced lesson plans based on scientific approaches and video media. Also, it revealed a positive influence on cognitive, affective, and psychomotor learning outcomes, with the completeness achievement of more than 85% of all students. Further, this finding can become a recommendation for teachers to apply a scientific approach with video media in elementary schools.

Keywords: scientific approach, video media, lesson plans, elementary school

1 Introduction

Social science is a simplification or adaptation of social science disciplines and basic human activities, which are organized scientifically for educational purposes [1]. At the elementary school level, social science learning is related to social science disciplines integrated with other knowledge and packaged scientifically for learning purposes [2]. Based on the Competency Standards and Basic Competencies for elementary schools in the Regulation of the Minister of National Education Number 22 of 2006 concerning content standards for elementary and secondary education units, social science is defined as a subject that examines a set of events, facts, concepts, and generalizations related to social issues. The content of social science lessons is designed to develop knowledge, understanding, and analytical skills on the community's social conditions to enter social life [3].

The hope of learning social science is that children become responsible, democratic, and peace-loving citizens [4]. With the existence of social science education, children are expected to have a strong soul and spirit of supporting and carrying out national development. It aligns with the social science learning objectives, namely, to develop basic knowledge and skills useful for students in everyday life and as a provision to continue education to a higher level.
Thus, the goals of social studies education need to be realized by educators to the
t最大限度 so that social studies learning is carried out optimally and in line with expectations.

Considering the purpose and essence of social science education, the implementation of
social science education should prepare, guide, and shape students to master the basic
knowledge, attitudes, values, and skills to live in society. Therefore, teachers are needed to
support the success of educational goals. In this case, teachers must have supporting
competencies. These competencies include pedagogic, personality, social, and professional
competencies [6]. The task of teachers is not only to transmit the knowledge they have to
students [7] but also able to shape the personality of students [8], able to assess the level of
students' abilities [9], and able to master the class well [10]. In addition to teachers, the use of
a learning approach is also required to help teachers realize maximum social science learning.
For this reason, teachers must be able to create interesting learning conditions and learning
processes through the use of approaches to media promotion among students [11].

Based on observations on social science subjects at an elementary school in Kebumen
Regency, it was revealed that there were gaps in the learning process. The gap, among others,
is that the processional ability displayed by the teacher was still standard, and the teacher paid
less attention to the students’ needs in learning. It could be seen in the lesson plans prepared
by teachers, which have not been categorized as good. This category was seen from the
formulation of competency achievement objectives, method selection, teaching and learning
activities, media selection, and selection of learning resources. The observation results also
showed that teachers only used learning resources in the form of books in the classroom.
Whereas in the environment around the school, there were many learning resources and could
be used to support the learning process. By looking at these conditions, the teacher's efforts
that were not optimal would lead to student learning outcomes. Based on the interview results
with classroom teachers, the mean value of social science learning was 67. This value was still
below the good category or the minimum completeness criteria of 75. Therefore, alternative
solutions to problems that occur in the school are needed.

In connection with the above problems, efforts to improve the quality of social science
learning are urgent to be realized. One alternative thought to be a bridge to overcome this
teacher anxiety is implementing a scientific approach in social science learning. Related to
this, the scientific approach is a concept made so that students actively build concepts, laws, or
principles, which are carried out in several stages: observing, formulating problems,
formulating hypotheses, collecting data, analyzing data, drawing conclusions, and
communicating [12]. This opinion is reinforced by previous researchers, who explained that
the use of the scientific method is to explore science to children by providing a systematic way
to attract or involve children in observing, asking, predicting, trying, summarizing, and
conveying results [13]. Thus, the learning atmosphere is expected to be more conducive, fun
and encourage students to discover various discoveries directly through observation.

In addition to employing a scientific approach, media in accordance with the students’
characteristics are needed, one of which is collaborating the scientific approach with video
media. Video is an effective tool to build the learning process. Video media is a non-printed
teaching material that presents moving images accompanied by sound and can directly reach
the students [14]. This media can convey audio-visual-motion messages, just like films and
television. The messages conveyed can provide information, educate, and teach [15].
Therefore, social science learning by applying a scientific approach accompanied by video
media on economic activity materials is expected to encourage students to be more confident,
active, responsible, and develop collaboration skills.
Based on the study of the problems described above, this research implemented a scientific approach with video as a process in a planned and directed manner. For this reason, this research was directed at developing a social science lesson plan with a scientific approach and video media and explaining the influence of a scientific approach on social science learning outcomes. The purpose of this study included developing a social science lesson plan through a scientific approach with video media and explaining the influence of the scientific approach on social science learning outcomes.

2 Research Methods

This pre-experimental design research used a one-shot case study design [16]. This research’s population was fourth-grade students at Public Elementary School 2 of Tanggeran, Kebumen, who studied economic activities. The technique of determining the sample was by purposive sampling. Through this technique, 21 students were determined as the research sample. Data collection techniques then employed test, observation, and documentation techniques, while data analysis techniques utilized descriptive statistics and inferential statistics. Descriptive statistical analysis is a statistic used to analyze data by describing the data collected. This study used descriptive analysis by presenting a table of the findings obtained. Meanwhile, inferential statistical analysis was employed to draw conclusions and make decisions from the results carried out. As for the conclusion, it was information about the influence of the scientific approach with video media on student learning outcomes.

3 Results and Discussion

The lesson plan used applied a scientific approach. This approach is in accordance with a copy of the attachment to the Regulation of the Minister of National Education Number 65 of 2013. In the regulation, the learning steps refer to the scientific approach and character building, primarily in the core activities. The core learning activities in lesson plan 1 are presented in Table 1.

<table>
<thead>
<tr>
<th>Learning steps</th>
<th>Learning activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observing</td>
<td>Observing the teacher's explanation about economic activities in the surrounding environment</td>
</tr>
<tr>
<td>Asking</td>
<td>Asking questions about economic activity</td>
</tr>
<tr>
<td>Collecting data</td>
<td>Gathering information based on videos and books</td>
</tr>
<tr>
<td>Associating</td>
<td>Solving problems by discussing</td>
</tr>
<tr>
<td>Communicating</td>
<td>Presenting the discussion results</td>
</tr>
</tbody>
</table>

Table 1 shows the data of learning steps and activities by applying a scientific approach. Lesson plan 1 has not combined a scientific approach with video media. The steps included observing, asking, collecting data, associating, and communicating. Characters that emerged comprised curiosity, conscientiousness, openness, caring, respect for others, love to socialize,
love to read, discipline, objectivity, and self-confidence. The core learning activities in lesson plan 2 are shown in Table 2.

<table>
<thead>
<tr>
<th>Learning steps</th>
<th>Learning activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observing</td>
<td>Reviewing the discussion results on economic activities that have been observed through video</td>
</tr>
<tr>
<td>Asking</td>
<td>Conducting questions and answers and identifying various economic activities close to the student environment</td>
</tr>
<tr>
<td>Collecting data</td>
<td>Designing simple interview activities, conducting interviews, and recording the interview results with economic actors</td>
</tr>
<tr>
<td>Associating</td>
<td>Processing interview data, answering the subject matter of student worksheets and making conclusions</td>
</tr>
<tr>
<td>Communicating</td>
<td>Reporting and presenting interview results</td>
</tr>
</tbody>
</table>

Table 2 above represents that learning activities have collaborated with video media as a tool to generate student enthusiasm for learning. Each step was associated with a previously observed video (in the first step). The pre-test results of cognitive, affective, and psychomotor learning outcomes before applying the scientific approach were displayed in Table 3.

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>The mean of pre-test</th>
<th>Number of students who completed</th>
<th>Not completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>78.14</td>
<td>47.62%</td>
<td>52.38%</td>
</tr>
<tr>
<td>Affective</td>
<td>81.50</td>
<td>76.19%</td>
<td>23.81%</td>
</tr>
<tr>
<td>Psychomotor</td>
<td>79.50</td>
<td>57.14%</td>
<td>42.86%</td>
</tr>
</tbody>
</table>

Table 3 reveals that not all aspects of cognitive, affective, and psychomotor learning outcomes reached the specified classical completeness, which was 80%. These results were pure results before applying the scientific approach in learning. After the scientific approach was implemented, the post-test results were much better than before. The post-test results on the scientific approach and character-building concerning the cognitive, affective, and psychomotor learning outcomes are exhibited in Table 4.

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>The mean of pre-test</th>
<th>Number of students who completed</th>
<th>Not completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>85.71</td>
<td>85.71%</td>
<td>14.29%</td>
</tr>
<tr>
<td>Affective</td>
<td>87.45</td>
<td>95.24%</td>
<td>4.76%</td>
</tr>
<tr>
<td>Psychomotor</td>
<td>83.57</td>
<td>90.48%</td>
<td>9.48%</td>
</tr>
</tbody>
</table>

From the results in Table 4, it is known that the mean post-test had reached the specified completeness > 80%. The percentage of students who completed was also better than the pre-
test results. The highest mean value was obtained in the affective aspect, with a mean score of 87.45, while the lowest was in the psychomotor aspect at 83.57. In general, all aspects had met the requirements. Thus, it could be concluded that the scientific approach has succeeded in improving students' cognitive, affective, and psychomotor learning outcomes.

Furthermore, the material for economic activities is a science related to social learning in society. This material is not just the mastery of a collection of knowledge in the form of principles, facts, or concepts but is a social science considered a process of acculturating culture with knowledge. In general, social science is taught in schools so that students understand the social science concepts and apply them themselves in solving social problems fully. Besides, nowadays, teachers need to train students to appreciate every kind of activity or one's work. Realizing how crucial this subject is, teachers are expected to choose the proper method or approach to optimize student involvement in the classroom so that the learning is more meaningful for students.

One way to create meaningful learning is to apply a scientific approach. According to Tang et al., the scientific approach directs students to infer problems in the form of problem formulations and hypotheses and teaches good values/characters directly [17]. In its application, students get the opportunity to investigate, search, develop, and report the work [17]. With this investigation, students will be able to think analytically, be honest, disciplined, think creatively and independently. The activity of presenting the work will bring up creative behavior, respect others' achievements, be responsible for their work results, work together, and communicate well. In the end, students will learn to analyze and evaluate the problem-solving process by way of thinking analytically and evaluatively because they have to reflect on their work results with the process they have gone through.

Based on the description of the results, it appears how vital the scientific approach is to be applied in the classroom. It aligns with previous research that the application of a scientific approach can develop various skills, such as critical thinking, communication, cooperation, investigation, and character-building [18]. The learning experiences students pass are useful for their daily lives. Besides, the scientific approach can also raise the natural character of students.

The scientific approach with video media and character building in the material for economic activities is presented as follows:

Observing. The step of observing prioritizes the meaning of the learning process. This finding is supported by previous researchers that the observation step provides benefits to students to observe objects directly or through the media [19]. In this step, the researcher combined video media as a tool. This media has the advantage of presenting moving images with sound. The existence of video media could attract students' attention because it was displayed on LCD and projectors so that they felt like watching television with a widescreen. This observing process could then fulfill students' curiosity [20]. That way, displaying on the LCD screen in the class could attract students' interest to observe and listen carefully. In addition, this study’s results are relevant to previous findings, which proved that the use of video media could improve the behavior of stroke patients [21]. The patient was pleased with the impressions presented via video.

During learning, the teacher facilitated students to observe and trained students to listen and pay attention calmly to the essential things of an object. This observation activity included material on economic activities in the school environment, rural communities, and urban communities. The characters shown by students encompassed curiosity, conscientiousness, and earnestness.
Asking. The teacher provided opportunities for students to ask widely. The material asked was related to things that had been observed, listened to, and read by students through video media. The teacher guided the students to ask questions. It was done so that students were not embarrassed. Through questioning activities, students could develop their curiosity and become more trained to ask questions. This finding is in line with the concept expressed by Ryan and O'Callaghan that the questioning step provides a way for learners to determine hypotheses so that the results asked will not be biased in the end [22]. This question became the basis for seeking further information and various sources determined by the teacher. The characters that emerged were developing creativity, the ability to formulate questions, and lifelong learning.

Collecting data. This activity was carried out to seek information from various sources in several ways. Students could read books, pay attention to phenomena, or conduct experiments. In this learning, the teacher utilized the resources of textbooks, people, and the surrounding environment. The experiences carried out by students in this study are consistent with Hadromi et al. that the step of collecting information is done by determining information from previous questions from various sources, both online and offline [23]. The characters developed included honest, politeness, respect, communication skills, and developing study habits.

Associating/reasoning. It is an information processing activity from the previous stage, either limited to experimental activities or initial observations. Information processing increases the breadth and depth of the material to the processing of information, looking for solutions from various sources. This activity was carried out to find the relationship between some information and the patterned relationship of learning materials with things relevant to real life. The contribution made in this finding is reinforced by previous findings, where the scientific approach allows the involvement of teachers and students and contributes to strengthening students' work skills [24]. This activity continued to conclude learning with a scientific approach. The characters developed consisted of honest, disciplined, obedient, hard work, and thinking inductively and deductively.

Communicating. In the scientific approach with video media, teachers are expected to open opportunities for students to communicate what they have learned. The activities carried out are like writing down or telling what they have found. Delivery was done in class and assessed by the teacher as a result of student or group learning. This stage opens opportunities for students to criticize the presentation results from other students.

In learning the material on economic activities, three learning outcomes were obtained. (1) Attitude; in accordance with the attitude characteristics, then one of the alternatives chosen was the affective process of receiving, carrying out, appreciating, living, and practicing. All activities were focused on character building to encourage students to carry out these activities. (2) Knowledge; the process of acquiring knowledge was carried out by knowing, understanding, applying, analyzing, and creating. The learning characteristics in the realm of knowledge have differences and similarities with the realm of skills. The learning approach was used to encourage students to produce creative and contextual work. (3) Skills were acquired through observing, asking, trying, reasoning, communicating, and conducting experiments. All economic activity materials supported students to carry out a series of these activities.

However, the implementation of a scientific approach with video media needs to follow educational principles. This principle will lead to the achievement of the social science education goals. If all steps in the scientific approach are carried out correctly, student learning outcomes are ensured to be better than before [25]. This statement is evidenced by research
results that student learning outcomes, especially in social science content, have succeeded in increasing students' literacy skills and maximizing the learning process.

The scientific approach is also sufficient to prioritize the way of acquiring knowledge through inquiry. This inquiry strategy is designed to develop students' fluency and accuracy in problem-solving, concept-building, and hypothesis testing. The advantage of the inquiry learning process is that it encourages the growth of cooperative relationships, provides feedback, confirms the time in completing tasks, and develops the ability to formulate problems, analyze data, and conclude [26].

Based on Table 3, it is known that learning to apply a scientific approach could improve student learning outcomes in three domains compared to previous learning. However, this result does not mean that the previous model is ineffective compared to the scientific approach. However, through this approach, students felt more challenged and could grow their bright ideas during problem-solving. The combination of lessons presented in a scientific approach makes teachers and students more creative by providing unusual concepts or ideas. These three aspects are the focus of character education development. Character building through social science is related to the learning design that the teacher creates. Without planning, social science learning will be difficult and unable to grow children's character. The development of a social science learning approach also aims to provide students with a broader and better insight, emphasizing problem syntax, solutions, and consideration of limitations. This goal is in harmony with the previous research results that the development of social science learning models has proven effective in increasing students' knowledge and social attitudes [27].

Further, applying a scientific approach to social science learning as a process of inquiry and character building are two sides of one coin or two mutually reinforcing focuses. In line with Suyanto's findings, the scientific approach carried out according to the correct stages has proven to successfully bring up students' attitudes and characters, such as curiosity, criticalness, innovation, and cooperation [28]. The teacher's performance can also be maximized at every stage because the series of the scientific approach stages are easy to apply. On the other hand, the difficulties experienced can decrease with the learning time. Thus, character education will produce positive attitudes for students in the school environment if carried out consistently [29]. In order for a scientific approach in social science learning to be connected with character education, the involvement of staff, students, teachers, stakeholders, parents, and the community in the school environment is needed.

In addition, there are many reasons why character education needs to be internalized in schools. These reasons include (1) much violence between young people due to weak morals and awareness; (2) inculcating moral values in the younger generation is the primary function of civilization; (3) the role of the school as a mean for character education is needed when many students do not get the attention of their parents; (4) there are still universally accepted moral values; (5) democracy is needed for moral education; (6) effective character education can make schools more civilized, caring, and have good performance [30].

For this reason, the role of educators is crucial. Things that need to be done include (1) teachers must be involved in the learning process [31], (2) teachers interact with students [32], (3) teachers are role models for students in attitude [33], (4) teachers can encourage students to be active in learning [34], (5) Teachers can encourage and create change, (6) Teachers can help students develop social sensitivity and reduce emotions so that they appreciate and develop useful soft skills [35], and (7) the teacher must show love to the students. Character education integrated into science learning can provide meaningful experiences for students because they can understand, internalize, and actualize it through the learning process. This
finding is consistent with previous findings that character education has developed into a part of the curriculum so that learning in schools makes children more comfortable [36]. As a result, these values can be absorbed naturally through daily activities. If the value of character education is developed through school culture, it is possible to develop positive values and attitudes toward developing student character [37]. Hence, character education must be a pioneer and priority because it is proven to bring benefits to children. If character education is not a school program, it is predicted that students will find it difficult to blend in with their environment. It is as researched by Moreno that students with low emotional intelligence have more difficulty responding to problems found in real life [38]. Students also do not care about each other. An example of reality found that students do not want to listen to others’ opinions or suggestions, resulting in difficulties in communicating with others [39]. Character education in schools then becomes a vital need so that the next generation of the nation will be equipped with basic abilities that not only make them life-long learners but also function as positive individuals in their environment [40]. Thus, it is necessary to make instrumental efforts to make learning effective along with positive culture development. In this case, schools are the basis for character development at the formal education level, so that an effective approach or model of character education is needed.

4 Conclusion

This research has developed a lesson plan on the material of economic activities applying a scientific approach with video media and character building. This approach application has been proven to positively affect cognitive, affective, and psychomotor learning outcomes and has achieved the specified classical completeness, which was more than 85% of all students who took part in the learning. The description of the research results that have been discussed can be theoretically implied that the scientific approach application accompanied by media is an alternative approach and suitable to be applied to social science learning. Meanwhile, this research’s practical implications are that social science learning through the scientific approach application with video media at each step can stimulate students' interest and enthusiasm in learning, practice speaking skills, the ability to formulate questions, provide space for opinions, improve students' cooperative attitudes, and practice language skills and systematic thinking. In addition, the success of learning through the scientific approach application with video media can be recommended to other teachers through teacher working group activities, teacher training, education, and other teacher professional development activities.

Acknowledgments. The authors would like to thank the principal, teachers, and students of the State Elementary School 2 Tanggeran who have been willing to become partners in this research.

References

Case Study of The Utilization Zoom Cloud Meeting for Natural Science Learning PGSD STKIP Muhammadiyah Muara Bungo Students

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Abstract. The study aims to increase the use of online learning applications, one of which is using Zoom Cloud Meetings. The zoom cloud meetings application certainly has advantages and disadvantages that users must face. Next, what about the process and online learning products using zoom cloud meetings. This research is qualitative research with a descriptive approach. The subjects in this case study were PGSD level V students and lecturers who taught science learning subjects. The research data were collected through questionnaires, document studies, and interviews. The results showed that online learning made students less competent, the atmosphere of lecture competition was less, the opportunity to ask questions was not used during the lecture process, online lectures technically made it difficult for students to complete college assignments. However, online learning has provided good learning knowledge. Furthermore, for natural science online learning products in the form of a learning implementation plan, several components need to be evaluated to be improved, namely the main material components, learning media, learning steps, and assessment of learning outcomes.

Keywords: Science Learning, Students, Zoom Cloud Meetings

1 Introduction

The Covid-19 pandemic has had an impact on changes in educational activities. The rules and regulations of lectures at regular times must be able to adapt to existing conditions. One of them is that lectures must be carried out from their respective homes online. This is so that the entire campus community avoids crowds to break the chain of transmission of Covid-19. Online learning uses the internet network with accessibility, connectivity, flexibility, and the ability to show various types of learning interactions[1]. This online learning is also felt by all PGSD STKIP Muhammadiyah Muara Bungo students, where they have to undergo online lectures using zoom cloud meetings.

Zoom cloud meetings application is a practical alternative application for cloud-based virtual meeting software used to communicate with many people without meeting in person [2]. One of the features in Zoom can display share screens so that lecturers and students can present lecture
material. However, Zoom itself has a weakness for free use, which is only limited to 40 minutes. So hosts and participants have to rejoin after exiting automatically. According to [3] that there are 46.93% of students in Flores agree with online education based on zoom cloud meetings, and 7.40% of students and disagree 3.17% strongly disagree with online education. They are based on zoom cloud meetings. Some students do not agree because the internet network is less stable, and financial constraints to buy data packages. The above situation is also faced by students here, but it remains the best alternative choice to be used as an application in the lecture process during the covid pandemic.

A high-class science learning course is one of the courses that use zoom for lecture activities. This lecture activity equips students to prepare Learning Implementation Plans (LIP) at the elementary level in grades 4-6, meaning that there are natural products from this lecture, namely the LIP and learning practice videos that students must make. According to [4] that learning to use zoom is effective with a good enough category for students. However, information obtained in the field when online lectures occur, sometimes there is students at the beginning who can join but cannot make it to the end of the lecture or vice versa. Obstacles like that will make students unable to get the whole experience in online studies. As a result, the learning process cannot run optimally.

The reality in the field shows that the use of zoom cloud meetings for online learning depends on its users' support capacity. So each user will get different results. The issue above is what underlies this research: What about the quality of high-class science learning products after using zoom cloud meetings at STKIP Muhammadiyah Muara Bungo?

2 Research Methods

The research carried out includes qualitative descriptive research, meaning that the data obtained will be processed in a description. This descriptive research method is in the form of a case study, namely an activity that examines a problem to describe in detail the background, character, or personality contained in a problem [5]. The subjects in this case study are PGSD students in the fifth semester and lecturers who teach science courses for high-grade students. This case study focuses on examining the process and products of high-grade science learning in the form of a Learning Implementation Plan (LIP). Case study instruments consist of interviews, questionnaires, and document studies. The data obtained will be analyzed and presented textually by the following pounder the existing findings and will be narrated.

3 Results and Discussion

Online learning is an option that must be lived by students during the COVID-19 pandemic. All forms of activities and lecture assignments changed from Offline to Online. This online lecture is implemented to minimize the spread of covid 19 that is currently hitting Indonesia, especially in Bungo Regency. Many applications offer to carry out online learning, one of which is using zoom cloud meetings. Although zoom cloud meetings have advantages and disadvantages, they are still the best choice at STKIP Muhammadiyah Muara Bungo to carry out online learning.

Based on the results of the questionnaire that has been distributed to students as many as 45 students in the fifth semester regarding online learning who take high-class science learning
courses. The results on the flexibility aspect state that online learning gives students the flexibility to attend lectures, this is viewed from their place and remains in accordance with the learning schedule. There are 57.8% who agree with this, and 4.4% strongly agree, while 26.7% disagree and 11.1% disagree. The responses above show that Online learning by using zoom cloud meetings has been chosen because it provides a flexible place. According to [6] that student perceptions related to the use of the zoom application in lectures, 20% of students gave effective lecture responses, 80% said lectures were not effective.

Furthermore, for the aspect of "Online learning provides a highly competitive atmosphere." The questionnaire results showed that students who strongly disagreed were 13%, quite agreed 43.5%, agreed 30.4%, and strongly agreed 13%. This condition is caused by the constraints faced by students significantly affect the learning atmosphere. This was conveyed by the course lecturer, who stated that students' enthusiasm to take part in online learning was there. Still, when the lecture was running, the signal in some places of the students was unstable, plus when there was a power outage so that something is cut off in the middle of the lecture due to receiving an incomplete explanation of the material. According to [7] that 73% of students can understand the given material module with a moderate level of understanding category, 23% have a high level of understanding. Lectures using zoom meetings are considered less effective and make students unable to compete in the learning process, because it is constrained by several things, namely the availability of an unstable internet network [6].

Another aspect that becomes a question in the questionnaire is "Online lectures make me more competent." The results of the responses from students showed that 6.5% strongly disagreed, 43% said they did not agree, 34.8% agreed, and 15.2% strongly agreed. So almost half of the students stated that they disagreed that online learning made them more competent. The level of competence of students should rely on the learning process with their lecturers. Still, students should learn a lot from several sources to gain knowledge independently so that their abilities are increasingly competent. If the learning process only relies on online learning, it will cause students to be passive, less creative, and productive in developing their potential [8]. Increased knowledge of lectures that dare to be assessed at 2.33% is providing experience and knowledge with a relatively sufficient amount, this is due to several factors, namely the willingness to learn and persistence to learn using the application which is still lacking [7].

Evaluation of student competence can be done by providing "the opportunity to ask questions in the lecture process." This is intended to measure the level of knowledge and understanding of the material being taught. Based on the questionnaire given shows that online learning has provided space for students to ask questions. A total of 19.6% stated strongly agree, 39.1% agreed, 37% disagreed, and 4.3% strongly disagreed. The ability to ask questions is closely related to student competence, but this opportunity to ask questions is not used correctly because students are not confident in their abilities. There is a strong relationship between self-confidence and questioning skills [8]. As a result, the misunderstanding experienced by students is not appropriately resolved. This is one of the causes of student competence not increasing.

In line with the findings above, the following statement is "Online Lectures have succeeded in providing good learning knowledge." Responses from students related to this statement, there were 17.4% strongly disagree, 41.3% who stated less agree, 30.4% who agreed, and 10.9% who said strongly agree. Learning activities aim to provide knowledge; whether or not the command is accepted depends on the participants who learn. If someone says that online learning does not provide sound knowledge, this can be caused by not following the whole learning process. So they do not feel the benefits of the learning process that has been observed. Like [8] states, online learning will accumulate many information and concepts, but it is not helpful.
The online lecture process that is carried out dramatically affects the quality of student assignments. There are exciting things to be revealed from the statement on this aspect "Online lectures make it easy for me to complete college assignments." Student responses from the idea that 13% of students strongly disagree, 41.3% disagree, 34.8% agree, and 10.9% strongly disagree. The majority of students stated that online lectures made it difficult for students to complete assignments from the percentage results. The majority of students said that online lectures made it difficult for students to complete projects from the percentage results. In addition, the lack of communication for the learning process with colleagues. In addition, the lack of contact for the learning process with colleagues. So groups that are not presenters cannot coordinate in the same zoom space.

Next, what about the quality of this online learning product. Especially in high-class science learning. The results of the study of documents collected by students show that the product in the form of a Learning Implementation Plan (LIP) produced from online learning is generally by following per under the framework of the Minister of Education and Culture Number 22 of 2016 in which the LIP components include school identity, subject identity or theme/subtheme, class/semester, subject matter, time allocation, learning objectives, essential competencies and indicators of competency achievement, learning materials, teaching methods, learning media, learning resources, learning steps, assessment of learning outcomes. Students must produce lesson plans as potential instructors in order to meet the Basic Competence goal (KD). Furthermore, the appropriate LIP must be able to systematically scenario such that learning is engaging, exciting, enjoyable, demanding, and efficient, motivating students to participate actively, and allowing ample room for initiative, creativity, and independence that support learning.\(^9\).

In addition, the LIP that is prepared must be able to systematically scenario so that learning takes place interactively, inspiring, fun, challenging, efficient, motivating students to participate actively, and providing sufficient space for the initiative, creativity, and independence that supports talents, interests, and development. Physical and psychological \(^10\). Therefore, prospective teachers to be able to develop lesson plans \(^11\).

The results of the LIP correction are very prominent parts, namely the subject matter, learning media, learning steps, and assessment of learning outcomes. The four components are still very lacking. The primary material presented in the lesson plans is not contextual with the current situation. It is still very fixated on the existing handbooks so that the fabric that will be given can be unattractive, and students' creativity is not well-honed. This is in line with the analysis results conducted by \(^12\), where the ability to compose material in lesson plans only reached 60.71%. So the fabric that will be presented in the learning process must be prepared as well as possible to become a good knowledge insight for students.

In addition, learning media and assessment of learning outcomes should receive more attention because there are still many things that need to be improved in this component. In percentage terms, learning media only reached 65%, and the assessment of learning outcomes only got 32.50%. The low percentage of the two components proves that students' abilities must be retrained. Because the components of learning media must be adapted to the material to be taught. Learning media is very important because it will make it easier to convey material and information to be understood by students. In addition, the learning media used in learning will significantly affect learning outcomes \(^13\). And the use of learning media will dramatically help increase learning motivation \(^14\). Given the importance of teaching media in the learning process, it should be for students to design and use learning media by following the materials to be taught and adjust to the steps in their learning. The last component in the spotlight is the assessment of learning outcomes. Assessment is a systematic and continuous process or activity to collect
information about students' processes and learning outcomes to make decisions based on specific criteria and considerations\(^\text{[15]}\). This assessment activity aims to determine the level of success of the teacher in carrying out the learning process and to reflect on the teacher in planning the following learning process\(^\text{[16]}\). However, in this component, many students have not included an instrument for assessing learning outcomes from cognitive, affective, and psychomotor aspects. Assessment of learning outcomes is critical if the lesson plans are not equipped with assessment instruments, the achievement of learning outcomes is not measurable because assessment is a process of measuring the success of the learning process and knowing deficiencies in the learning process as a form of evaluation to improve the quality of further learning.

According to\(^\text{[17]}\) that research instruments can be used to improve the quality of learning outcomes. This agrees with \(\text{Aji}\)^{[18]} that assessment instruments are prepared by meeting good criteria so that learning outcomes can be adequately detected. So the assessment instrument must be made and appropriately arranged to measure the objectives of the learning that has been done.

### 4 Conclusion

Based on the research results from the case study above, it shows that the use of zoom cloud meetings for online science learning that has been implemented has obstacles that must be faced. The constraints faced are in the process and product aspects of the assignment. In the process aspect, online learning makes students less competent, less competitive in lectures, and lacks opportunities to ask questions in the lecture process. However, lectures have succeeded in providing good learning knowledge, but online lectures are technically tricky for students to complete coursework; furthermore, for the online science learning product in the form of a learning implementation plan, several components to be evaluated for improvement, namely the main material component, learning media, learning steps, and assessment of learning outcomes.

### References

\(^1\) Moore J L, Dickson-Deane C, and Galyen K 2011. *E-Learning, online learning, and distance learning environments Are they the same Internet and Higher Education.*


\(^3\) Liu A. N. A. M, and Ilyas I 2020 *Student perceptions in implementing online learning based on zoom cloud meeting students of the university of physics education study program* (Optics: Journal of Physics Education) 4(2), pp 85-90.

\(^4\) Sukawati S 2021 *Utilization of zoom meetings and google classrooms in lesson study (semantic) learning innovation courses.* (Semantik) 10(1) pp 45-54.

\(^5\) Nursalim 2016 *Nursing research methodology* (Jakarta: Salemba Medika Practical Approach Ed 4).


\(^7\) Basori. 2014. *The effectiveness of online learning communication using E-Learning media in automotive body lectures.* JIPTEK 7(2).


Development of Mobile Media “GeMBul” in Science Learning: The Validity and Reliability Study

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Abstract. The development of technology 4.0 affects learning and teaching in schools, especially with the COVID-19 pandemic, which requires teachers and students to use technology. This study aims to develop mobile media on solar and lunar eclipse material, abbreviated as "GeMBul," which can assist teachers in teaching concepts. Students can repeat learning materials anytime and anywhere. The development of mobile media "GeMBul" was developed using the ADDIE model (analysis, design, development, implementation, and evaluation). Validation was carried out by three material experts and one media expert with 78.33 and 76. The mobile media "GeMBul" was valid/feasible to use in science learning. The limited trial of mobile media "GeMBul" to students and teachers obtained 91 and 94 with excellent categories. Reliability data were obtained from a multiple-choice test of conceptual understanding and technological literacy as many as 22 questions to 75 junior high school students in Surabaya. The reliability results stated that the test was declared reliable to measure students' conceptual understanding and literacy with high criteria. The responses of students and teachers to the "GeMBul" application in terms of the practicality of using the "GeMBul" application obtained data that students and teachers stated that the "GeMBul" application was efficient to use in science learning with scores of 83.96 and 90.

Keywords: mobile media, mobile technology, conceptual understanding, technology literacy, science learning

1 Introduction

The rapid development of technology should be a place for teachers and students to improve the quality of education. Children need to be encouraged to be ready to acquire lifelong knowledge and skills in the 21st century [1]. Thus, the integration of technology becomes a must in the learning process. Learning that uses technology assistance in learning has various benefits for students ranging from involvement, comfort, convenience, achievement, and satisfaction [2]. One technology that almost everyone has is mobile. Mobile technology has entered every activity carried out by students or the community. The use of mobile has developed so that the functions of mobile technology are increasingly being used effectively. Mobile technology can be accessed anytime and anywhere. Mobile technology has also entered the realm of education, where the use of mobile technology can develop various ways of student learning both at school, at home, and in the community, interacting with others, sharing information and views, absorbing information from multiple sources, increasing student understanding of concepts, and achievement. Academic students in the learning process [3][4][5].
The use of mobile technology in science learning will also increase students' technological literacy as a form of skill development in the 21st century. One of the 21st-century skills that students must possess is the ability of students to access and use technology in the learning process. Technological literacy is seen as very important considering the increasingly rapid technological developments [6]. Technological developments will affect students' technological literacy in learning, especially during the Corona Virus Disease 2019 (Covid-19) pandemic where face-to-face learning cannot be carried out, so students and teachers are required to be able to carry out technology-based learning (e-learning).

Technological literacy is the ability to use technology effectively in completing required learning tasks [7]. Rapid technological developments will need students to have good technical literacy skills. Therefore, students' literacy skills must be maintained to help achieve learning objectives. Students' specialized literacy skills will lead students to have the ability to adapt, adapt, find and evaluate technology that can be used to achieve learning goals [8].

One way to integrate mobile technology in learning is to apply the learning media needed to help today's learning process, especially during the COVID-19 pandemic. Mobile technology-based media is one of the best solutions considering the very high use of mobile technology among students and teachers. Mobile media in learning can help teachers explain science concepts and improve students' conceptual understanding and technological literacy.

One way to integrate mobile technology in learning is to apply the learning media needed to help today's learning process, especially during the COVID-19 pandemic. Mobile technology-based media is one of the best solutions considering the very high use of mobile technology among students and teachers. Mobile media in learning can help teachers explain science concepts and improve students' conceptual understanding and technological literacy.

2 Research Methods

This study uses the ADDIE development model, namely analysis, design, development, implementation, and evaluation. The model is a more systematic, simple, and interactive process in which each phase integrates and synergizes with each other [9,10]. This article is limited to the development stage and the validity and reliability tests of students' conceptual understanding and technological literacy. The subjects of this study were 7th-grade junior high school students in Surabaya as many as 75 students. Furthermore, validation is carried out by experts by validating the content/material and media from the mobile media “GeMBul”. The data were obtained from the results of the validity and comments given by material and media experts on the "GeMBul" application using a media and material validation questionnaire. The experts who carried out the validity of the "GeMBul" application consisted of 3 material experts and 1 media expert. Reliability data were obtained from the multiple-choice test of conceptual understanding and technological literacy as many as 22 questions and the data were analyzed using SPSS version 26.
3 Results and Discussion

The development of the mobile media "GeMBul" was carried out using the ADDIE development model in science learning at the junior high school level to improve students' conceptual understanding and technological literacy. In this study, it was limited to the development stage because the researchers only looked at the validity of the "GeMBul" application in science learning and the consistency of the conceptual understanding test and technological literacy in measuring students' understanding and literacy levels of the material provided and seeing the responses of teachers and students related to the practicality of using the application. "gamble" in science learning.

3.1 Analysis Stage

The mobile media "GeMBul," which was developed in this study, raised the solar system's subject matter, sub-material of solar and lunar eclipses. Development of mobile media "GeMBul" to improve students' understanding of concepts and technological literacy. The portable media "GeMBul" contains easy-to-access content, is easy to use, and can be used in the form of games that can be played individually and in groups. The development of "GeMBul" mobile media analyzes the curriculum, materials, and student characteristics.

3.1.1 Curriculum Analysis Results

The curriculum used in Indonesia is the 2013 curriculum. Based on the science subject syllabus data, there are core competencies and essential competencies selected in the study, as shown in table 1.

<table>
<thead>
<tr>
<th>Core Competencies</th>
<th>Basic Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Understanding knowledge (factual, conceptual, and procedural) based on curiosity about science, technology, art, culture related to visible phenomena and events</td>
<td>3.11 Understanding the solar system, the rotation and revolution of the earth and moon, and their impact on life on earth</td>
</tr>
<tr>
<td>4. Trying, processing, and presenting in the concrete realm (using, parsing, assembling, modifying, and helping) and the abstract realm (writing, reading, counting, drawing, and composing) according to what is learned in school and other sources in the same perspective.</td>
<td>4.11 Presenting works on the impact of the rotation and revolution of the earth and moon for life on earth based on observations or searches for information sources.</td>
</tr>
</tbody>
</table>

3.1.2 Material Analysis

Based on the core competencies and essential competencies above, they can be broken down into several main topics: the planets, the concept of a solar eclipse, lunar eclipse, telescope, and tides. The primary materials that have been described are made indicators to be achieved,
which aim to focus research on the indicators to be completed in the manufacture of mobile media "GeMBul." The details of the indicators of the selected subject matter can be seen in table 2.

<table>
<thead>
<tr>
<th>Basic Competencies</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.11 Understanding the solar system, the rotation and revolution of the earth and moon, and their impact on life on earth</td>
<td>1. Classify the characteristics of the planets in the solar system</td>
</tr>
<tr>
<td>4.11 Presenting works on the impact of the rotation and revolution of the earth and moon for life on earth based on observations or searches for information sources.</td>
<td>2. Explain the concept of eclipse</td>
</tr>
<tr>
<td></td>
<td>3. Explain the process of the total, ring, and partial solar eclipses</td>
</tr>
<tr>
<td></td>
<td>4. Explain the process of accommodation, partial and penumbral lunar eclipses</td>
</tr>
<tr>
<td></td>
<td>5. Explain about telescope</td>
</tr>
<tr>
<td></td>
<td>6. Describe the position of the sun, moon, and earth during a lunar and solar eclipse</td>
</tr>
<tr>
<td></td>
<td>7. Explain the effects of solar and lunar eclipses</td>
</tr>
</tbody>
</table>

Based on the KD and indicators above, the content/material in the mobile media "GeMBul" is created, improving students' conceptual understanding and literacy in science concepts. The material/content in educational media must pay attention to the content provided to students so that it is exciting and can be played by students [11].

3.1.3 Analysis of Student Characteristics

Analysis of student characteristics was carried out by interviewing via WhatsApp (WA) with teachers in the classroom. Based on the results of interviews obtained, in learning, students tend to be passive, only listen to the teacher's explanation, lack motivation in online learning. Internet signal is also one of the reasons why students sometimes don't attend lessons while online. Besides that, the teacher also explained the effect of cell phones on students because, during the pandemic, students studied more online and played more games than at home. The teacher also found that students answered the questions correctly when the individual material exams were conducted online. But when the school's midterm exams held offline exams, it was found that there were still many students who did not understand the material presented. The teacher suspects this is because students can copy answers via the Internet, not the results of students' understanding.

In addition, students' character at the seventh grade of junior high school is a transitional age where students are more likely to like to play and practice hands-on. The development of technology also makes teenagers dependent on the Internet and online games [12]. Students' varied learning styles are also a challenge for teachers in conveying solar and lunar eclipses both online and online the tendency of students to learn when learning is considered attractive by them.

3.2 Design Stage

The mobile media "GeMBul" developed is a game-based media that is expected to increase students' understanding of concepts and technological literacy. Previous research has shown that
Game-based learning can increase motivation, student engagement [13], effectively used in education [14], and improve students' learning attitudes, achievement, and self-confidence [15]. The developed mobile media "GeMBul" also contains evaluations that can measure students' conceptual understanding. According to [16], it is essential to include assessment in game-based learning to show the achievements in the teaching. The "GeMBul" mobile media design made by researchers can be seen in Figure 1.

![Game-based learning media](image)

Fig. 1. (a) "GeMBul" cover design (b) KD Design and Indicators and Learning menus (c) Key Functions on "GemBul" media

### 3.3 Development Stage

Development is carried out according to the design carried out. However, in the process, the researchers made changes to the layout and background of the "GeMBul" application to make it look attractive to students. The results of the development of the "GeMBul" application media can be seen in Figure 2.
3.4 Validation of “GeMBul” mobile media by experts

The “GeMBul” mobile media created and tested and has passed the repair and refinement stage is validated by material and media experts. The "GeMBul" media was validated by three material experts and one media expert to be used in learning. The results of the validation of the experts can be seen in table 3. and table 4.

3.4.1 Material expert validation results

Three validators carried out material expert validation with the results of the validators being seen in table 3.

<table>
<thead>
<tr>
<th>No</th>
<th>Name Validator</th>
<th>Eligibility Percentage (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Validator 1</td>
<td>75</td>
<td>Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Validator 2</td>
<td>86</td>
<td>Very Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Validator 3</td>
<td>74</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td><strong>Rata-rata</strong></td>
<td><strong>78.33</strong></td>
<td><strong>Valid</strong></td>
</tr>
</tbody>
</table>

Based on the results of material expert validation, it was concluded that the content contained in the "GeMBul" application was suitable for use by users.
3.4.2 Media Expert Validation Results
One validator carried out media expert validation with the results of the validator can be seen in Table 4.

<table>
<thead>
<tr>
<th>No</th>
<th>Name Validator</th>
<th>Eligibility Percentage (%)</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Validator 1</td>
<td>76</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Based on the results of media expert validation, it was concluded that the "GeMBul" application media was suitable for use by users.

3.5 Reliability of mobile media "GeMBul."

The development of the mobile media "GeMBul" is carried out to improve students' conceptual understanding and technological literacy. Concept understanding and specialized literacy tests were made to measure students' abilities before and after using the mobile media "GeMBul" in science learning. Before the "GeMBul" mobile media reliability test was carried out, an examination of the difficulty level of the questions and the differentiating power of the questions was conducted. The story of difficulty test is carried out to see the proportion of inquiries made in complex, medium, and accessible categories. At the same time, the Distinguishing Power or the discrimination index to see and distinguish between the intelligent group and the group that is somewhat lacking with the decision criteria presented in the table. The analysis of the IBM SPSS version 26 differentiating power and the level of difficulty of the technology literacy test and understanding concepts can be seen in Tables 5 and 6.

Table 5. Criteria for Question Difficulty Level [17]

<table>
<thead>
<tr>
<th>Range Koefisien</th>
<th>Kriteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,00-0,30</td>
<td>Hard</td>
</tr>
<tr>
<td>0,31-0,70</td>
<td>Medium</td>
</tr>
<tr>
<td>0,71-1,00</td>
<td>Easy</td>
</tr>
</tbody>
</table>

Table 6. Discriminating Power Criteria [17]

<table>
<thead>
<tr>
<th>Range Koefisien</th>
<th>Kriteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,00-0,20</td>
<td>Ugly</td>
</tr>
<tr>
<td>0,21-0,40</td>
<td>Enough</td>
</tr>
<tr>
<td>0,41-0,70</td>
<td>Good</td>
</tr>
<tr>
<td>0,71-1,00</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Table 7. Result of SPSS Results of Discriminating Power and Difficulty Level of Technology Literacy Test and Concept Understanding

<table>
<thead>
<tr>
<th>No</th>
<th>Discriminating Power</th>
<th>Difficulty Level</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technology Literacy

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Criteria</th>
<th>Value</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.</td>
<td>.306</td>
<td>Enough</td>
<td>.82</td>
<td>Easy</td>
</tr>
<tr>
<td>23.</td>
<td>.257</td>
<td>Enough</td>
<td>.87</td>
<td>Easy</td>
</tr>
<tr>
<td>24.</td>
<td>.385</td>
<td>Enough</td>
<td>.71</td>
<td>Easy</td>
</tr>
<tr>
<td>25.</td>
<td>.347</td>
<td>Enough</td>
<td>.83</td>
<td>Easy</td>
</tr>
<tr>
<td>26.</td>
<td>.168</td>
<td>Ugly</td>
<td>.47</td>
<td>Medium</td>
</tr>
<tr>
<td>27.</td>
<td>.332</td>
<td>Enough</td>
<td>.50</td>
<td>Medium</td>
</tr>
<tr>
<td>28.</td>
<td>.423</td>
<td>Good</td>
<td>.59</td>
<td>Medium</td>
</tr>
<tr>
<td>29.</td>
<td>.305</td>
<td>Enough</td>
<td>.62</td>
<td>Medium</td>
</tr>
<tr>
<td>30.</td>
<td>-.075</td>
<td>Ugly</td>
<td>.38</td>
<td>Medium</td>
</tr>
<tr>
<td>31.</td>
<td>.396</td>
<td>Enough</td>
<td>.55</td>
<td>Medium</td>
</tr>
<tr>
<td>32.</td>
<td>.339</td>
<td>Enough</td>
<td>.45</td>
<td>Medium</td>
</tr>
<tr>
<td>33.</td>
<td>.478</td>
<td>Good</td>
<td>.76</td>
<td>Easy</td>
</tr>
</tbody>
</table>

### Concept Understanding

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Criteria</th>
<th>Value</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.</td>
<td>.360</td>
<td>Enough</td>
<td>.50</td>
<td>Medium</td>
</tr>
<tr>
<td>23.</td>
<td>.523</td>
<td>Good</td>
<td>.68</td>
<td>Medium</td>
</tr>
<tr>
<td>24.</td>
<td>.231</td>
<td>Enough</td>
<td>.43</td>
<td>Medium</td>
</tr>
<tr>
<td>25.</td>
<td>.218</td>
<td>Enough</td>
<td>.78</td>
<td>Easy</td>
</tr>
<tr>
<td>26.</td>
<td>.399</td>
<td>Enough</td>
<td>.80</td>
<td>Easy</td>
</tr>
<tr>
<td>27.</td>
<td>.364</td>
<td>Enough</td>
<td>.58</td>
<td>Medium</td>
</tr>
<tr>
<td>28.</td>
<td>.422</td>
<td>Good</td>
<td>.59</td>
<td>Medium</td>
</tr>
<tr>
<td>29.</td>
<td>.442</td>
<td>Good</td>
<td>.46</td>
<td>Medium</td>
</tr>
<tr>
<td>30.</td>
<td>.572</td>
<td>Good</td>
<td>.55</td>
<td>Medium</td>
</tr>
<tr>
<td>31.</td>
<td>.246</td>
<td>Enough</td>
<td>.37</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Based on table 7, information is obtained that the test results of technological literacy questions are 12 questions; two questions cannot measure students’ technological literacy because they are in the wrong and easy category. The technological literacy questions used for this research are ten questions. Furthermore, ten questions on the conceptual understanding test can measure the students’ overall conceptual understanding ability. Moreover, the instrument test results are processed by obtaining a reliability index and then interpreted. The interpretation of the reliability index can be made based on the following table 8.

<table>
<thead>
<tr>
<th>Coefficient Range</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.81-1.00</td>
<td>Very high</td>
</tr>
<tr>
<td>0.61-0.80</td>
<td>High</td>
</tr>
<tr>
<td>0.41-0.60</td>
<td>Enough / Moderate</td>
</tr>
<tr>
<td>0.21-0.40</td>
<td>Low</td>
</tr>
<tr>
<td>0.00-0.20</td>
<td>Very low</td>
</tr>
</tbody>
</table>

An instrument is reliable if the reliability is above the table at a significance level of 5% [17]. The results of the reliability analysis of conceptual understanding and technological literacy are presented in table 9.

<table>
<thead>
<tr>
<th>Concept Understanding</th>
<th>Reliability Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach's Alpha</td>
<td>N of Items</td>
</tr>
<tr>
<td>.658</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technological Literacy</th>
<th>Reliability Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach's Alpha</td>
<td>N of Items</td>
</tr>
<tr>
<td>.717</td>
<td>10</td>
</tr>
</tbody>
</table>

Based on table 9, it can be concluded that the student’s concept understanding and technological literacy test questions are reliable and suitable to be used to measure students’ conceptual understanding and technical literacy skills.

3.6 Teacher and Student Responses

Student and Teacher Responses to the Practicality of Mobile Media "GeMBul," which was developed in science learning, can be seen from the questionnaires that the researchers distributed to students and teachers. The practicality of the generated mobile media "GeMBul" can be seen in tables 10 and 11.

<table>
<thead>
<tr>
<th>Table 10. Results of Student and Teacher Responses to the Practicality of “GeMBul” Mobile Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Aspect</td>
</tr>
<tr>
<td>Score</td>
</tr>
<tr>
<td>374</td>
</tr>
</tbody>
</table>
The practicality of mobile media "GeMBul" is to see the usefulness of using mobile media "GeMBul" in science learning for class VII. Suitability was analyzed using the average score of the questionnaire distributed to 17 students and one teacher of 83.96 and 90 with a convenient category (V> 80). Judging from the comparison of each aspect of the assessment to the teacher, namely the ease of using mobile media "GeMBul" in learning of 87.06 with efficient criteria, the element of increasing student interest and motivation when used in learning both individually and in class is 71.76 with practical measures, the pапапа element is used for individual learning by students is 76.47 with helpful categories, aspects that can be used as teaching aids for teachers are 74.12 with practical criteria, aspects of Assisting students in understanding the concept of solar and lunar eclipses and their impact on the earth is 85.88 with efficient measures and media factors "GeMBul" which was developed according to the characteristics of the seventh-grade junior high school students of 78.82 with practical actions. Based on the results of practicality carried out on students and teachers, it can be concluded that the media developed is very practical to be used by students and teachers.

Mobile media "GeMBul" can help increase students' interest and motivation when used in individual learning and in the classroom to get responses from students that can increase student interest and motivation. This can be seen from the comments given by students in the distributed questionnaires. The results of previous studies stated that implementing a mobile app can increase student motivation in learning, namely research conducted by [18][19][20][21]. Mobile media "GeMBul" can be used for individual learning by students getting responses from students and teachers that it is practical to operate both individually. The portable media "GeMBul" development was compiled and developed to be used separately or in groups. The design used by the "GeMBul" media car, which can be used offline, can support students to study independently at home and can access learning materials anytime and anywhere [22], which are not limited by space and networks. Internet. In line with the opinion [23], said that android-based learning can facilitate students who not only learn with content quickly but can also improve students' mobile learning performance, such as problem-based learning, knowledge construction tools (e.g., concept maps), discussion issue-based, collaborative learning, inquiry-based learning design, project-based learning, peer-assessment strategies, and digital storytelling.
Furthermore, it can be used as a teaching aid for teachers to get an efficient response used by teachers in learning. This means both teachers and students say that the mobile media "GeMBul" can be a choice of android-based media that can be used in teacher teaching in improving student learning outcomes. This is in line with the opinion [24], which says that teachers can use mobile technology to facilitate the development and practice of student skills. So that not only can teachers benefit from mobile technology, but students can also develop their skills and knowledge. "GeMBul" mobile media can also help students understand the concept of solar and lunar eclipses and their impact on the earth, getting responses from students and teachers that students gain a better understanding after using. "GeMBul" mobile media. Finally, the "GeMBul" media was developed according to the characteristics of the seventh-grade junior high school students who received responses from students and teachers who stated that the "GeMBul" media agreed that the "GeMBul" mobile media was under the characteristics of students. Before developing the mobile media 'GeMBul', researchers had analyzed the factors of junior high school students so that their mobiles were designed according to the characteristics of students so that they could facilitate the development and abilities of students.

4 Conclusion

Based on the validity, reliability, and questionnaire responses of students and teachers to the mobile media "GeMBul" in science learning, it is concluded that the portable media "GeMBul" is valid, reliable, and practical to use in education. With the ease of using "GeMBul" mobile media in science learning, most students and teachers believe that using "GeMBul" mobile media is efficient to use. Students and teachers argue that the menus and buttons contained in the media provide convenience for students and teachers in accessing learning materials included in the "GeMBul" application. In addition, the "GeMBul" application can be a choice of educational games in learning that can increase students' enthusiasm for learning. Based on the explanation above, the researcher can recommend that the mobile media "GeMBul" can be a choice of mobile media that can be used by teachers and students in improving students' conceptual understanding and technological literacy. The portable media "GeMBul" has the advantage that it can be accessed anytime and anywhere without an internet network for all Android smartphones. Further research can develop mobile media for other learning materials. Mobile media can be developed based on Android or iOS and based on 3D so that it is easier for students to understand concepts.

Acknowledgment. The author would like to thank the Education Fund Management Institute (LPDP) for providing financial support in carrying out research conducted by researchers.
References

[22] Ferreira MJ, Moreira F, Pereira CS, Durão N. The Role of Mobile Technologies in the Teaching /


**Abstract.** This study aimed to assess the proportion of establishing and running Instagram content using #belajarbahasainggris, which translates to #learningEnglishlanguage. We also aimed to determine the English learning content and English language business. The article used the #belajarbahasainggris hashtag in the search feature in the Instagram application to locate and identify 362,089 posts. The report then analyzed and classified the first 100 posts into being either educational or marketing content. Marketing content signifies educational content that implicitly or explicitly encourages the public to buy a product or service even though it looks like educational content. The analysis found that the majority of the content was marketing content. It acknowledges the media literacy of the stakeholder in Indonesia who prefer to consume educational content compared to marketing content. Further research is needed to evaluate the effectiveness of this interactivity against other types of academic content initiatives in social media.

**Keywords:** Instagram, English language, English language learning, hashtag, marketing content.

1 Introduction

There has been a surge of interest in English language learning in Indonesia during the last decades since English is a compulsory subject in Indonesia [1]. However, the reality is not as promising as Indonesia falls behind other non-English speaking countries; Indonesia is ranked low at 74 out of 100 countries [2]. English language for Indonesian continues as an important language for business, technology, and education. One of the languages earning platforms for modern learners is social media which relates to the technological advancement in Indonesia with 170 million social media users [3] since Indonesians are early adopters of technology [4], smartphone as the primary device to access social media [5]–[7].

In Indonesia, at least four social media platforms have been utilized as communication space for various aspects of Indonesian society; politics, social, religion, business, and information sharing [8], [9]. Instagram falls under the image and video social networking sites, and most of the posts contain a stream of photographs documenting and exhibiting the user's daily life [10]–[12]. Also, Instagram has been used as an educational and knowledge acquisition source [13]. Unfortunately, resources readily accessible by users in Instagram has created promising marketing and advertising space as well which diluted the educational content for
users who has educational motive using Instagram. Using Instagram with knowledge acquisition motives positively affects social media use when analyzing and studying social media. In addition, most studies in social media impact the unappreciated positive side of the discussion while underlining the fact that social media is underutilized and the negative side [14]–[16]. The drive to pour more positive content while negative, hoax, and ethical violation content competing have undoubtedly led to trust in users searching for knowledge, information, and inspiration in Instagram, consequently extending their existence. One of the knowledges gained from social media is language learning. Indonesians learn English as a second language from social media as Instagram utilized photos and videos as the prominent underlining uniqueness.

The main objective of this study was to assess the proportion of educational content in the English language compared to English language marketing and advertising content. Additionally, several hashtags were analyzed to validate content concentrations.

2 Research Methods

A data selection of several specific hashtags was conducted at the Instagram search feature, which is the primary function of gathering posts from this social media platform. Hashtags were preferred to collect the possibly sizable volume of content using Indonesian words; #belajarbahasainggris (learn the English language), #belajarenglish (learn English), and #belajarbahasainggrismudah (learn the English language easy). #belajarbahasainggris hashtag was chosen because of the most significant volume of posts (362,089 posts). This data-gathering process was finalized in June 2021. The total data then were reduced to 100 first posts. Data were categorized for educational content and marketing content and followed up to the analysis process.

Analysis of data categorized video and photo posts into business and educational content against academic standards according to the credibility of sources [17]. While marketing content was posted by an institution or person who sells products or services related to English language products, educational content was mainly posted by a peer who has skills or sharing the educational journey with other Instagram users. The first 100 posts were collected from the standard Instagram search feature where it divides into the recent and top posts. This study explored the recent section post, started from June 30, 2021, and continued to later posts until 100 posts were collected and analyzed.

3 Results and Discussion

One hundred posts were able to generate a consensus that content is divided into two categories according to the aim of the study. In contrast, the data analysis found of the 100 #belajarbahasainggris posts, 23 were educational, and 77 were categorized as business content. The systematic breakdown of the first 100 posts can be viewed in Table 1. The posts were a mix of video and photo posts. The type of the post varies from introductory photo post and carousel. Video posts mostly covered a closeup of a person while explaining a specific English language topic in Indonesian. This study gave a picture of a category that describes which positions can be consumed by Instagram users for education and which posts might be educational and contain marketing purposes.
Table 1. Data from the first 100 posts from #belajarbahasainggris.

<table>
<thead>
<tr>
<th>Post</th>
<th>Quantity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing content</td>
<td>77</td>
<td>Sell product/service</td>
</tr>
<tr>
<td>Educational content</td>
<td>23</td>
<td>Post educational content without selling any product or service</td>
</tr>
</tbody>
</table>

Good use of Instagram features by content creator using the hashtag #belajarbahasainggris was the carousel, video, stories, and hyperlink username. The intention of getting views and likes made the content creators used all the features available. A carousel is a post on Instagram where users can place multiple photos or videos in one position and can be viewed by swipe and click the left button on the seat. While video post can be identified by a button-shaped as filled triangle arrow facing right located at the top right or middle of thumbnail referring to play button, the carousel post can be identified by a button-shaped as two filled squares stacked on top of each other. The video post can be seen in Figure 2 and the primary photo post in Figure 3. The introductory photo post does not have any button on the post thumbnail. As seen in Figure 1, the carousel post typically can be swiped left or clicked next arrow to open the following content in the center.

This carousel is used widely in the data where content creators can finish one topic as a comprehensive learning material in one post. Diverse topics used carousel post including word of the week; daily habit led to English acquisition, word synonym, slang words, article, action verbs, and many more.

Fig. 1. Carousel post.
3.1 Marketing content

This study indicates that marketing content is the majority of collected data—marketing content in this context aimed to encourage other users to buy products or services offered. Through enticing content with the right image, design, and logo, educational information is also used more often as the soft selling approach. However, the marketing content is categorized from academic content, looking at the content sources from their username, bio, and a sales pitch in the post. For example, a username, @agc_ourse, might sell an English course, but the analysis stage digs deeper into their bio section and another post.

This study confirms that marketing content usual marketing content, including educational information, are adapted to their posts. Then, marketing content reported information associated with product and service from the institution or language firm, allowing the other users to point out that data mostly leads to buying a product or service. This study result suggests that for some
Instagram users, marketing content is a blatant sales pitch. Creating exciting content that inviting views is the skills and creativity demanded by literate social media users and one of the benchmarks that will win the business area’s competition. Most marketing contents used attractive graphic design and a well-thought layout. In terms of marketing content using educational information, the data shows that Instagram business account in this niche applied more informational content that explicitly stated the product or service they sell with a more hard selling approach.

3.2 Educational content

Integrating the findings from this study, the data suggest that educational content within the #belajarbahasainggris hashtag in Instagram most reinforced the posts showing individuals or institutions without selling any English product or service contributing to the overall content. A few posts where random accounts used this hashtag to engage with the niche contributed to incidental unrelated English language learning. There was even a foreign account with questionable intentions that used the hashtag. Also, none of the posts categorized in educational content sell any English language learning product or service. Nonetheless, the hashtag has been famous as a social media marketing strategy to get the view as an engagement in the business niche. Finding business intention in educational content, one may conclude that Instagram content is relatively open to business and social approach, but have no single categorize when content creator aiming to gain engagement from other Instagram users. Data shows that educational content used more video as a speaker explaining an English language learning topic.

4 Conclusion

To conclude, this study found that marketing content used educational information in inviting Instagram users to view their content. This study sheds new light on the phenomenon of foreign language learning from social media platforms. This data reveals that the affordances of social media content deliver a convenient space for Instagram users to learn English via material provided by the content creator, whether they are business-oriented or social-oriented. According to this study, exciting content with enticing graphic design is mainly created by business intention, while educational content mostly used video.

However, social media literacy (which was referred to as understanding the benefit) cannot be detected via this study. Taking the categories (marketing and education) in this study, this is one of the studies that explore the data quantitatively to address the availability and the question of positive and negative content in the social media realm. Thereby, these findings contribute to how Instagram users offer a specific range related to English language learning. A further investigation of this research scope might be directed towards how effective educational content that consumed by Instagram users who have different motives.

References


Look who’s talking: Means of interpersonal communication between librarians and library users

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Abstract. This article is aimed to explore the interpersonal communication of library staff in library service. Satisfaction of library users and the correlation interpersonal communication of library staff to the satisfaction of library users of library service. This research used quantitative research method. The data collecting technique used observation, questionnaire, and documentation. The population in this research consists of library service visitors (N=81.896), then it is taken visitors for sampling (n= 99). The chosen sampling technique used a simple random sample, while data measurement used the Likert scale. The validity test applied the product-moment correlation formula, while the reliability test uses the Alpha Cronbach formula. The result shows that interpersonal communication of library staff in library service belongs to high category. The satisfaction of library users in library service is in the high class. There is a positive correlation between the interpersonal communication of library staff and the joy of library users in library service.

Keywords: interpersonal communication, library, librarian, quantitative method, questionnaire.

1 Introduction

Since the COVID-19 pandemic hit the world, many libraries responded swiftly by offering remote services (1). Direct services of the library when users ask for help finding a specific book, immediate benefits of the library decrease as libraries close their doors in recent times. The vital purpose of the library is to provide satisfaction to the users of the services, facilities, and collections contained in the library. However, service delivery to the users’ needs to run smoothly; otherwise, all goals will be useless. This means that visitor satisfaction will be created if the services provided by the library are suitable. Decent service will give birth to the closeness between library staff and visitors so that the collections, services, and library facilities can be maximally utilized. Ideally, libraries should always provide and improve good service and provide convenience for visitors. The library users will be happy to come to the library if the library staff serve with a warm welcome, provide instructions patiently, friendly, and sensitive to the needs of its users (2,3). All of this can be realized if all aspects in the library support each other and work in harmony, harmony, and balance.
Professionally, high communication skills will lead to success in work. In a library, library staff has a lot to do with visitors who find the information they need, especially in the circulation section. Having adequate communication skills, helping their tasks that can build and instill a positive image in the library (4).

Communication is a form of human interaction that influences each other, intentionally or unintentionally. There are several types of communication, one of which is interpersonal communication. Interpersonal communication is the delivery of messages by one person and receipt of notifications by another person or a small group of people, with various effects and with the opportunity to provide immediate feedback (5–7). In the library, communication activities are an essential activity, especially for library staff, such as communication between users and library staff who provide information services. All forms of assistance that exist in the library, the transaction's success is not only measured by the information provided but also by the positive and negative effects of the interaction of library users or library staff. What kind of positive and negative attitudes of the library staff are accepted by the visitors is an essential factor in measuring visitor satisfaction with the services provided (8,9).

Satisfaction is the level of a person's feelings statement produced and the comparison of the perceived usefulness of the product with the expectations of the product. If a person fulfils the desired information needs in a library, then he will feel satisfied and will meet his information needs in the same place repeatedly. The users will likely invite other people to come to the same library.

The South Sumatra Provincial Library Office is one of the information centres. As an information centre, it is better to provide good service to its users constantly, so users are satisfied with the services offered. Therefore, satisfaction, needs, and services are essential to describe the library as having carried out the objectives of a library. Based on the background above, the study aims to explore the lack of communication skills that may affect visitor satisfaction, and lack of attention made by library staff in examining visitor request.

2 Research Methods

This research uses quantitative research methods. Quantitative research can be defined as a research method based on the philosophy of positivism, used to research specific populations or samples, data collection using research instruments, quantitative/statistical data analysis to test predetermined hypotheses. The research design used is a non-experimental type, using correlational research. Correlational research aims to examine the relationship between two or more variables (10). The time used starts from preparing the research proposal to the implementation of the research, which is four months. This research was conducted at the Library Office of South Sumatra Province.

This study applied primary data sources and secondary data sources:

a. Primary Data Sources

Primary data comes from data obtained by distributing questionnaires to respondents, namely library visitors at the Library Office of South Sumatra Province.

b. Secondary Data Sources

Secondary data obtained from media sourced from lecture books or books that explain interpersonal communication and visitor satisfaction, journals that describe interpersonal communication and visitor satisfaction, research results that discuss interpersonal
communication and visitor satisfaction, websites that contain interpersonal communication and visitor satisfaction, and so on related to the problems raised in this study.

The data collection techniques used in this research are questionnaire, observation, and documentation. The population is all individuals who are the source of sampling. The population in this study were visitors who visited the South Sumatra Provincial Library Service. From January 2018 - December 2018, the number of visitors who visited was 81896. The total population taken in this study was the average number in one month, so that the number of visitors was 6825. The sample is a portion of all individuals who are the object of research. This research uses a simple random sampling technique. Simple random sampling is the simplest technique because the sampling of population members is done randomly without paying attention to the strata in the population. Finding the sample size, this study used the Slovin formula proposed by Husein Umar, with an error rate of 10%. The variable measurement scale used in this study is a Likert scale and is made in a checklist.

Table 1. Item measurement and statement weight.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>5</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
</tr>
<tr>
<td>Somewhat Agree</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
</tr>
</tbody>
</table>

Research variables are anything in the form determined by the researcher to study, so that information about it is obtained, then conclusions are drawn. In a study, there are two variables, namely the independent variable and the dependent variable. Independent variables (complimentary) are variables that explain or influence other variables, while dependent variables (dependent) are variables that are affected by independent (free) variables. The independent variable (X) in this study is the interpersonal communication variable of library staff at the South Sumatra Provincial Library Service. In contrast, the dependent variable (Y) is visitors' satisfaction at the Library Service of South Sumatra Province. Variables, sub-variables, and indicators in this study are as follows:

Table 2. Variable communication and users' satisfaction.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sub variable</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>a. Openness</td>
<td>• Communication skill</td>
</tr>
<tr>
<td>interpersonal</td>
<td></td>
<td>• Attitude to accept critics and suggestions from someone else</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Open attitude in responding communication</td>
</tr>
<tr>
<td></td>
<td>b. Empathy</td>
<td>• Understanding other people needs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ability to listen to other people complain</td>
</tr>
</tbody>
</table>
Validity is an index that shows the measuring instrument measures what is being measured. This validity concerns the accuracy of the instrument. To find out whether the questionnaire
compiled is valid/valid, it is necessary to test the correlation between the score (value) of each question item using the Product Moment Correlation formula.

Reliability (trust) refers to the notion of whether the instrument can measure something that is measured consistently over time. The keywords for the qualification requirements of a measurement instrument are consistency, consistency, or not change. To measure the reliability of the questionnaire used, a reliability analysis was carried out based on the Cronbach Alpha coefficient.

The collected data were analyzed quantitatively, namely by collecting the results of field research, especially questionnaires. The data is analyzed following tabulating data from the questionnaire, then describe the correlation. Furthermore, the percentage calculation is carried out. For each answer from the respondent, the highest score will be five (5) and the lowest one (1). The sum of the scores for each question will be divided by the number of respondents so that an average score (value) will be obtained. Hypothesis testing was done using the Product Moment formula. In contrast to the validity test, in this data analysis, the processed data is the sum of the total answer scores of each respondent. The next stage is counting the correlation coefficient as an index or number used to measure the degree of the relationship, including the strength of the relationship and the shape/direction of the relationship. For the power of the relationship, the value of the correlation coefficient is between -1 and +1. To determine the closeness of the relationship/correlation between interpersonal communication variables and visitor satisfaction, a correlation coefficient symbolized "r" is used.

3. Result and discussion

Data gathering was conducted on 99 visitors who visited the South Sumatra Provincial Library Service to answer research objectives. Researchers collected data from respondents through distributing questionnaires. Researchers provided 30 statements consisting of 15 ideas for the variable (X), namely interpersonal communication, and 15 words for the variable (Y), namely visitor satisfaction. The distribution of questionnaires to respondents was carried out for three (3) days, 25-27 February 2019, at the South Sumatra Provincial Library Service to find out how the interpersonal communication of library staff at the South Sumatra Provincial Library Service, to find out how the satisfaction of visitors at the South Sumatra Provincial Library Service, and how the interpersonal communication relationship between library staff and visitor satisfaction.

3.1 Test results of the validity and reliability of the instrument

Before distributing the questionnaire to 99 respondents, the validity and reliability test were applied on 30 respondents outside the sample. It could be known whether the statements that had been compiled were valid, consistent, and reliable or not. For the level of validity, the researcher used the significance test by comparing rcount and rtable values utilizing the degree of freedom (df) formula to determine the rtable. The procedure is df = n-k, where n is the number of samples and k is the number of constructs (number of variables). Thus, it can be calculated that df = 30-2 = 28 with an error level of 0.1. If you look at the table r (simple correlation coefficient), rtable is 0.306. If rcount on each item of the statement is more significant than rtable, then each item of the information is declared valid, and vice versa. In testing the validity test, the calculations are shown in the following table:
Table 3. Result of the validity test of the questionnaire for the variable (x).

<table>
<thead>
<tr>
<th>Statement numbering</th>
<th>( R_{count} )</th>
<th>( R_{table} )</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.701</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.460</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.350</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>0.451</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>5</td>
<td>0.456</td>
<td>0.582</td>
<td>Valid</td>
</tr>
<tr>
<td>6</td>
<td>0.441</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>7</td>
<td>0.539</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>8</td>
<td>0.663</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>9</td>
<td>0.669</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>10</td>
<td>0.396</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>11</td>
<td>0.643</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>12</td>
<td>0.779</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>13</td>
<td>0.742</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>14</td>
<td>0.723</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>15</td>
<td>0.651</td>
<td>0.306</td>
<td>Valid</td>
</tr>
</tbody>
</table>

Based on table 3 above, it can be explained that the \( r_{table} \) value, when viewed from the significance level of 0.1, is 0.306. So from the results of the validity test on each item of the statement on the variable (X), interpersonal communication above, when viewed from the \( r_{count} \), has a value greater than \( r_{table} \). Thus it can be concluded that each item of the questionnaire statement for the variable (X) interpersonal communication is all declared valid.

Table 4. Result of the validity test of the questionnaire for the variable (x).

<table>
<thead>
<tr>
<th>Statement numbering</th>
<th>( R_{count} )</th>
<th>( R_{table} )</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>0.800</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>17</td>
<td>0.674</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>18</td>
<td>0.669</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>29</td>
<td>0.645</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>20</td>
<td>0.556</td>
<td>0.582</td>
<td>Valid</td>
</tr>
<tr>
<td>21</td>
<td>0.521</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>22</td>
<td>0.606</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>23</td>
<td>0.472</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>24</td>
<td>0.620</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>25</td>
<td>0.720</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>26</td>
<td>0.548</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>27</td>
<td>0.522</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>28</td>
<td>0.376</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>29</td>
<td>0.614</td>
<td>0.306</td>
<td>Valid</td>
</tr>
<tr>
<td>30</td>
<td>0.586</td>
<td>0.306</td>
<td>Valid</td>
</tr>
</tbody>
</table>
Based on table 4 above, it can be explained that the r table value, when viewed from the significance level of 0.1, is 0.306. So from the results of the validity test on each item of the statement on variable (Y), user satisfaction above when viewed from rcount has a value greater than rtable. Thus it can be concluded that each item of the questionnaire statement for variable (Y) visitor satisfaction is all declared valid.

3.2 Data description

The data obtained are then analyzed, and the percentage calculations are carried out in each statement item. In variable (X) interpersonal communication, several sub-variables help determine the interpersonal communication of library staff at the South Sumatra Provincial Library Service: openness, empathy, supportive attitude, positive attitude, and equality.

Response description sub variable openness shown in the following is the respondent's statement regarding the indicators of the openness sub variable, which will be explained in the following table:

<table>
<thead>
<tr>
<th>Statement numbering</th>
<th>VS</th>
<th>S</th>
<th>SS</th>
<th>D</th>
<th>VD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>42</td>
<td>40</td>
<td>5</td>
<td>1</td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>4</td>
<td>37</td>
<td>7</td>
<td>1</td>
<td>99</td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>34</td>
<td>42</td>
<td>6</td>
<td>0</td>
<td>99</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>121</td>
<td>119</td>
<td>18</td>
<td>2</td>
<td>297</td>
</tr>
</tbody>
</table>

Based on the calculation of table 5 above, it can be explained that the results of the total number of respondents' responses to openness through the three statement items, namely: point 1) library staff are willing to convey important information to users, 2) library staff receive criticism and input from users, 3) library staff communicating openly with users, the average results obtained were 12.46% Very Satisfied, 40.74% Satisfied, 40.07% Somewhat Satisfied, 6.06% Dissatisfied, and 0 Very Dissatisfied, 67%. When viewed from the results above, the highest result is the Satisfied answer, namely 40.74%.

Interpersonal communication of library staff at the Library Office of South Sumatra Province based on the results of data processing that has been carried out obtained an average value of 3.64 with a percentage of 3.68%, it can be concluded that the interpersonal communication of library staff in the Library Service of South Sumatra Province is high. Satisfaction of visitors in the Library Office of South Sumatra Province based on the results of the data processing that has been carried out obtained an average value of 3.75 with a percentage of 3.79%, it can be concluded that the satisfaction of visitors in the Library Service of South Sumatra Province is high.

\[^1\text{VS=Very Satisfied, S=Satisfied, SS=Somewhat Satisfied, D=Dissatisfied, VD=Very Dissatisfied}\]
Meanwhile, for the analysis of the relationship between library staff interpersonal communication and visitor satisfaction at the South Sumatra Provincial Library Service, researchers used Product Moment correlation analysis. The correlation coefficient was 0.882, with an r table at a 10% error level of 0.256. Thus, the correlation coefficient value is greater than the value of the r table (0.882 > 0.256). So, it can be concluded that the null hypothesis (Ho) is rejected, while the alternative idea (Ha) is accepted. This means that there is a relationship between the interpersonal communication of library staff with visitor satisfaction at the South Sumatra Provincial Library Service. By obtaining a correlation coefficient value of 0.882, it is included in the category in the range of 0.80 - 1.00. The interpretation is a robust correlation between the library staff interpersonal communication variable (X) and the visitor satisfaction variable (Y). This indicates that the interpersonal communication of library staff does have something to do with the satisfaction level of visitors at the South Sumatra Provincial Library Service (11,12).

4. Conclusion

So it can be concluded that through the openness sub variable, library staff at the South Sumatra Provincial Library Service already have an open attitude towards users in interpersonal communication. Based on the formulation of the problems that have been compiled and data analysis and findings, conclusions can be formulated about what the interpersonal communication of library staff at the Library Service of South Sumatra Province is, what is the satisfaction of the visitors at the South Sumatra Provincial Library Service, and how the interpersonal communication relationship between library staff and visitor satisfaction at the South Sumatra Provincial Library Service. Based on the analysis and findings and conclusions outlined in this study, it proposes suggestions since the satisfaction of visitors in the Library Office of South Sumatra Province is already high, so that library staff must maintain and increase visitor satisfaction both in terms of interpersonal communication of library staff and from other aspects (13)(14). Library visitors are expected to establish contact with library staff, whether asking questions when experiencing difficulties or providing input to library staff (15,16). It is hoped that further researchers can develop this research by using interpersonal communication theory and other visitor satisfaction theories that are the topic of discussion to be studied (17,18). And it is advisable to increase the number of reference sources in the library study, such as books or research journals (19),(20,21).

References


EFL Student Challenges, Preferences, and Reactions towards Moodle-Based Online Learning under the New Normal in Indonesia

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Abstract. Online learning can play a significant role in continuing the teaching-learning process, especially during the pandemic. Moodle platform is one of the online learning solutions which is free. It is essential to justify and study student reactions, problems, and challenges using a Moodle-based online learning system for further successful online learning. This study aimed to investigate the EFL student challenges, issues, and reactions to the Moodle-based online learning system. The data were collected from 40 graduate and undergraduate EFL students from a private university in Central Java, Indonesia, through a questionnaire-based online survey. The data were analyzed using descriptive statistical techniques. Results of the study have shown that the most common challenges faced by the students were slow internet connection, over-loaded assignments with limited submission time, and health issues. Students believed that a slow connection increased their stress level. Besides, this study has revealed that the teacher's support was crucial in online learning using the Moodle-based system.

Keywords: students reactions, students challenges, students preferness, students health, new normal, pandemic, Covid-19.

1 Introduction

The novel coronavirus or Covid-19 has had the most devastating effect on the education sector. It initially occurred at the end of 2019 in the Chinese city of Wuhan. From Wuhan, it later spread to many different countries all everywhere in the world. World Health Organization declared it as 'Pandemic' in early 2020 due to its rapid spread \cite{1,2}. Most countries declared a lockdown and later introduced everything as New Normal, but there were complications in education. About 61 countries already made the local take down to their citizen by closing the schools and universities \cite{3}.

Education is interrupted since the educational institutes cannot run their regular activities. According to Goyal, owing to the shutdown of educational institutions, about 600 million students have been affected in all the countries. According to UNESCO (2020), closing
universities and schools has several adverse effects on students. Interruption of learning is the most common that can result in students deprived of education, development, and growth [4].

Since the government did not permit the institutions to open, it has been risky to open the institutions. The institutions are allowed to survive and continue the teaching and learning process using an online learning platform. Raju [5] argued that distance learning or online learning is a solution to continue education and overcome student stress and anxieties during the new normal period. Thus, distance online learning platforms can address this problem with internet-based learning. Learners are familiar with both online and distance learning. COVID-19, on the other hand, has reignited the urge to investigate online teaching and learning options.

Online learning can play a vital role in continuing the teaching-learning process, particularly during a pandemic. It provides facilities for teachers, students, administrators, and even parents. It is more practical to use it in a pandemic. For example, students can use it to download teachers' materials, can be engaged in some learning activity with teachers, and attend the exam on a laptop or mobile device from their home. Moreover, students can download the materials anytime, anywhere if their device has an internet connection.

UNESCO suggested solutions to the online learning system [4]. Many digital learning management systems are available on the web to deliver education. Edmodo, Google Classroom, Schoology, and Moodle are just a few examples. Moodle is a community-driven and globally-supported open learning platform. It provides various functions that are easy to integrate with other information systems of an educational institute [6]. Furthermore, it is open source and extensible. There are many other E-learning systems like [7].

The success of online learning depends on student's and teacher's capabilities. It also needs to confirm their willingness and acceptance of the platform [8,9]. Teacher's responsibility studentent's satisfaction is a vital parameter to measure the success of online learning. According to Khan, both the teachers and the students are positive of online learnplatformsform [10]. However, a justification of student reactions, problems, and challenges of the Moodle-based online learning system is required for further successful online learning activities because the university's investment site is valuable and may hamper the overall development and growth of the students. To our best understanding, this subject is still in its infancy, where the students' opinions are not entirely studied [11,12]. Thus, this article explores student challenges, problems, and reactions to a Moodle-based online learning system at a private university in Central Java, Indonesia, during the New Normal period. Onclass UMP, a customized Moodle-based learning system, is used at the university.

2 Literature Review

2.1 Indonesian government policy in pandemic

The Indonesian government has taken some steps to tackle the Covid-19. They announced regulation of large-scale social restrictions until the newest rule is implemented, such as new normal regulation [13]. The Indonesian government purposefully created a policy in response to the pandemic breakout by requiring all educational institutions to host education, teaching, and learning at home by leveraging the online system. The Ministry of Education has mandated that all educational institutions use virtual classes.
2.2 Online learning platforms

Through online lectures, teleconferencing, digital open books, online examinations, and interactivity in virtual worlds, COVID-19 causes a digital revolution in higher education [14,15]. Mpungose [16] discovered that students like Moodle as a learning management system. Students use Moodle to access course materials and module outlines. They also expressed an interest in taking quizzes. Because Moodle's discussion forum and bidirectional chat room were not user-friendly, the students were unsatisfied. Instead, they developed a WhatsApp group for fluid communication and exchange of ideas. The study suggested an informal e-learning platform (WhatsApp) to supplement formal e-learning platforms (Moodle) to meet student's personal needs [17]. Besides, many countries use Zoom, Teams, YouTube, Skype, Google Meets/Hangout, Google classroom, WhatsApp, and many more. Generally, social e-learning platforms such as Facebook, Twitter, and WhatsApp play a critical role in meeting societal communication needs during the higher education learning process. These platforms permit a student to create and share experiences. Higher education students are used to use social media in their everyday life. In Indonesia, Google Classroom is the most common online learning platform after zoom [19] shows various learning platforms used in Indonesia, which offer 57.1% used Google Classroom and 21.4% used Zoom.

2.3 Challenges of online learning

On one hand, new ICT difficulties constitute part of problems in developing country education policies, but on the other hand the necessity to account for the extensive usage of ICT outside of the [20] classroom for teaching and learning is undeniable [19]. Aung discovered that developing countries face trouble like insufficient internet connections, lack of awareness of ICT use, and a lack of content production [21]. It may result in unprepared and unqualified students in the future, because there is no readiness for incorporating online education into the study program at home during the Covid-19 outbreak [22]. There is a sharp distinction between those who can afford the means to use the new education platform and those who cannot [23].

2.4 Student challenges in online learning

Numerous studies found many challenges such as materials, communication, and data bundles in online learning. Technology issues, e-learning system quality elements, cultural elements, self-efficacy elements, and trust elements, according to Yawson, are the common problems in E-learning. Furthermore, the findings revealed that there are three primary obstacles to using an e-learning system: (1) change management concerns, (2) e-learning system technical concerns, and (3) financial support concerns [24]. Lack of e-learning assistance, students' unfamiliarity with the English language, infrastructural issues, students' lack of computer skills, and a lack of financing for research and encouragement are primary barriers to E-learning [25].
3 Research Methods

3.1 Participants

This survey aimed to discover the challenges, preferences, and reactions of the EFL students on the online learning system during the New Normal period at the university level. The survey drew the participation of 40 undergraduate and postgraduate EFL students. They were students at a private university in Banyumas, Central Java, Indonesia, majoring in English Language Teaching or English Education.

<table>
<thead>
<tr>
<th>Degree Level</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>17 (5 Male, 12 Female)</td>
</tr>
<tr>
<td>Graduate</td>
<td>23 (4 Male, 19 Female)</td>
</tr>
<tr>
<td>Total</td>
<td>40 (9 Male, 31 Female)</td>
</tr>
</tbody>
</table>

The survey was conducted in February 2021. The researcher selected the participants based on the random sampling technique. Table 1 displays the degree level and the number of participants to describe the distribution of the respondents. There were 17 respondents from the undergraduate level; five of them were males and twelve females. Meanwhile, among the graduate students, 23 respondents were recruited, out of whom four were male, nine were female. The total respondents were 40, nine of them male and 31 females.

3.2 Instrument

A questionnaire-based online survey was used in the study. It was used to collect data on student problems, preferences, and reactions to Moodle-based online learning. The online questionnaire consisted of close-ended questions and open-ended questions. According to Newlove [26], students can express their thoughts and reactions more freely using open-ended questions. The closed-ended questions inquired about the students' experiences with their concerns in the online class. The closed-ended questions were related to student reactions to online learning, teacher's support, LMS Moodle of the university, internet connection, and stress level. There were two parts of closed-ended questions. The first part consisted of multiple-choice questions related to student reactions to online learning. The other part of the close-ended questions dealt with student preferences of online learning. The close-ended questions used a 5-point Likert scale ranging from 1 to 5 as a rating where one represents "strongly disagree" and five means "strongly agree." Under the open-ended questions section, few questions were related to measuring stress level, teacher's support, and LMS easiness. The questionnaire was validated using expert judgment by two e-learning experts: one, an IT expert, working as a software developer, and a researcher who is an expert in the e-learning area.
3.3 Procedure

The researcher transformed the hard copy of the questionnaire into Microsoft Forms. It is easy to use and user-friendly. It gives some extra facilities over Google Form. The online survey form URL was then shortened at https://www.shorturl.at website to make the URL look nice and short. The URL with a short message was then distributed to the undergraduate (S1) and graduate (S2) students of English Language Education. The researcher sent the URL via the respective department heads to get higher privileges from the students. The URL and the guidance were sent via WhatsApp, considering that it is a common platform in Indonesia, and each study program has a WhatsApp group. The researcher used the simple random sampling technique to regulate the instrument to target participants.

3.4 Data analysis

The data of the online survey were downloaded from Microsoft Form as an Excel file. A descriptive research analysis technique was used to understand the frequency, distribution of the respondents and the Likert scale data. Close-ended questions, on the other hand, were analyzed using SPSS software. The author used a descriptive statistics technique to examine the close-ended data. The open-ended question was analyzed using a content analysis method.

4 Results and Discussion

4.1 EFL student’s significant challenges in online learning

The questionnaire contained an open-ended question related to the student's primary challenges or problems in online learning. The open-ended data were analyzed inductively using the qualitative content analysis technique. Online learning brings unique challenges to students [27]. Students' most common obstacle in online learning is the poor internet connection at their homes [28]. Table 2 shows the primary challenges faced by the students in their online classes attending from their home.

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Connection</td>
<td>17</td>
<td>42.5</td>
</tr>
<tr>
<td>Understanding Material</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Assignments Deadline</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Overloaded Assignments</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Health Issue</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Communication</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2 indicates that the internet connection takes first place among the problems or challenges they faced. There were 17 (42.5%) respondents out of 40 who faced major internet connection problems. The students believed that limited quota, poor internet connection, and unstable mobile data connection were the major problems. Few students had to install Wi-Fi in
their homes due to finding a good mobile signal in their areas. Understanding Material ranks second among other problem groups. The material delivered to the students by the teachers while online teaching was quite hard. A previous study showed that the difficulty in understanding the objectives of the online courses was a challenge [29]. According to the above result, about 20% of the students believed that the lecture was very tough to understand due to drooped voice and unstable internet connection. Moreover, it was challenging for the students to concentrate.

Assignments were also one of the primary challenges faced by students. The result has shown that 27% percent of the students believed that a job is one of the primary challenges they faced during online learning. According to Livana et al., the learning task is the primary factor that causes stress to students during the pandemic Covid-19 [30]. Approximately 12.5 percent of students agreed that they were overworked. Students in an online learning environment feel a high burden [31]. Some students said they were given assignments instead of giving a class lecture. The teacher needs to understand the student's situation. They need to make sure they can do the task within due time. A teacher also needs to consider student's technical competencies. Because the students have to do the assignments on computer and they need internet access to do so. A teacher should give the students flexible time for assignments submission. Fifteen percent of the students believed that the time allotted for completing the activities was insufficient. The primary obstacle in online learning, according to Lora, is time management [32]. Thus, a flexible time will be a better option to reduce student workload.

The respondents agreed that the workload increased their stress levels. Some students got sick, and 12.5% of them gave their opinion about health issues. They said they experienced problems with their eyes due to online classes and too many assignments they had to do with a computer, which was in line with the results of a study by Octoberlina and Muslimin [33]. Students feel more stressed in online learning than in face-to-face learning [27]. Furthermore, the effects of stress have an impact on every system in our bodies [34]. Studies found that extended periods working on mobile or computer leads to physical harm [35]. The intensity of mental health issues among college students can strain mental health facilities, resulting in long wait times for care [36]. Since the Covid-19 pandemic, the quick shift from face-to-face learning to online learning in the educational system might have caused intense stress on students [37]. Kapasia et al. found that most students suffer from stress, depression, and anxiety in online learning [18]. The current study results also found that students experienced other minor health issues due to increased stress levels. Eventually, only 5% of students reported communication complexity with their teachers in further understanding of assignments. According to Hasan, teachers should consider and suggest the students have a healthy body. Besides, they should keep away students from the psychological effect of online learning, such as stress and being afraid of academic loss and the score. Thus, Hasan and Bao [18] suggested that teachers improve their teaching and learning plans and professional competence.

4.2 EFL student’s preferences of online learning

Figure 1 shows the student's preference of learning mode between online and face-to-face to class delivery. The result indicates that a significant number of students prefer face-to-face classes instead of online courses. Among the students, 68% of students prefer face-to-face courses, whereas 32% prefer online learning. Krishnapatria found that 56% of students were
satisfied, and 44% were dissatisfied with their online learning experience [19]. According to Abbasi, traditional learning is better than online learning [38]. However, a study in Oman revealed that most students prefer online mode instead of face-to-face [39].

Figure 2 shows the students’ preference for the opening camera during online classes. The result demonstrated that 33% of students preferred to open the camera during online learning, 30% of students did not want to open the camera during online classes, and 38% did not give their opinion.

Figure 2 illustrates the importance of support from the teachers in solving student problems in online learning. The result has indicated that 25% of students agreed to the teacher’s help. They believed their teachers would help them if they faced any problems during online classes. Only about 8% of students disagreed that their teacher did not care about the difficulties in online learning. However, 30% of students did not give their opinion between Yes and No.

Hasan and Bao [40] found that To have a meaningful teaching and learning process, teachers should slow down their explanations so that students may understand and remember the ideas discussed in the online session.

Figure 1. Online versus face-to-face learning.

Figure 2. Student reactions to the use of web-camera.

Supporting online learning and maintain a healthy and friendly relationship can make online learning more enjoyable [41]. Cambridge Assessment International Education [42] shows that To enhance their readiness in tackling online education, the majority of Indonesian scholars have been ICT literate. Teachers should contact learners to find out what type of assistance they require. They also need to find a way to support them, especially the technical and technological problems students may face in online learning [43]. Additionally, online teachers need to be given training in multiple areas to best support their students [44–46].
Figure 3. Teacher’s support in solving students’ problems of online classes.

Figure 4 illustrates the students’ preference for the Learning System (LMS) in online learning. The result has indicated that a significant number of 75% of students preferred Onclass UMP for online classes. However, only 8% of students chose Google Classroom, 13% of students selected Schoology, and the remaining (5%) students preferred other LMS Apps in online learning. It seems that the students were a little bit biased while giving opinions in preference of the LMS platform. Table 3 shows that the On class was quite hard to operate, and the usability score was also low.

On the contrary, they preferred the On-class UMP platform. If we put Onclass UMP back, this study would show that the students chose Schoology followed by Google classroom. Schoology has some advantages in teaching compared to others. Schoology with Slido can be a very effective tool for online education. However, Google Classroom is a widely used LMS Platform in Indonesia [47]. Google Classroom is also effective in teaching as it is very light and user-friendly. The advantages students and teachers can take from Google Classroom are that most of them already have Google account. Thus, they do not have to create new accounts. Besides, Google provides cloud office tools such as Google Form, Word, Excel, and Presentation apps with 15GB of free storage. Studies in Indonesia proved that Google Classroom is an effective tool in online learning and that the majority of Indonesian students increase their attendance in Google Classroom classes [48–50].
Figure 5. Student preferences of web meeting apps.

Figure 6. The number of devices used by students.

Figure 5 shows the students’ preference for video meetings during online classes. The result has indicated that about 55% of students preferred Zoom for a video meeting, whereas only 3% of students preferred Onclass UMP, and 43% of students prefer Google Meet. Figure 6 shows the number of devices that students used during online classes. The result demonstrated that a significant number of around 62% used two devices during online learning, whereas 30% used one device. However, surprisingly enough, 8% of students used up to three devices during online learning. Table 3 shows the students’ opinion on Moodle's usability. According to the results, Moodle was not so comfortable to use on a mobile device. The majority of students used two devices because they could do the task from the mobile phone. However, a study found that EFL teachers are positively motivated to use Mobile in online teaching [51]. Thus, a mobile-friendly Moodle system is required to develop.

Figure 7 illustrates the class duration in online learning according to the EFL student’s perspective. The result has shown that 50% of the students believed the online class should not be more than one hour, 23% of students accepted class duration should be more than one hour, and the remaining (28%) students did not give their opinion in-between Yes and No. A short class is the best. Since students attend classes from home, there must be some obstacles. Classroom conditions and home conditions are different. Usually, students have activities at their homes. Considering their surroundings, they have to engage with other work. Since the pandemic breakout, students have been back to their traditional homes. They depend on cellular internet connection. The internet speed is limited in rural areas compared to the city. Even finding a better cellular signal is difficult. They need to go to the city or finding a Wi-Fi area. Considering all the aspects, a short class is better in an online learning situation. Besides, the teachers can think about asynchronous learning. The results showed that 50% of students believed the class duration should not be more than an hour. An earlier study also suggests that class duration should be reduced [52].

Figure 7. Student’s opinion of online class duration.

Figure 8. Type of internet connection.
Figure 8 shows the type of internet connection that students used during online learning. The result demonstrated that about 63% of the students used Wi-Fi in online education, 33% used mobile data, and only a tiny portion (5%) of students used other internet connection types.

Figure 9. Student’s stress level due to connection speed.

Figure 9 illustrates the reactions of the EFL students regarding stress levels in online learning. The result has shown that 80% of the students agreed that poor internet connection increased their stress level during online classes. In contrast, only 5% of students said that slow connection did not increase their stress level during online learning. The remaining 15% of students did not give their opinion in-between Yes and No. The previous study found that students have poor internet connectivity in online learning. According to previous studies, having a bad connection can increase stress levels [18,53].

4.3 EFL student’s reactions to an online learning platform

Table 3 shows the result of the descriptive statistics on reactions of the EFL students towards online learning. The result has indicated that the importance of teacher’s support and teacher’s support in online learning reached the highest average scores of 4.60 and 4.03. With the standard deviations of 0.81 and 0.73, they took the first and second positions, respectively. On the other side of the coin, the easiness of operating the On-class system and usability of Moodle platform took the last places with average scores of 2.42 and 2.03 sequentially. Mpungose found that students face some difficulties using Moodle [17].

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of Teacher’s Support</td>
<td>4.6</td>
<td>0.81</td>
</tr>
<tr>
<td>Teacher’s Support in Online Learning</td>
<td>4.03</td>
<td>0.73</td>
</tr>
<tr>
<td>Overall Rating of On class</td>
<td>3.88</td>
<td>0.85</td>
</tr>
<tr>
<td>Challenges of online class using Moodle Platform</td>
<td>3.75</td>
<td>0.90</td>
</tr>
<tr>
<td>Internet Connection Speed</td>
<td>3.68</td>
<td>0.97</td>
</tr>
<tr>
<td>Easiness of Operating On class</td>
<td>2.42</td>
<td>1.09</td>
</tr>
<tr>
<td>Usability of Moodle Platform</td>
<td>2.03</td>
<td>1.23</td>
</tr>
</tbody>
</table>
The students preferred Moodle for uploading materials uploads instead of conducting whole online activities. They believed Moodle is not user-friendly. The results have shown that the overall rating of the On class attribute averaged 3.88. The challenges of the online class scored a mean value of 3.75. Internet connection speed scored a mean value of 3.68. According to a study, students’ reactions to the internet connection were 21.4% Very Good, 84.3% Good, and 14.3% Bad in online learning [19]. Overall, the importance of teacher’s support had the highest mean score, whereas the usability of Moodle platform of a native speaker (teacher) recorded the lowest mean score. Moreover, Moodle is not user-friendly, and it has confusing functions [17].

5 Conclusion

This study revealed the primary challenges of the EFL students in online learning during pandemic New Normal period. The slow internet connection, over-loaded assignments with limited submitting time, and health issues are the primary challenges. Besides, students have faced difficulties in understanding lecture materials. The students cannot concentrate on their classes due to drooped voices and other factors. Students believe that a slow connection increases their stress level. They also think about the importance of teacher’s supports in online learning. This study was limited to a university level, with a limited number of participants. Further studies should be conducted in a wide range of universities. Further research should uncover the reasons behind the students’ stress. Besides, types of Moodle-based solutions for students are required. This study contributes to the current literature, and it will be a guideline for the teachers to find proper materials which can help engage students in their online classes.

References


Development And Validation Instrument To Measure Teacher Knowledge About HOTS Mathematics Assessment

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Abstract. Preparing for the implementation of the National Assessment, a test instrument is needed to measure teacher knowledge related to the mathematics HOTS assessment. The aims of this study are 1) to develop an instrument for measure teacher knowledge about HOTS Mathematics Assessment, 2) to produce a valid instrument. Using development research methods Multiple choice test instrument includes 20 questions with 3 dimensions are Definition, Characteristics, and learning of HOTS. Data were collected from 372 mathematics teachers. Technical analysis of data using expert judgment using Aiken's V formula, factor analysis, and confirmatory factor analysis. The results of expert judgment analysis using the Aiken's V formula show that the instrument can be used. Factor analysis shows that 14 items meet and are grouped into 5 factors. Then proceed with the confirmatory factor indicating that the instrument can be used to measure teacher knowledge in the construction of mathematics HOTS test.

Keywords: Development and Validation, Teacher Knowledge, HOTS.

1 Introduction

The rapid development of technology in the era of globalization requires every country to continue to innovate, update and improve all systems, especially education. Education is one way to produce quality human resources. One of the efforts made by the Indonesian government to improve the quality of education is the existence of the National Assessment Program in 2021 [1]. This is in line with the Law of the Republic of Indonesia number 20 of 2003 concerning the National Education System.

In this Ministerial Regulation what is meant by National Assessment, furthermore abbreviated as AN, is a form of evaluation of the education system by the Ministry at the primary and secondary education levels. AN is an assessment program for the quality of schools in Indonesia. AN aims to measure cognitive learning outcomes, non-cognitive learning outcomes, and the quality of the learning environment in educational units [2].

Implementation of AN for Students through minimum competency assessment, character survey, study environment survey and itself adapts from PISA and TIMSS [1]. This indicates that the National Assessment contains questions that require reasoning or can also be called High Order Thinking Skill (HOTS) questions and the construction of the test questions is very closely related to HOTS.

Brookhart said that HOTS is a higher-order thinking ability using knowledge transfer, problem-solving, and critical thinking [3]. Then Bloom has another understanding that HOTS
is the top thinking ability in the cognitive dimension, namely analyzing, evaluating, and creating [4]. Based on the opinion of experts, it can be concluded that HOTS is a thinking process on the cognitive dimension of analyzing, evaluating, and creating.

HOTS in the assessment has characteristics, as stated by Brookhart that the HOTS assessment has the principle of presenting a stimulus, using new problems, and having different levels of difficulty in each question [3].

The HOTS assessment will be successful if it is supported by learning that uses methods that support the HOTS assessment. For example, problem-based learning, according to research by Hidayati and Retnawati, problem-based learning models are effective in terms of HOTS learning achievement [5].

Through the explanation of HOTS above, of course, HOTS is one of the characteristics of the National Assessment questions. One thing that will be measured in the National Assessment is numeration or math problems [6]. Of course, this must be prepared by the school so that students understand when working on numeracy problems. One of the preparations that must be carried out by schools is that teachers must be given knowledge of National Assessment questions to understand and master them. Because according to research by Heather C. Hill, Brian Rowan, and Deborah Loewenberg Ball, it is stated that teacher's knowledge of mathematics is significantly related to student achievement [7].

This is the background of research to develop instruments to measure teachers' knowledge of HOTS mathematics. As previously stated, the National Assessment contains HOTS questions. So schools must know the extent of their understanding of HOTS mathematics. In addition, it is rare to find an instrument to measure teacher knowledge about HOTS mathematics.

The aims of this study are 1) to develop an instrument for measure teacher knowledge about HOTS Mathematics Assessment, 2) to produce a valid instrument to support the use of an instrument for measuring teacher knowledge about HOTS Mathematics Assessment.

## 2 Research Methods

### 1.1. Participants

The sample in this study was taken from 372 high school mathematics teachers who are members of the high school mathematics MGMP members from seven provinces in Indonesia.

### 1.2. Instrument development

The development of this instrument uses three stages, namely, 1) instrument preparation, 2) content validation by experts, 3) construct validation with EFA followed by CFA. This type of instrument is a multiple-choice test instrument. This instrument has three dimensions, namely definition, characteristics, learning. This refers to the competencies that teachers must have when they want to apply HOTS to mathematics.

### Table 1. Aspects of teacher knowledge about HOTS

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>INDICATOR</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Explain the definition of HOTS</td>
<td>1. The following are categories that show higher-order thinking according to Brokhart are...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. A student cannot automatically recognize the right way to achieve the desired goal, he must...</td>
</tr>
</tbody>
</table>
Characteristics Describe the characteristics of HOTS

3. Based on the statements above, which is the understanding of higher-order thinking according to King et al are...

4. In general, HOTS is a thought process that is not just remembering. In Bloom's revised taxonomy, HOTS is thinking at the top three levels of cognitive dimensions. The three levels are...

5. Based on the above statement, the characteristics of the HOTS assessment are indicated by...

6. Thinking processes by distinguishing, organizing, and connecting. This statement is a characteristic of HOTS questions at the cognitive level...

7. The process of thinking by examining, refuting, and deciding is a characteristic of HOTS questions at the cognitive level...

8. The process of thinking by generating, planning, and producing. This is a characteristic of HOTS at the cognitive level...

9. Concerning the 2013 curriculum based on the statement above, things that must be studied regarding the content of HOTs in learning are:...

10. In developing indicators of competency achievement to assess the ability of HOTS. In addition to paying attention to KI, KD, and sentence composition. Teachers should pay attention...

11. The example of the question above is to measure the cognitive level of students at the stage...

12. The example of the question above is to measure the cognitive level of students at the stage...

13. The example of the question above is to measure the cognitive level of students at the stage...

14. Thinking processes by distinguishing, organizing, and connecting. This statement is a characteristic of HOTS questions at the cognitive level...

15. According to Anderson & Krathwohl, learning HOTs in the classroom can be realized, teachers can carry out learning with various strategies or varied models. Based on

Learning

a) Analyzing basic competencies (KD) to adjust to HOTS-based learning objectives

b) Explaining learning models that can support
the above statement, the learning model that encourages HOTS learning is...

16. A suitable learning model to support HOTS-based assessment is….

17. To support the HOTS assessment, in learning mathematics the teacher gives a problem at the beginning of learning so that students construct knowledge with discussion and investigation to solve problems. These activities are characteristic of the learning model...

c) Explain the preparation of HOTS questions for assessment

14. The first thing that must be considered in preparing questions is...

18. The making of HOTS items must provide introductory material such as pictures, graphics, or contextual text by demanding the ability to read at a higher level of thinking. It is called….

19. The making of HOTS items has the principle of using new materials. This means that...

Table 1 shows that the definition dimension has 4 questions, the characteristic dimension is 7 questions, and the learning dimension is 9 questions. After the preparation of the instrument is done, the next step is to validate the content with experts and continue with the Aiken's V formula.

Construct validation was carried out in two stages, namely giving instruments to 144 teachers and then analyzing them using EFA. If the results of the EFA analysis have stated that they can be continued, the instrument is given to 228 teachers and then analyzed using CFA.

1.3. Data collection and analysis

The data collection has obtained permission from each head of the high school mathematics MGMP from 7 provinces. Instruments are given using a google form. The MGMP Chair provides a link in the messaging app group. The teachers were asked voluntarily to fill out the instrument. After the teacher fills out the instrument then the data is processed using SPSS 16 for factor analysis (EFA). then continued with CFA using AMOS.

3 Results and Discussion

Content validity is done by expert judgment. Three experts provide a review of the instrument. The study pays attention to three aspects, namely aspects of material, construction, and language. After a study has been carried out, it is then confirmed with Aiken's V. The results of the content validity analysis of the instrument for measure teacher knowledge about HOTS Mathematics Assessment can be seen in table 2.

Table 2 shows that the coefficient of content validity with Aiken's V 0.4 on each item. Based on the content validity criteria with Aiken's V, it can be stated that all items can be used and have quite valid criteria.
Construct validation was carried out with exploratory factor analysis (EFA) then followed by confirmatory factor analysis (CFA). In the EFA stage, instruments that have gone through the content validity stage were then given to 144 respondents. The results of the EFA analysis show that the adequacy of sampling shows the Chi-square value in the Bartlet test of 281,556 with 91 degrees of freedom and the p-value shows less than 0.01, namely 0.00. This shows that the sample size of 144 has met the size of the adequacy of sampling. In addition, the results of the sample adequacy analysis are also strengthened by the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of 0.656 which is greater than 0.5 [9].

Based on the analysis of the adequacy of the sample, it can be concluded that the items in the test instrument can be analyzed further. Furthermore, the results of the analysis of the anti-image correlation value if the value is > 0.5 then the item can be used and if < 0.5 then the item is not used. The anti-image correlation shows that 14 items can be accepted because the anti-image correlation value of each item is more than 0.5 (> 0.5), then 6 items are not used because the anti-image correlation value of each item is less than 0.5 (< 0.5). The 6 items that cannot be used are item 3 with a value of 0.369, item 9 with a value of 0.450, item 10 with a value of 0.348, item 13 with a value of 0.466, item 14 with a value of 0.490, and item 20 with a value of 0.483. which can be used next are 14 items, namely item 1, item 2, item 4, item 5, item 6, item 7, item 8, item 11, item 12, item 15, item 16, item 17, item 18, item 19, and item 20. Then the number of factors in the results of the EFA analysis can be obtained from the scree plots in Figure 1 [6]. The figure shows that there is a steep one and concludes that there are 5 factors and seen from the agent value of more than 1 (> 1) with an influence of 56.41% percentage value. We named these factors, namely the definition of HOTS (DH) with item 1, item 16, and item 19, Characteristics of HOTS (KH) with item 5, item 6, and item 7, HOTS assessment (PH) with item 4, item 17, and item 18, HOTS Evaluation Assessment (PE) with item 2, item 11, item 18, and HOTS Analysis Assessment (PA) with item 12, and item 15.

<table>
<thead>
<tr>
<th>Item</th>
<th>Aiken's V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.56</td>
</tr>
<tr>
<td>2</td>
<td>0.58</td>
</tr>
<tr>
<td>3</td>
<td>0.69</td>
</tr>
<tr>
<td>4</td>
<td>0.64</td>
</tr>
<tr>
<td>5</td>
<td>0.69</td>
</tr>
<tr>
<td>6</td>
<td>0.67</td>
</tr>
<tr>
<td>7</td>
<td>0.61</td>
</tr>
<tr>
<td>8</td>
<td>0.67</td>
</tr>
<tr>
<td>9</td>
<td>0.47</td>
</tr>
<tr>
<td>10</td>
<td>0.44</td>
</tr>
<tr>
<td>11</td>
<td>0.58</td>
</tr>
<tr>
<td>12</td>
<td>0.61</td>
</tr>
<tr>
<td>13</td>
<td>0.58</td>
</tr>
<tr>
<td>14</td>
<td>0.58</td>
</tr>
</tbody>
</table>
Furthermore, before moving on to CFA, we first ensured that our data was normal by using maximum likelihood estimation, this method is widely used in structural equation modeling. Research with CFA usually uses the following three to meet the criteria that state the instrument can be used or model fit. Namely 1) non-statistical significance can be seen from the chi-square test value and the root-mean-square error of approximation (RMSEA) value, which is a measure of overall fit, 2) Looking at the t-value compared to the t-table value > 1.96 at the significance level of 0.05. 3) pay attention to parameter estimates with positive or negative coefficients [10]. However, here we only use the first criterion, which is looking at Chi-square, degree of freedom, RMSEA, AGFI, and GFI. The results of a one-time run using AMOS with 228 teacher respondents showed that RMSEA = 0.54, GFI = 0.939, AGFI = 0.905, Chi-Square = 111.823, df = 1.669. If you look at the model fit criteria on Chi-Square and df which is less than 3 (< 3), it can be said that this model has met the model fit criteria. In addition, seeing the RMSEA is between 0.5 and 0.8 then GFI and AGFI are greater than 0.9 (> 0.9) then it can be said that it is also a good fit and it shows that the instrument can be used to measure teachers' knowledge of HOTS mathematics. The purpose of this study is to develop and produce a valid instrument to measure teacher knowledge related to HOTS mathematics. Based on the development process starting from content validation and construct validation, it shows that the instrument is valid and can be used.

Our research theoretically determines that the instrument for measure teacher knowledge about HOTS Mathematics Assessment determines that there are 5 factors, namely the definition.
of HOTS (DH), HOTS Characteristics (KH), HOTS Learning (PH), HOTS Evaluation Assessment (PE), and HOTS Analysis Assessment (PA). Then for practical benefits, our research can be used by students for further research related to teacher knowledge about HOTS. Because currently the test instrument for measure teacher knowledge about HOTS Mathematics Assessment is very rare. This instrument can also be used by instructors, supervisors, principals to evaluate teachers, especially mathematics. With the implementation of the AN test program in Indonesia, this instrument is very good for use by school principals, instructors, supervisors to find out the extent of teacher knowledge in dealing with the program.

4 Conclusion

This study development had produced a valid instrument that can be used to measure teachers' knowledge of HOTS Mathematics assessment. This instrument includes 14 items and can be used for further research related to the measurement of teacher competence on mathematics HOTS. The limitation in this study is the number of samples that should be more. Suggestions for further research are that data collection can be done by making training that can be attended by hundreds of teachers as participants.

References

Implementation of Fuzzy C-Means and K-Medoids in Grouping People's Welfare Indicators (Case Study in Riau Province in 2020)

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{18611144@students.uii.ac.id¹, achmadfauzan@uii.ac.id², 18611082@students.uii.ac.id³}

Abstract. Riau Province is one of the provinces that has social inequality in its society. This is due to the uneven distribution of development carried out in remote areas that are difficult for the government to access. Therefore, the researchers grouped districts in Riau Province with a low welfare index by clustering using Fuzzy C-Means and K-Medoids methods. Clustering is a method of grouping objects or events into groups based on their similarity values. Later, a comparison will be made between the Fuzzy C-Means and K-Medoids methods to get the best result on the Riau Province community welfare data in 2020. From the analysis that has been carried out, there is a grouping of data into 3 clusters for Fuzzy C-Means method and 2 clusters for K-Medoids. Based on the result of the variances comparison of the two methods, namely Fuzzy C-Means and K-Medoids, each of which has a variance of 0.375681 and 3.248903, it can be concluded that the best cluster method for this case is Fuzzy C-Means. Based on the results of clustering on districts/cities by Fuzzy C-Means method can be applied as a reference by related parties to improve the welfare of the people of the Riau province.

Keywords: Riau Province, Clustering, Fuzzy C-Means, K-Medoids, Variance.

1. Introduction

The government's development has not all been evenly distributed to small districts that are difficult to access in Riau Province, which causes inequality in the welfare of society. People's welfare is the right of citizens to enjoy life in the country they live in. A country certainly has a goal in the development of the country itself, one of which is the welfare of its people. Prosperity here is defined as a state of peace and prosperity which is also interpreted as always sufficient and not lacking in life, not lacking in physical, material, and spiritual.

In measuring people's welfare, it is necessary to calculate people's welfare indicators, namely the level of population welfare as a reflection of the quality level of a country's human resources, which includes indicators of population, environment, consumption, housing, education, nutritional health, expenditure, employment, etc.
The house as a place to live is one of the primary human needs, where a decent home or place to live in the dream of every household in urban and rural areas. A comfortable and peaceful place to live is one level to improve life in the family. A habitable house is a house that meets several criteria, namely building resilience (building materials, roofs, walls, and floors of the house that meet the requirements), minimum adequacy of living space (floor area per capita 7.2 m2), has electricity as a source of lighting. Primary care have access to proper drinking water, and have access to adequate sanitation. A household is categorized as occupying a livable house if there are a maximum of two criteria that are not met from the seven forming indicators [1].

This study will compare the Fuzzy C-Means and K-Medoids Clustering methods to discover the best clustering method for grouping districts in Riau based on welfare indicators. Fuzzy C-Means is a clustering technique that uses weighting on each member of the set [2]. K-Medoids is a clustering technique that can handle objects among high values that may deviate from their distribution [3].

2. Literature Study

2.1. Assumptions in Clustering

There is an assumption that must be met in cluster analysis, and there is no multicollinearity [4]. A multicollinearity test is needed to determine the existence of a linear relationship between 2 or more variables. One way to see the symptoms of multicollinearity can be detected by calculating the tolerance value or Variance Inflation Factor (VIF) [5]. If the VIF value exceeds 10, it indicates that there is multicollinearity between variables. If multicollinearity occurs, it is recommended to eliminate one of the two variables with a fairly significant correlation [6]. VIF value is calculated as Equation 1.

\[
VIF = \frac{1}{1 - R_i^2}
\]  
(1)

Where \( R_i^2 \) is the coefficient of determination.

2.2. Fuzzy C-Means Clustering

Fuzzy C-Means is a clustering approach in which the existence of each data point in a cluster is defined by the degree of membership [7]. The goal of this approach is to obtain the cluster's center, which will then be utilized to determine the data that enter the cluster [8]. The explanation of the Fuzzy C-Means algorithm is as follows [9]:

1) Input data to be grouped, namely \( X \) in the order of a sized matrix \( n \times m \) (\( n \) = quantity of data samples and \( m \) = attributes of any data). \( X_{ij} \) = \( i^{th} \) sample data \( (i = 1,2, \ldots, n) \), \( j^{th} \) attribute \( (j = 1,2, \ldots, m) \).
2) The number of clusters (c), the partition matrix's power (w), the maximum iteration (MaxIter), the least anticipated error (\( \xi \)), the initial objective function (\( P_0 = 0 \)), and the starting iteration (\( t = 1 \)) are all variables to consider.
3) As elements of the initial partition matrix \( U \), generate random integers \( \mu_{ik} \), where \( i = 1,2,\ldots,n \) and \( k = 1,2,\ldots,c \). Then count how many columns of random numbers you've created. Count how many of each column (attribute) by the equation 2.

\[
Q_i = \sum_{k=1}^{c} \mu_{ik}
\]  
(2)
Calculate the first partition matrix $U$ after adding up each column of the random number determined. Equation 3 may be used to obtain the initial partition matrix $U$:

$$\mu_{ik} = \frac{\mu_{ik}}{Q_i}$$  \hspace{1cm} (3)

4) Based on Equation 3, calculate the $k^{th}$ cluster center for the $j^{th}$ attribute $V_{kj}$, with $k = 1, 2, \ldots c$; and $j = 1, 2, \ldots m$.

$$V_{kj} = \frac{\sum_{i=1}^{n}((\mu_{ik})^w X_{ij})}{\sum_{i=1}^{n}(\mu_{ik})^w}$$  \hspace{1cm} (4)

$\mu_{ik}$ membership degree for the $i^{th}$ sample in the $k$-cluster and $X_{ij}$ is the $i^{th}$ data with $j^{th}$ attribute.

5) Calculate the objective function at the iteration to-$t$ using the Equation 5:

$$P_t = \sum_{i=1}^{n} \sum_{k=1}^{c} \left( \left( \sum_{j=1}^{m} (X_{ij} - V_{kj}) \right)^2 \right) (\mu_{ik})^w$$  \hspace{1cm} (5)

$P_t$ is the objective function in the $t^{th}$ iteration.

6) Calculate the change in the partition matrix using the Equation 6:

$$\mu_{ik} = \frac{\left( \sum_{j=1}^{m} (X_{ij} - V_{kj}) \right)^2 \left( \frac{1}{m-1} \right)}{\sum_{k=1}^{c} \left( \sum_{j=1}^{m} (X_{ij} - V_{kj}) \right)^2 \left( \frac{1}{m-1} \right)}$$  \hspace{1cm} (6)

7) Check the stop condition: if $t > MaxIter$, stop; if not, continue to step 4 with $t = t + 1$.

The initial fuzzy clustering approach is to find the cluster's center, which will serve as the average position for every cluster. After a series of upgrades to the cluster center, the cluster center will be moved to its proper position [10]. Each data will be given a value or weight to enter each cluster. Any weighted data that has the closest rarity to a cluster center will have a higher value. In fuzzy, the degree of membership is known, which has a value range of 0 to 1, in contrast to the firm set with a value of 1 or 0 [11]. The Fuzzy C-Means method is one of the simplest and is frequently used in data grouping approaches because it produces accurate estimates with few parameters. The Fuzzy C-Means method may be used to categorize data depending on specific qualities, according to various studies [12].

2.3. K-Medoids Clustering

K-Medoids or The Partitioning Around Medoid (PAM) clustering algorithm reduces the distance between the labeled point in the cluster and the point chosen as the cluster center [13]. The K-Medoids technique is being used to address the shortcomings of the k-means algorithm, which is extremely sensitive to outliers. Outliers are pretty far away from most data; thus, they can alter the cluster's average value (mean) [14]. K-Medoids Clustering will arrange a set of $n$ items into multiple $k$ clusters through clustering partitions. This technique works by employing medoids, which are items in a collection of objects that constitute a cluster. Then cluster is formed by calculating the closeness between medoids and non-medoids objects [15]. The steps of K-Medoids clustering in grouping the data are as follows [16].

1) Create a random number of clusters ($k$).
2) Using the euclidean distance measure equation, calculate each object to the nearest cluster:

$$D_{ik} = \sqrt{\sum_{j}^{c} (X_{ij} - c_{kj})^2}$$  \hspace{1cm} (7)
Euclidean Distance, \( x_i : \text{Data (i)} \), \( x_j : \text{Data (j)} \), \( x_{ij} : \text{Data (i) attribute (j)} \), \( c_{kj} : \text{Data (k) attribute (j)} \).

3) Select a random object from each cluster as a candidate for new medoids.
4) With new medoids, calculate the distance from each object in each cluster.
5) By calculating new total distance - old total distance. Calculate standard deviation (S). If \( S < 0 \), swap objects with data cluster medoids to form a new set of \( k \) objects as medoids.
6) Repeat steps 3 to 5 until there is no medoid change so that clusters and their respective cluster members are obtained.

The Within Sum Square (WSS) method defines the number of clusters formed by internal criteria. Validation with internal criteria focuses on measuring how compact the resulting cluster is either indicated by intra-cluster homogeneity, inter-cluster separation, or a combination of both using only internal data [11]. WSS is a method of evaluating intra-cluster variability. Each observation will be assigned to the closest cluster. The distance between the observations and the cluster will be determined using the Cosine Equation between the observations and the centroid. The next centroid will be changed as the average for observations on every cluster [17].

\[
\sum_{i=1}^{k} \sum_{j=1}^{n_i} (x_{ij} - \bar{x}_{kj})^2
\]

\( x_{ij} : \text{Data (i) cluster (j) and } \bar{x}_{kj} : \text{Mean cluster (j)} \)

### 2.4. Determining the Best Method

To compare two or more methods in clustering, the average standard deviation within the cluster and the standard deviation between clusters will be use [18]. Amount cluster optimum by minimizing the index value[19]. Standard deviation within-cluster (\( v_w \)):

\[
v_w = \frac{1}{N-k} \sum_{i=1}^{k} (n_i - 1) \times v_i^2
\]

\( v_i^2 : \text{Variance cluster (i), } n_i : \text{Count of data in a cluster (i), } k : \text{Count of a cluster, } N: \text{Count of data} \)

Standard deviation between cluster (\( v_b \)):

\[
v_b = \frac{1}{k-1} \sum_{i=1}^{k} n_i (\bar{x}_i - \bar{x})^2
\]

\( \bar{x}_i : \text{mean data (i) in cluster and } \bar{x} : \text{mean data (i). The variance of a cluster:} \)

\[
v = v_w / v_b
\]

### 3. Research Methods

#### 3.1. Data and Sources

Riau Province is the focus of this study. The information utilized came from the Riau Province's Central Statistics Agency's website. Secondary data is the type of data used in this study. The variables that were sampled were eight variables consisting of the percentage of households with walls and wood (\( X_1 \)); percentage of households with roofs of concrete, tile, zinc, asbestos, wood, and bamboo (\( X_2 \)); the percentage of families according to their housing...
ownership status (X1); percentage of households with clean drinking water sources (X2); percentage of non-ground floor households (X3); the percentage of households with the main source of lighting (X4); percentage of labor force participation rate (TPAK) (X5); percentage of open unemployment rate (TPT) (X8). The data used in this study were 12 locations in Riau Province.

3.2. Data Analysis Stage

The first step is to collect secondary data that has been taken from the riau.bps.go.id website, then pre-processing the data on people's welfare indicators in Riau Province in 2020. The stages are continued by analyzing the characteristics of the people's welfare indicator data in Riau Province in 2020. Before clustering analysis is carried out, we will check the assumption of the multicollinearity test. After that, a grouping or clustering analysis will be carried out using the Fuzzy C-Means and K-Medoids methods. After comparing the goodness of clusters by comparing the variance of two methods, the best approach will be chosen, and profiling will be made—all analysis using the Rstudio application.

4. Results and Discussion

4.1. Descriptive Analysis

This descriptive analysis of the Riau Province people's welfare indicator data in 2020 is displayed in the form of a descriptive statistical table containing the value of median, mean, variance, standard deviation, maximum and maximum, and the upper quartile value and that of the data; it looks like the Table 1.

<table>
<thead>
<tr>
<th></th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>X8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>97.58</td>
<td>94.42</td>
<td>72.21</td>
<td>68.70</td>
<td>99.16</td>
<td>84.74</td>
<td>65.57</td>
<td>5.80</td>
</tr>
<tr>
<td>Median</td>
<td>99.12</td>
<td>96.38</td>
<td>74.61</td>
<td>74.15</td>
<td>99.08</td>
<td>87.59</td>
<td>65.53</td>
<td>4.96</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>4.31</td>
<td>4.83</td>
<td>11.72</td>
<td>24.24</td>
<td>0.51</td>
<td>8.77</td>
<td>2.71</td>
<td>1.56</td>
</tr>
<tr>
<td>Variance</td>
<td>18.59</td>
<td>23.30</td>
<td>137.47</td>
<td>587.46</td>
<td>0.265</td>
<td>76.97</td>
<td>7.36</td>
<td>2.45</td>
</tr>
<tr>
<td>Minimum</td>
<td>84.51</td>
<td>81.66</td>
<td>51.26</td>
<td>12.06</td>
<td>98.20</td>
<td>68.63</td>
<td>60.90</td>
<td>4.33</td>
</tr>
<tr>
<td>Maximum</td>
<td>100</td>
<td>98.12</td>
<td>89.89</td>
<td>94.16</td>
<td>100</td>
<td>95.81</td>
<td>69.28</td>
<td>9.62</td>
</tr>
<tr>
<td>1st Qu.</td>
<td>97.94</td>
<td>93.04</td>
<td>65.45</td>
<td>66.70</td>
<td>98.91</td>
<td>80.70</td>
<td>64.37</td>
<td>4.85</td>
</tr>
<tr>
<td>3rd Qu.</td>
<td>99.58</td>
<td>97.68</td>
<td>80.61</td>
<td>83.78</td>
<td>99.54</td>
<td>90.59</td>
<td>67.74</td>
<td>6.26</td>
</tr>
</tbody>
</table>

Based on Table 1, the highest average value is in the X5 variable or the percentage of non-ground floor households of 99.16, while the lowest average value is in the X8 variable or the percentage of the open unemployment rate of 5.80. Variable X4 has an average of 97.58; the average variable X1 is 94.42; the average variable X3 is 72.21; the average variable X4 is 68.70; the average variable X5 is 84.74; the average variable X6 is 65.57, and the average variable X8 is 5.80. Of these eight variables, the one with the highest variance value is in the X4 variable or the percentage of households with clean drinking water sources of 587.46, which means that the diversity of data on this variable is significant.
4.2. Fuzzy C-Means Clustering

For the assumption of multicollinearity from the results of the VIF value, no variable has a VIF value > 10; then, the assumption is met. Fuzzy C-Means cluster analysis outcomes are presented in the form of a cluster plot with three clusters, as illustrated in Figure 1.

Based on the cluster plot in Figure 1, the results obtained are districts/cities in the province of Riau based on the welfare of the people using the Fuzzy C-Means method divided into three colors. Cluster 1 is represented by a red area, cluster 2 is represented by a green area, and cluster 3 is represented by a blue area. Based on Fig 1, it is arranged in Figure 2.

As indicated in Table 2, the profiling result is based on the computation of the average value from each cluster's variables.

Table 2. Fuzzy C-Means cluster profiling

<table>
<thead>
<tr>
<th>Variable</th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
<th>$X_6$</th>
<th>$X_7$</th>
<th>$X_8$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1 (High)</td>
<td>99.7</td>
<td>97.1</td>
<td>55.8</td>
<td>90.2</td>
<td>97.5</td>
<td>87.1</td>
<td>68.2</td>
<td>6.40</td>
</tr>
<tr>
<td>Variable</td>
<td>X₁</td>
<td>X₂</td>
<td>X₃</td>
<td>X₄</td>
<td>X₅</td>
<td>X₆</td>
<td>X₇</td>
<td>X₈</td>
</tr>
<tr>
<td>----------</td>
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<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Cluster 2 (Low)</td>
<td>92.3</td>
<td>90.5</td>
<td>86.4</td>
<td>21.2</td>
<td>99.8</td>
<td>71.3</td>
<td>66.1</td>
<td>5.48</td>
</tr>
<tr>
<td>Cluster 3 (Medium)</td>
<td>98.2</td>
<td>94.4</td>
<td>75.2</td>
<td>73.0</td>
<td>98.8</td>
<td>87.5</td>
<td>64.3</td>
<td>5.63</td>
</tr>
</tbody>
</table>

From table 2, it can be explained that cluster 1 is a grouping with variables that have the highest average value, almost all of the variables have the highest value among the three clusters except for the variables X₃ and X₅. Cluster 2 is a grouping with variables with the lowest average value, and almost all the variables have the lowest values among the three clusters except for variables X₃ and X₅. And cluster 3 is a grouping with variables that have a medium average value.

### 4.3. K-Medoids Clustering

Using K-Medoids method analysis, the best cluster that describes people's welfare in Riau Province using the WSS method is 2 clusters. The results of two clusters, as shown in Fig 3.

![Fig 3. Plot K-Medoids Clustering](image1)

Based on the computation of the similarity between observations of people's wellbeing in Riau Province, the output of K-Medoids reveals that there are two clusters. Based on Figure 3, the results of the clustering groups are in Figure 4.

![Fig 4. Maps K-Medoids Clustering](image2)
According to the K-medoids method, cluster one consists of ten districts, whereas cluster two consists of two districts. The results of the profiling of the average value computation of each cluster group occurrence are presented in Table 3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>X8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1 (High)</td>
<td>98.64</td>
<td>95.201</td>
<td>69.358</td>
<td>78.186</td>
<td>98.424</td>
<td>87.422</td>
<td>65.467</td>
<td>5.865</td>
</tr>
<tr>
<td>Cluster 2 (Low)</td>
<td>92.25</td>
<td>90.54</td>
<td>86.445</td>
<td>21.25</td>
<td>99.825</td>
<td>71.345</td>
<td>66.07</td>
<td>5.475</td>
</tr>
</tbody>
</table>

From Table 3, the results of profiling using the K-medoids clustering method in cluster 1 consisting of 10 districts have the best average for variables X1, X2, X4, and X6. While cluster 2 has two district members with the best average on X3, X5, X7, and X8. Based on the high average of each indicator, because cluster 1 and cluster 2 have the same score, next see the average distance. For example, even if cluster two is better than cluster one in X5, but the average distance is not far, it is different from X4. Cluster one and cluster two has a very long distance. It will be determined that cluster 1 has a high level of people's welfare and cluster 2 is a low.

4.4. **Comparison of Variance of Fuzzy C-Means and K-Medoids Method**

Based on equation 6-8, it is continued by determining the best method presented in Table 4-6.

<table>
<thead>
<tr>
<th>Fuzzy C-Means</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>X8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vw</td>
<td>13.17</td>
<td>15.06</td>
<td>39.90</td>
<td>168.86</td>
<td>10.57</td>
<td>27.46</td>
<td>8.63</td>
<td>0.98</td>
</tr>
<tr>
<td>Vb</td>
<td>72.36</td>
<td>50.96</td>
<td>1270.94</td>
<td>6004.01</td>
<td>7.27</td>
<td>423.2</td>
<td>30.77</td>
<td>1.46</td>
</tr>
<tr>
<td>Vw/Vb</td>
<td>0.18</td>
<td>0.29</td>
<td>0.031</td>
<td>0.028</td>
<td>1.45</td>
<td>0.06</td>
<td>0.28</td>
<td>0.66</td>
</tr>
<tr>
<td>Var</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.375</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K-Medoids</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>X8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vw</td>
<td>13.63</td>
<td>22.01</td>
<td>102.56</td>
<td>105.92</td>
<td>3.42</td>
<td>41.59</td>
<td>8.04</td>
<td>2.68</td>
</tr>
<tr>
<td>Vb</td>
<td>68.14</td>
<td>36.21</td>
<td>486.61</td>
<td>5402.85</td>
<td>3.27</td>
<td>430.78</td>
<td>0.61</td>
<td>0.25</td>
</tr>
<tr>
<td>Vw/Vb</td>
<td>0.20</td>
<td>0.61</td>
<td>0.21</td>
<td>0.02</td>
<td>1.04</td>
<td>0.10</td>
<td>13.26</td>
<td>10.55</td>
</tr>
<tr>
<td>Var</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuzzy C-Means</td>
<td>0.375</td>
</tr>
<tr>
<td>K-Medoids</td>
<td>3.25</td>
</tr>
</tbody>
</table>

Based on Table 6, the value of the variance ratio shows that the Fuzzy C-Means method has better performance than the K-Medoids method because the variance of the Fuzzy C-Means method is more petite than the K-Medoids method.
5. Conclusion

Based on the explanation of the previous sections, it can be concluded that the Fuzzy C-Means method's results obtained 3 clusters with cluster one is a group with a relatively high state of community welfare, cluster two is a group with low community welfare conditions, and cluster three is a group with moderate community welfare conditions in Riau Province in 2020. At the same time, the K-Medoids method's result obtained 2 clusters with cluster 1 of 10 districts with relatively high community conditions and cluster two with low community conditions. The best method is the method with minor variance. In this study, the Fuzzy C-Means method is the best method with the value of variance is 0.375. From the results of the research that has been done, it can be seen that several areas in Riau Province have a relatively low level of people's welfare. Based on this research, policymakers can pay more attention to the welfare conditions of the community so that all people in the area receive equitable welfare.

REFERENCE


A Study on Javanese Learners of English and Compliment Response Strategies

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Abstract: The purpose of this study is to examine how Javanese English learners respond to compliment tactics (JLE). Discourse completion tasks (DCT) were used to collect data from 25 JLE. In addition, answers to compliment tactics in Javanese were elicited from 25 native Javanese speakers (NJ) to establish a baseline for how their Javanese strategies influence JLE's strategies. The complement to response techniques was investigated using Yu's modified response taxonomy (2004). The findings demonstrate that both JLE and J.N. employ the standard acceptance method, which includes appreciation tokens, agreement, downgrade, query, transfer, return, transfer, and a variety of sub-strategies. Furthermore, the data suggest that JLE's praise responses may reflect the impact of Javanese culture on their English usage. Similarly, global change has altered Javanese natives' complement response tactics, with J.N. appearing to respond to compliments in ways that are not constrained by Javanese cultural standards.

Keywords: compliment responses, strategies, Javanese, EFL learners

1 Introduction

Compliments are a universal speech act that includes both giving and receiving them. Compliment is defined as "a spoken act that expressly or implicitly bestows credit onto the addressee for any property, skill, characteristic, or the like, the speaker and addressee positively appraise that." As a result, to be regarded as a complement, an utterance must allude to something that the participants esteem highly and ascribe to the addressees [2]. Complementing behavior can develop or reinforce unity [3],[4]. Compliments can be used at any point in a conversation, including the start, middle, and end, and are frequently used as conversation openers and closings. Ignoring to provide praises could be interpreted as a sign of disapproval, and using compliments inappropriately can lead to embarrassment and even offense [5].

Although compliments are widely acknowledged as a universal speaking act, different cultures have distinct tactics for delivering and responding to compliments. [6],[7]. When responding to a compliment, speakers must not only agree with the compliments given to them, but they must also avoid self-praise, which can be difficult for the speakers. Participants in a conversation must strike a balance between agreeing with others' compliments and refraining from self-praise [8]. In this study, English speakers and Javanese speakers had different complement response methods. Avoiding self-praise is more important in Javanese culture. Cross-cultural variations cannot be overlooked when it comes to pragmatics. As a result, people do not generally speak in the same way at all times. As a result, while studying talks, elements such as power and distance, age, sex, and ethnic identities, as presumed by linguistics, must be examined [9][10].

are frequently interpreted as assessments, and people appear to feel pressured to agree with the assessment [13]. Another issue is whether to accept the compliment, which may portray them as self-congratulatory, or reject the compliment, which shows a disagreement with the speaker's good and positive intentions and may be viewed as disrespectful.

Several research have been conducted on features of compliment replies in EFL students. [14-16] highlight the pragma-linguistic transfer, which highlights how EFL learners respond to compliments, whereas [17] focuses on EFL learners' sociolinguistic ability in responding to compliments. Similarly, [13][18] concentrate on the linguistic characteristics of the compliment and compliment answer expression, [21] on the gender variations in compliment responses, and [19][20] on the cultural differences in compliment responses. The tactics of speakers of regional languages learning English as a foreign language remain unstudied among the elements of EFL learners' responses to compliments.

Given that compliments lubricate the social wheels [2] it's worth looking at the possible patterns of how Javanese English learners respond to compliments and how their methods differ from those used in the Javanese language. The findings of this study may help English teachers in Java assist Javanese English learners in responding to compliments in English in a more acceptable manner, as well as contributing to the social pragmatic understanding of Javanese English learners.

2 Research Methods

The data of this study were elicited through discourse completion tasks (DCT) from 25 JLE (Javanese learners of English). In addition, responses to compliment strategies in Javanese were elicited through DCT from 25 native speakers of Javanese (N.J.) to provide the baseline of how JLE’s strategies of compliment response are influenced by their Javanese language. The participants are university students of 3rd semester, aged between 19-21 years old. Prior to the participants' completing the DCT, briefing were given and consent forms were distributed to be signed by the participants as they agreed to participate in the study.

The data obtained from DCT may not provide a fully authentic picture of what the subjects have actually said in real-life situations. Nevertheless, the data should be able to reflect the norms which the group of target subjects keeps to. Besides, since the responses are presented in written forms, the phonological aspects were not discussed. The DCT consists of 20 scenarios with four topics of compliment i.e. appearance, possession, achievement and attitude. Additionally, the context situation is informal, and the familiarity between participants, the distance, is the focus when investigating the variable that may change the way a compliment recipient responds to a compliment. The data were analyzed based on a modified response taxonomy proposed by [17].

Table 1. Coding scheme on compliment response strategies, modified from Yu (2005)
### Strategies

#### Acceptance strategies: the remark is recognized as a compliment
1. Appreciation token: words showing gratitude
2. Agreement: agree with the compliment
3. Pleasure: show the complimentee is pleased
4. Association: more than one of the Acceptance sub strategies above

#### Amendment strategies: the speaker tries to amend its complimentary force
1. Return: reciprocate the compliment by offering praise
2. Downgrade: scale down the compliment
3. Upgrade: increase the force of the compliment
4. Question: question the sincerity or appropriateness
5. Comment: do not take credit for it but impersonalize the force of the compliment
6. Transfer: switch the force or the focus back to the complimenter
7. Association: include two or more of the Amendment strategies

#### Non acceptance strategies: deny, question, or joke about the content of the compliment
1. Disagreement: disagree with the assertion of the compliment
2. Qualification: do not accept the compliment by questioning the quality that is praised
3. Diverge: question the compliment by suggesting other intended acts
4. Association: include more than one of the Non acceptance sub strategies

#### Combination strategies: the addressee's responses combine two or more of the three main strategies

### 3 Results and Discussion

The aim of this study is exploring the possible compliment response strategies used by Javanese learners of English as well as Javanese Native. The participants carry the roles of the compliment recipients and are asked to respond to the compliments. The scenarios are supposed to be the possible situations JLE and NJ will receive compliments. Moreover, the scenarios are designed intentionally to show complimenting among people relatively familiar in informal situation.

The situations with the peer (status equal) are situations in which the complimenter is friends, classmates or sibling of the complimentee. The compliment-response exchanges take place at campus or at home. Besides, there are also situations in the complimenter are teachers or coach with whom the complimentee are familiar, and mothers. Basically, in the situations, references to gender, age, nationality, and are avoided.

There are 12 scenarios in DCT in which the participants have a picture of where it is and what the relationship between the speakers is. The DCT is given to 20 participants comprising the topics of compliment of appearance, possession, achievement and attitude. Therefore, there are 60 responses to compliments for each topic, and totally, there are 240 responses analyzed.
The analysis of DCT by Javanese learners of English indicates acceptance to the compliment as general strategy that JLE use in responding to compliment. The acceptance is mostly expressed by appreciation token with 162 responses on all topics of the compliment with the most occurrence is on the topic of attitude (52 responses) and the least occurrence is on the topic of appearance (31 responses). The appreciation token is mostly expressed by the phrase 'thanks', 'thank you' or 'O thank you'.

Following the appreciation token, other strategies of accepting compliment used by JLE is agreement (19 responses) which occur on the topic of possession and attitude. The agreement is generally expressed by restate the compliment as can be seen in the following example:

Speaker 1: "It's a new motorcycle, isn’t it? It looks cool."
Speaker 2: “Yes, it’s a new product, just launched last month”

In the conversation above, the compliment on the topic of possession (a new motorcycle) is accepted and responded by stating agreement on the new condition of the motorcycle. It is also followed by an association that gives more information on the topic complimented.

Though having fewer occurrences, amendment as a strategy to respond compliment is also used by JLE. The amendment is generally expressed by downgrading (19 responses), questioning (12 responses) and transfer (12 responses). Further, it is interesting to note that the amendment strategy by downgrading occurs only on the topic of possession and achievement, whereas question occurs only in the topic of appearance, and transfer occurs on the topic of achievement and attitude.

The amendment strategy by downgrading is usually done by decreasing the quality of the topic complimented, from ‘being excellent’ to ‘being trivial’, as can be seen in the following example:

Speaker 1: “Your writing is excellent, I like it”
Speaker 2: “It’s just a trivial thing”

Question is usually expressed by phrases ‘really’, ‘Isn’t it’, ‘Are you sure’, and ‘Are you kidding?’ and transfer are expressed by reattributing the compliment to other recipients. In addition to the general strategies of accepting the compliment, some JLE also use disagreement to respond the compliment. This occurs only on the topic of appearance.

Speaker 1: “You look charming wearing that shirt”
Speaker 2: “I don’t think so”

In the dialog above, the complimentee did not accept the compliment by disagreeing on the topic complimented. The disagreement is expressed by the expression ‘I don’t think so’. Similarly, the responses to compliment showing the non-acceptance strategy are mostly expressed by such a phrase with a variation of ‘I don’t believe it’. The summary of the strategies used by Javanese learners of English in responding to compliments can be seen in table 2.
Table 2. Strategies of compliment responses in English by Javanese English Learners

<table>
<thead>
<tr>
<th>Sub Strategies</th>
<th>Appearance</th>
<th>Possession</th>
<th>Achievement</th>
<th>Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appreciation token</td>
<td>31</td>
<td>40</td>
<td>39</td>
<td>52</td>
</tr>
<tr>
<td>Agreement</td>
<td>15</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pleasure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downgrade</td>
<td></td>
<td>5</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Upgrade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comment</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td>8</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreement</td>
<td>8</td>
<td></td>
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<tr>
<td>Qualification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diverge</td>
<td></td>
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</tr>
</tbody>
</table>

1= Acceptance; 2= Amendment; 3= Non Acceptance; 4= Commodification

Similar to JLE, Javanese native generally use acceptance as their compliment response strategy. The acceptance is expressed by appreciation token (95 responses), agreement (27 responses), return (14 responses), question (23 responses), transfer (24 responses) and disagreement (19 responses). The appreciation token occurs on all topics, whereas agreement occurs in the topic of possession and achievement; return occurs in the topic of appearance and attitude; question occurs in the topic of possession and achievement; transfer occurs in the topic of achievement and attitude and disagreement occurs in the topic of appearance, possession and achievement. The summary of the strategies deployed by Javanese native can be seen in table 3.

Table 3. Strategies of compliment responses in Javanese

<table>
<thead>
<tr>
<th>Sub Strategies</th>
<th>Appearance</th>
<th>Possession</th>
<th>Achievement</th>
<th>Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appreciation</td>
<td>12</td>
<td>10</td>
<td>33</td>
<td>40</td>
</tr>
<tr>
<td>Agreement</td>
<td>26</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasure</td>
<td></td>
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<td></td>
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</table>
Furthermore, the appreciation token is expressed by general expression of gratitude in Javanese ‘nuwun’ and ‘maternuwun’, while the expressions of question are ‘mosok’, ‘ah mosok’, ‘mosok to’, ‘opo iyo’, ‘tenane’, and ‘ah tenane’. The following is an example of how the complimentee questions the compliment:

Speaker 1: “Klambimu ketok apik, kuwi klambi anyar ya?”
(Your dress looks good, it is new, isn’t it?)

Speaker 2: “Mosok to, sing apik apane?”
(Really, what is good on this dress?)

In the conversation above, the complimentee question the compliment by asking the aspect of quality of something being complimented i.e. the dress. In addition to the acceptance, it is interesting to find out that Javanese native also use non-acceptance strategy in responding to compliment. The strategy is mostly expressed by disagreement. The expression of the disagreement used by J.N. is the variation of the following expression showing negation ‘No’:


Speaker 1: “Garapanmu apik banget ki, mengko lak bijine A”
(Your work is excellent; you must get A)

Speaker 2: “Halah ora yo” (No, it doesn’t)

The sorts of replies employed by both JLE and J.N. participants are: (1) appreciation token; (2) agreement; (3) downgrade; (4) question; (5) transfer, (6) return, and (7) transfer, according to data analysis. However, because JLE’s answer is dominated by token appreciation, it appears that they follow the English culture's paradigm: I want to respect and appreciate when people say nice things about me, but I don't want to expressly agree with nice things other people said to me (Yan Huang 2014).

When this pattern is followed, expressing thanks is the initial response to an English compliment. J.N., on the other hand, accepts the compliment but replies by directly expressing their agreement or by declining the compliment. This can be understood by considering that,
just as compliments differ by culture, so do responses to them. When accepting compliments, Indonesians may consider "thank you" to be the sole acceptable response. This occurs because Indonesians are not accustomed to elevating themselves. The majority of the time, Indonesians reject compliments by reducing their own quality on the commended items. According to [22], when learning English, Javanese learners of English may be influenced by Javanese culture, which places a high priority on modesty. This may lead them to speak according to their own set of rules. They may reject compliments rather than receive them. As a result, rather than saying "thank you," they may say "oh, no" [22].

Furthermore, rapid changes in lifestyle and technological advancements may be factors influencing Javanese learners' varied language usage. Because the participants are young people who have been the primary market for new digital technology and global change, their use of the Javanese language is influenced to some extent by their interactions with speakers of other languages on social media platforms such as Twitter, Facebook, and WhatsApp.

The Javanese culture that underpins the use of the Javanese language appears to be mingled with world culture. ‘Ora yo Bro (No, buddy) is an example of how a Javanese learner declines a compliment, which is not following the traditional Javanese culture of keeping the ‘rasa (feeling)’ of other people by using mixed language in which ‘Ora yo (no)’ is a Javanese word, and ‘Bro (brother)’ is an English word that has become a youth address term nation-wide in Indonesia. In addition to Javanese adaptation to global culture and language, this indicates to varying degrees that Javanese underlying principles in social interaction, such as kurmat (respect), andhap asor (low profile), empan papan (well-positioned), and tepa slira (empathetic), as renowned by [23] [24], are losing favor with the younger generation of Javanese.

5 Conclusion

According to the findings, both English learners and native Javanese respond to praises in a way that appears to be a hybrid. They employ the standard acceptance approach, with varying frequency of substrategies. Furthermore, the study suggests that JLE’s use of compliment responses may be impacted by their Javanese culture. This is especially evident in the usage of inquiry and disagreement as a method for reacting to compliments, which is not common in English, where the dominant strategy for responding to compliments is expressing appreciation. Javanese natives, on the other hand, are influenced by global change, which manifests itself in their usage of the Javanese language. Individuals's perspectives, attitudes, personalities, and communication behavior are changing as a result of rapid advancements in information and communication technology, which has offered people with limitless and better access to learn about various languages and cultures. As a result, the J.N. appears to respond to compliments offered more freely than the cultural norm with which they are associated. The attitudes and opinions of the young generation of Javanese speakers in executing the complement response speech act are diverse, according to this article. As a result, this will have an impact on their extensive interaction with global cultures and their practical adaption of contemporary ideals.
References


[23] A. Gunawan, Pragmatik, Budaya, dan Pengajaran Bahasa [Pragmatics, Culture and Language
Development of Chemical Learning Media in Reagent Bottle with QR-code

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Abstract. This study aims to develop learning media in the form of a reagent bottle with a label in the form of a QR code. This research is research and development with research stages namely analysis, design, development and evaluation. The data were obtained from the validity test and media readability test. The results of this study are the percentage of media validation tests from material experts, media experts, and student readability are 87.6%, 89.5%, and 90.5%, which means that the media is classified as very feasible and very good to use. It can be concluded that the learning media in the form of a reagent bottle with a QR code is declared feasible and very good for use in Basic Chemistry lectures. It is recommended to test the effectiveness and development of media on other materials.

Keywords: Reagent Bottle, Laboratory, QR-code, Basic Chemistry.

1 Introduction

Today's industrial revolution is characterized by the development of technology, information, and communication. This affects all aspects of life, including in the world of education [1]. The use of technology in the world of instruction can help implement the educational process to be better and modern [2]. An example of the use of technology in education is technology-based learning media [3].

Learning media is a tool used to help deliver materials and facilitate the learning process [4]. Learning media helps educators in channeling knowledge or material concepts to students in a more exciting way. Learning media is used in learning to students ranging from elementary education students to universities.

Natural Sciences (IPA) is a science learning about all aspects of life in nature [5]. In science, there is one family of science called chemistry. Chemistry learns about the nature of matter, material structure, material changes, and energy that accompanies energy that accompanies chemical reactions [6]. As prospective science educators, students of science education programs need to understand the basic chemistry concepts and their application in basic chemistry laboratories [7]. In a basic chemistry laboratory, the initial competency that students need to have is to know and understand chemical tools [8].

Chemicals in the laboratory are included in the learning medium. The chemicals in the laboratory circulating and available today are stored in reagent bottles with labels attached to the bottles. This is the same as the observation in the chemistry laboratory at the Natural...
Sciences Study Program, State University of Malang, that the existing chemical bottles are equipped with labels attached to the bottles. It is still conventional and its use is the same since the old days.

The reagent bottles used in the science laboratory are still bottles with an information label attached to the surface of the bottle. Chemical reagent bottles with QR code labels have been successfully developed to increase innovation from existing reagent bottles. The reagent bottle developed was declared suitable for use from the results of the validation of material, media and readability experts to students. The use of reagent bottles with QR codes is more attractive to students than reagent bottles with conventional labels because of the influence of smartphone involvement in its use [9].

In today's technological development era, the quality of chemical learning media in reagent bottles can be improved by developing integrated technology. With the participation of technology in reagent bottles, it is also hoped that it can increase students' interest in learning [10]. One technology that can display information more uniquely and excitingly is QR Code.

QR Code is a quick response code in sending messages or information [11]. QR Code has been used in an institution for the presence process [12]. QR Codes can also be used to label school assets [13]. QR codes in the world of education can be an alternative learning medium that is easy, interesting, and easy to scan [14].

Many researches on QR codes have been carried out, both in the form of their development and their use and usefulness in the world of education. For example, the use of QR code learning media for periodic system chemistry does not produce higher student learning outcomes than conventional learning media. This is because students are more interested in learning to use the QR Code learning media. Here, students are able to use learning resources independently, not only making the teacher the only source of learning [15].

Based on the description that has been presented above, to improve the learning media of chemical bottles by utilizing technology, the development of chemical bottles with QR codes is carried out. This QR Code is scanned through an application installed on the smartphone to display information about the chemicals in the chemical bottle. It is expected that with this development, the learning media of chemical bottles can be used in lectures and can be mass-produced shortly so that it can be used in basic chemistry laboratories in Indonesia.

2 Research Methods

This research is research and development (R&D) with ADDIE research model by Lee and Owens [16]. The stages are:

a. Analysis conducted initial needs analysis by looking at the condition of chemical bottles as a medium for Basic Chemical Practicum.
b. Design, media design starting from the application storyboard and QR-code.
c. Development, QR-code creation, Bottle Chem application development using Unity, and media validation test in terms of material, media, and readability to students of Science Study Program.
d. Evaluation, determination of the feasibility level of the media based on validation and readability tests.
Data collection techniques using observation and literacy studies in the initial analysis, then questionnaires on validation and readability tests. Research data is qualitative data in the form of comments and suggestions from validators and students and quantitative data in the form of score results from validation and readability tests. The data analysis technique used is a descriptive analysis by changing the percentage result of validation score and readability to the media's level of feasibility and practicality. The eligibility level category of validation percentage can be seen in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage Result</th>
<th>Eligibility Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81% - 100%</td>
<td>Very valid</td>
</tr>
<tr>
<td>2</td>
<td>61% - 80%</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>41% - 60%</td>
<td>Enough valid</td>
</tr>
<tr>
<td>4</td>
<td>21% - 40%</td>
<td>Invalid</td>
</tr>
<tr>
<td>5</td>
<td>0% - 39%</td>
<td>Very invalid</td>
</tr>
</tbody>
</table>

Based on Table 1, if the percentage result of the material and media expert validation test is above 60%, then the developed media is included in the valid category. Therefore, the minimum percentage of validation results that must be obtained is 61%.

3 Results and Discussion

It starts from the analysis of the need that results in the fact that the chemical bottle as a learning medium in the course Basic Chemistry I is still a chemical bottle affixed with a paper label/sticker on the bottle's surface. To further improve the quality and innovation of chemical bottles as a learning medium while utilizing technology, a chemical bottle development with a QR-code label was created on the bottle's surface that can be scanned and display chemical information on the smartphone.

The prototype resulting from this development has three main components: a chemical bottle containing chemicals, QR-code, and an application called Bottle Chem. The chemicals that have been developed prototypes are NaOH and H₂SO₄. If the QR-code is scanned using the Bottle Chem application, it will display information about chemicals in the form of: a) NFPI symbol, b) hazard symbol, c) identification of materials and company, d) hazard identification, e) first aid action, f) storage and handling of materials, g) physical and chemical properties, and h) reactivity and stability. The view of the Bottle Chem application can be seen in Figure 1.
Fig. 1. Architecture of a typical wireless sensor node.

Validation test results from material experts produced a percentage of 95.83%. It can be concluded that the media developed in terms of materials that belong to the category is very worth using. Details of the material expert validation test can be found in Table 2.

Table 2. Details of material validation test results

<table>
<thead>
<tr>
<th>No</th>
<th>Material feasibility aspects</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grammar eligibility</td>
<td>91.67</td>
</tr>
<tr>
<td>2</td>
<td>Concept truth</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Average percentage</td>
<td>95.83</td>
</tr>
</tbody>
</table>

Validation test results from media experts produced a percentage of 96.5%. It can be concluded that media developed in terms of media belongs to the category is very worth using. Details of the media expert validation test can be found in Table 3.

Table 3. Media validation test result details

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage Result</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>App opener view</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Main menu view</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>App button</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Marker</td>
<td>87.5</td>
</tr>
<tr>
<td>5</td>
<td>Scan results</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Average percentage</td>
<td>96.5</td>
</tr>
</tbody>
</table>

The results of readability tests to students of the Science Study Program produced a percentage of 90.5%. It can be concluded that the media developed in terms of readability falls into the category of excellent. Based on comments and suggestions submitted by students of Prodi IPA as the subject of research, Bottle Chem media is exciting, mainly because of the
involvement of smartphones in the use of Bottle Chem. It can be known that a person at the age of students today more often uses smartphones in daily life [18].

The advantage of Bottle Chem media is that it can improve the habit of using technology in students, attractive look with various color combinations, and easy use. While the shortcomings of the Media Bottle Chem are the limitations of chemicals developed and the limitations of the information displayed. QR-code assistance in a learning medium can improve students' skills to be more technologically literate, literate [19] and add innovation in more modern learning media. In addition, the combination of technology with conventional chemical bottles can provide the latest ideas to the industry to develop learning media with integrated other technologies in the present.

4 Conclusion

The reagent bottles used in the science laboratory are still bottles with an information label attached to the surface of the bottle. Chemical reagent bottles with QR code labels have been successfully developed to increase innovation from existing reagent bottles. The reagent bottle developed was declared suitable for use from the results of the validation of material, media and readability experts to students. The use of reagent bottles with QR codes is more attractive to students than reagent bottles with conventional labels because of the influence of smartphone involvement in its use.

Acknowledgments. Thank you, author, to the Science Education Program who fully supports the implementation of research for this industry prototype. Thank you also to CV Nisyab Jaya Selalu, who became a partner of this research industry, and developers and students of science programs who are the research subject.

References


Students' Mathematical Critical Thinking Ability in Solving The Application of First-Order Differential Equations

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Abstract. Many mathematical problems of natural symptoms whose mathematical models can be formulated in the form of differential equations. Because the problem is complex, students need to develop their thinking skills, one of which is critical thinking. This study aims to describe students' mathematical critical thinking ability in solving the problem of the application of first-order differential equations. The method used in this study is descriptive qualitative. The subject of this study was a 6th-semester student of Indraprasta PGRI Indraprastha, with as many as three people. The selection of subjects is done on a random sampling, based on the results of pretests. The instruments used are critical thinking skills tests (pretest and posttest questions), interview guidelines, and researchers. Data analysis techniques are carried out through data reduction, presentation of data, and verification. The results showed that there were student's critical thinking ability in solving problems of applying first-order differential equations, especially in subjects with high (L6) and moderate pretest (M9) results that met all indicators. However, issues with low pretest results (L2), from the three questions given, could only work on one question and did not fulfill the critical thinking indicators in the other two questions.

Keywords: Mathematical Critical Thinking, Application of First-Order Differential Equations

1 Introduction

Differential equations play an essential role in mathematics [1] to model different reality situations, allowing us to understand the characteristics of a particular phenomenon by analyzing its mathematical properties [2]. Differential equations are one of the courses that students of mathematics education must study. Especially in the mathematics education study program of Indraprasta PGRI University, differential equation courses are divided into primary or ordinary differential equations and advanced differential equations, where ordinary differential equations only focus on first-order.

A first-order differential equation is the most straightforward differential equation because it contains only the first derivative of an unknown function. Although simple in structure, many phenomena in life can be modeled as differential equations of order one. For decades, much
scientific knowledge of physics and engineering has been revealed through differential equations [3]. Application of first-order differential equations in other fields, among others decay of radioactive substances, growth, and shrinkage of population, heating, cooling, evaporation, financial development, stock price dynamics, drug dose regulation, cell division, and so on [4].

According to Widowati and Sutimin, people often need a mathematical model of the problem at hand about natural symptoms or phenomena. Many mathematical problems of natural symptoms whose mathematical models can be formulated in first-order differential equations. Furthermore, from the mathematical model obtained, this solution is searched by the appropriate method. This mathematical modeling is used to represent and explain physical systems or problems in the real world and mathematical statements to understand these real-world problems more precisely [5].

The problems in the learning of differential equations today are only focused on solving ordinary differential equations using algebraic or analytical methods. The solution is like this that students can find explicit or implicit expressions for unknown functions. These methods are characterized by algorithmic, procedural, symbolic, and particularly related properties of certain types of differential equations [6]. For example, determine the general solution of differential equations of separate variables, homogeneous, nonhomogeneous, exact and non-exact, linear order one, and Bernoulli. A literature survey on the teaching and learning of differential equations shows that for students, the relationship between differential equations, their solutions, and what each might represent is physical, meaning less. One reason is that differential equation themselves are complex, built on calculus, algebra, fundamental analysis, etc [7].

Another problem is that most of the teaching materials taught in differential equation materials today are widely circulated in abstract form. Students learn with examples of issues and formulas that have been provided and are trained to be able to solve problems without knowing their usefulness [8]. Learning like this makes students less constructive understanding of the underlying equation and appreciates what it means to be the solution of the equation [9]. Students have difficulty when studying ordinary differential equations and their application to real physical scenarios [10]. Thus, in the study of differential equations, it is essential to include fairly extensive material about the application and modeling of mathematics. This needs to be done to reassure students that mathematical modeling often leads to differential equations, and differential equations are part of problem investigations in various other areas. Because real-life problems are complex, students must develop their thinking skills [11]; one of them is thinking critically.

Critical thinking is one of the essential abilities in the 21st century [12]. Critical thinking is often described as a cognitive process consisting of several sub-skills (e.g., analysis, evaluation, and inference) that, when used appropriately, can produce logical conclusions for an argument or solution to a problem [13]. Critical thinking is necessary for solving math problems because critical thinking provides the right direction in thinking and working and helps find appropriate interrelationships of factors [14]. Another opinion states that critical thinking involves complex intellectual activity that emphasizes the following capabilities: problem formulation, problem reformulation, evaluation, the sensitivity of problems [15]. Six critical thinking abilities arise in the learning process, namely, (1) Interpretation is to understand and express the meaning of various experiences, real situations; (2) Analysis means the identification of the relationship between statements, questions, concepts, or other forms of representation; (3) Inference means identifying the elements necessary to draw reasonable conclusions; (4) Evaluation means to judge statements or other representations of oneself or others; (5) Explanation is the skill of determining and sharing reasons directly and logically
based on the data obtained, (6) Self-regulation is a skill to monitor a person's cognitive activity, the elements used in problem-solving mainly to apply skills in analyzing and evaluating [16]. Critical thinking should include several characteristics, such as analyzing, synthesizing, introducing and solving problems, concluding, and assessing [17].

A previous study conducted by [18] modified indicators of critical thinking ability according to Facione and Angelo to analyze and categorize the essential thinking abilities. These critical indicators in thinking include: interpreting problems, researching solutions, implementing solutions, evaluating solutions, and concluding the results obtained with supporting evidence. These indicators were further used in this study. Based on the description, this study aims to describe students' mathematical critical thinking ability in solving the problem of first-order differential equation application.

2 Research Methods

The method used in this study is descriptive qualitative. The subjects or participants of this study were students of semester 6 of Indraprastha PGRI University, as many as three people who attended ordinary differential equation courses. Subject retrieval is done by purposive sampling. After students were given a pretest, the subject's answers were analyzed based on indicators of critical thinking ability. Then a semistructured interview was conducted on the selected subject. Interviews via Google Meet are recorded as research documentation for data analysis purposes. This study uses various instruments, i.e., critical thinking skills tests (pretest and posttest), interview guidelines, and researchers as crucial instruments. The mathematical essential thinking ability for pretest and posttest used has been validated to be ready for use in research. Data analysis techniques are carried out through data reduction, continued presentation of data, and withdrawal of conclusions and verification. Then, the data obtained is tested for validity using the triangulation method by comparing test result data, interviews to subjects, and observation results during the learning process. For the technique of grouping students' critical thinking abilities, researchers used the rules of grouping over three ranks using mean formulas and deviation standards. Pretest data was analyzed before the study, which aims to group students into three categories, i.e., high, moderate, and low, to select research subjects. The results are presented in the following table.

<table>
<thead>
<tr>
<th>Category</th>
<th>High (percentage %)</th>
<th>Moderate (percentage %)</th>
<th>Low (percentage %)</th>
<th>Totality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>6 (22,22%)</td>
<td>15 (55,56%)</td>
<td>6 (22,22%)</td>
<td>27</td>
</tr>
</tbody>
</table>

Based on table 1, the distribution of student pretest results is at most in the moderate category. While the number of students in the high and low classes balanced by a percentage of 22.22%. After dividing students into three categories based on pretest results, the researchers then took posttest data on mathematical critical thinking ability by applying differential equations in order one. The essential thinking ability of the research subjects was analyzed based on five indicators, namely: a) interpreting the problem, b) analyzing the solution, c) applying the solution, d) evaluating the solution, and e) concluding the results. The application of differential equations given in this study consists of three questions concerning population
growth, Newton's Laws of cooling, and the decay of radioactive substances. The question was tested in the form of a description [19]. The given issue requires students to conduct investigations, seek ideas in interpreting information, analyzing information, and evaluating evidence and arguments.

3 Results and Discussion

3.1 Result

The distribution of students' critical thinking ability based on pretest and posttest results is presented in figure 1 below.

![Fig. 1. Distribution of students' mathematical critical thinking ability](image)

Figure 1 shows the spread of students' critical thinking ability based on pretest and posttest in solving first-order differential application problems. As seen in Figure 1, most of the increase in the posttest, except M15, H1, H2, H3, H4, and H5, decreases. When viewed from the average, there is an increase in the ability to think critically of students, although not significantly. Based on these results, an in-depth analysis of the research subjects was conducted. The selection of subjects is taken based on specific criteria, namely: 1) students with pretest results in the high category and posttest results are also high, called subject 1 (H6); 2) students whose pretest results on moderate category, and high posttest results, are called subject 2 (M9); 3) students whose pretest results are low and posttest results are low, are called subject 3 (L2).

H6 Data Analysis

Based on the results of critical thinking ability tests, H6 can solve all three problems of the application of first-order differential equations appropriately. For question number 2, H6 can print information based on the issue in the indicator interpreting the problem. However, in writing the population number, H6 does not use variables instead of an unknown value. For example, to state the population at the time of 60 years, H6 writes with "3 times". From the interview results, H6 stated that he understood better if he wrote what was known and asked using the phrase "multiply." After interpreting the problem, H6 analyzes the solution by
connecting information and concepts and writing down a mathematical model based on the
given situation. H6 illustrates population growth problems through mathematical models \( \frac{dx}{dt} = kt \). Based on the mathematical model, H6 applies solutions and uses acquired strategies to solve problems. H6 interjects first by separating each variable so that a standard solution is obtained. A unique key is obtained by H6 after substituted known values to get k (comparable constants). Using the previously provided information, H6 re-examines each completion step and reviews the identified knowledge, resulting in a result of \( t \approx 87.9 \) years. The last step is, H6 concludes the answer given is the time it takes for the population in the city to be five times that of about 88 years.

A semistructured interview via Google Meet was then conducted to H6. From the interview results with H6 related to the application of first-order differential equations, H6 stated that at first did not like to work on the problem in the form of a story because of difficulty understanding the given issues. However, after knowing the usefulness of the application material of the first-order equation in real life, he became more challenged trying to analyze the problem first and determine how it works to produce the correct conclusion.

Based on the results of answers and interviews, H6 experienced an increase in critical thinking ability, although not significant. H6 may write down what is known and asked about this matter wholly and appropriately; can write down the mathematical model of the given problem correctly and provide a correct and complete explanation; can use the right strategy in solving problems, complete and accurate in making calculations or explanations; can re-examine each step of the settlement and review the clearly and appropriately identified information; and can make conclusions properly, by the context of the problem and complete. Thus, H6 meets all indicators of critical thinking ability in solving the problem of first-order differential equation application.

M9 Data Analysis

Figure 1 suggests that the M9 is in the moderate category from the pretest results, and the posttest results of its critical thinking ability indicate a high class. Based on the posttest results, M9 was able to answer all three questions of applying for the order one differential equation correctly. On the indicator interpreting the problem, M9 can understand and write down the information obtained from the situation. Unlike H6, M9 assumes an unknown value with variables. M9 For example, in question number 2, to state the initial number of unknown populations with variable a. So to say the people at the time of 60 years to triple that is 3a, and to state, the population illustrates the problem of population growth through mathematical models. Furthermore, M9 implements solutions and uses acquired strategies to solve problems by finding standard solutions and specific solutions. Based on this particular solution, M9 uses the information it has obtained to find the time it takes for the population to be five times. M9 rechecks each completion step and reviews the identified knowledge, thus accepting \( t \approx 87.9 \) years. In concluding the answer given, M9 wrote, “So, the time it takes to achieve five times the population increase is 87.9 years”.

Although M9 based on pretest results is moderate, M9 gets excellent results on posttest results. This suggests an improvement in M9's critical thinking ability after obtaining the differential equation application material. Semistructured interviews were conducted to determine M9's responses to the application of the first-order differential equation. M9 says that studying the application material of differential equations requires extra understanding to understand what is known and asked in the question and how to model a real problem. After studying this material, M9 became more aware of the benefits of applying derivatives and integrals in various fields other than mathematics, such as physics and biology. By knowing the
material of differential equations is very applicative, M9 becomes more motivated in learning differential equations.

Based on test and interview results, M9 experienced a significant improvement in critical thinking skills. M9 may write down what is known and asked about this matter wholly and appropriately; can write down the mathematical model of the given problem correctly and provide a correct and complete explanation; can use the right strategy in solving problems, complete and accurate in making calculations or explanations; can re-examine each step of the settlement and review the clearly and appropriately identified information, and make precise conclusions and by the context of the problem. Thus, from the five indicators of critical thinking ability in solving the application of first-order differential equations, M9 can meet all these indicators.

**L2 Data Analysis**

L2 is a subject where pretest results are in a low category. At the time of the pretest, L2 could not answer at all the given problem. Although there is an improvement in posttest results, the ability to think critically of L2 is still in the low category. Of the three differential equation application questions given, L2 can only answer one question about Newton's Laws of cooling, where the problem is given in determining the temperature of coffee at a given time. L2 can do the problem because it is similar to the examples and exercises studied. As for other issues concerning population growth that are not answered correctly by L2, L2 does not write down the answers about the decay of radioactive substances. On population growth, L2 cannot interpret the sentence in the question, so it does not write down what is known and asked. In the following indicator, which analyzes the problem's solution, L2 cannot find a suitable mathematical model. L2 thinks out of context and uses the simplest way to answer the population in a given year, i.e., using a concept of comparative worth. With this concept, L2 gets the answer to the people to be five times after 100 years.

From the interview, L2 stated that it is not familiar with population growth because it is different from the examples of questions and exercises that have been done. The question is not given information on the number of inhabitants in a given year, only written with "multiply." While in the exercises that have been done in L2, clearly written information on the number of residents in the year. The same is the case with the decay of radioactive substances. The question does not write down information about the number of radioactive substances in a given year. So, L2 doesn't understand how to solve problems like this. This indicates that L2 is not yet used to working on different questions with examples. The lack of precise L2 in interpreting the given situation and the lack of precision in describing the problem through mathematical models resulted in L2 not being able to use strategies to solve problems and provide conclusions.

Based on the results of tests and interviews, although L2 can solve problems about Newton's Laws of cooling when given a compound that has low critical thinking ability. This is because, on other issues presented, namely about population growth and decay of radioactive substances, L2 cannot write down what is known and what is asked; improper writing of mathematical models of a given problem; using incorrect and incomplete strategies in solving problems; not review the identified information, and make erroneous conclusions that do not fit the context of the problem. Thus, L2 has not met all indicators of critical thinking ability in solving the application of first-order differential equations.
3.2 Discussion

Based on the results of research on the subjects (H6, M9, and L2), there was an improvement in the critical thinking ability of each subject after being given the material application of differential equations order one. This can be seen from the results of the pretest and posttest subjects (see figure 1). Of the three subjects analyzed, the most significant improvement was M9. H6 and M9 have high critical thinking ability to solve differential equation application order problems, interpret issues, research, apply and analyze solutions, and conclude results correctly.

From the interview results, before trying to work on the given question, H6 and M9 try to understand the meaning of the sentence first by understanding word by word. H6 said that understanding the given problem takes a bit longer. Similar to H6, M9 tries to interpret the question to find out what information can be known and asked in the question carefully. The results of previous research stated that a person who has a high ability to think critically would be more thorough and careful to solve problems [20]. When someone thinks critically about solving a problem in mathematics, they will make a reasoned decision or judgment about what to do and think about. In other words, the student considers the criteria or basis for a wise decision and not just guesses or applies the rule without assessing its relevance.

Another factor that is considered to affect students' critical thinking ability is that if students realize the usefulness and benefits of studying differential equation applications, then those students will get good results. Based on interviews with H6 and M9, they became more motivated and interested in learning differential equations after learning their usefulness and benefits. The results of previous research stated that several factors affect students' ability to solve differential equation problems at the university level. The four elements include epistemological math problem-solving beliefs, beliefs about the usefulness of mathematics, self-learning strategies, and goal orientation, which have great potential to improve the problem skills of differential equations. One factor, namely beliefs about the usefulness of mathematics, is considered to positively influence this study, such as the results of analysis of H6 and M9 subjects.

Furthermore, in critical thinking, indicators interpret the problem and solve the real problems given play an essential role. When a person misinterprets the meaning of a given problem, then he will find it challenging to find the right solution. As L2, when he mistook the purpose of the given problem, L2 had difficulty predicting the relationship or explaining the information in question. This is according to the study results, which states that students' interpretation and understanding of the context of a problem is the key to successfully solving problems [21].

The application of first-order differential equations is new for students. Students who were only used to working on routine problems, such as finding standard solutions or unique solutions to differential equations, should represent and explain issues in the real world through mathematical modeling. Mathematical modeling itself is essential to study in differential equation courses. Mathematical modeling often leads to differential equations, and differential equations are part of problem investigations in various other fields. Ideally, modeling helps students express and socialize their thoughts, visualize and test the components of their theory, and make the material more interesting. Therefore, teachers need to introduce modeling in math learning, especially in differential equation courses. Previous research has shown that mathematical modeling can help develop competencies in different math classes [11].

The results of other studies state that modeling in mathematics learning can develop students' skills [22]; other studies say that modeling in mathematical knowledge can be like critical thinking ability by the opinion that critical thinking is a skill that can be developed [23].
In addition to the importance of mathematical modeling in the learning of differential equations, students need to be used to working on questions that require more complex understanding and analysis. Developing students' critical thinking skills is to create a learning atmosphere that can encourage students to be actively involved in learning; students do more activities such as open dialogue than just listening [24].

4 Conclusion

Many mathematical problems are from natural phenomena whose mathematical models can be formulated in the form of first-order differential equations. Because problems in life are complex, students must develop critical thinking skills. To describe students' mathematical critical thinking ability in solving first-order differential equations application problems, an in-depth analysis was carried out on three research subjects (H6, M9, and L2). Where the results obtained, from the three subjects, H6 and M9 can meet all indicators of critical thinking skills in solving first-order differential equations application problems. While L2 cannot meet the critical thinking ability indicator. This study has not highlighted further the role of mathematical modeling on student learning outcomes and the use of applications in solving differential equation problems. So, suggestions for further research to better highlight how modeling in mathematics learning can develop a variety of student skills, critical thinking skills; and highlights about using computer applications such as GeoGebra, maple, etc., improving students' ability in differential equation courses.

References


Identification of Epicatechin Gallate and Other Phytochemicals in Methanol Extract of Fresh and Dried Star-Fruits (Averrhoa carambola Linn.) for Treatment of Type 2 Diabetes Mellitus

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Abstract. From an in-silico study, Averrhoa carambola L. (star fruit) contains epicatechin gallate (ECG), which has a similar effect to Sodium-glucose co transporter 2 (SGLT2) inhibitor. This study aimed to identify ECG and other phytochemicals in methanol extracts of fresh and dried star fruits. Ripened star-fruits (RSFs) were divided into two parts: directly extracted using methanol, while the other was dried and were then extracted using methanol. ECG and phytochemicals were identified using GC-MS, LC-MS and spectrophotometer. The yield of fresh RSFs extract was approximately double than that of dried RSFs extract. 4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy-6-methyl was the highest phytochemicals in fresh RSFs extract whereas drie
ded RSFs extract had glycerine. However, extract of dried RSFs had higher ECG levels than that of fresh RSFs (p=0.002). In conclusion, methanol extract of dried RSFs has higher ECG levels and different phytochemicals than fresh RSFs, which potentially become a diabetes herbal drug for an SGLT2 inhibitor.

Keywords: Sodium-Glucose Co-Transporter 2 inhibitor, Star Fruits Extract, Epicatechin Gallate, Type 2 Diabetes Mellitus

1 Introduction

The prevalence of type 2 diabetes mellitus (T2DM) has been rising in this decade, which increases the number from 4.7% in 1980 to 8.5% in 2014 [1]. Three in four people with diabetes are between the ages of 20 and 64 years old [2]. Therefore, younger adults with diabetes mellitus need oral hypoglycemic drugs to improve insulin secretion, reduce insulin resistance, and increase glucose uptake to lower blood glucose levels [3].

Sodium-glucose co-transporter 2 inhibitor (SGLT2i) is a glucose-lowering drug that inhibiting glucose and sodium reabsorption in the kidneys, thus resulting in glucosuria (calorie loss). Consequently, the effect includes reductions in blood glucose levels and decreases in body weight and adiposity, potentially addressing the caloric excess [4–6]. Dapagliflozin is the SGLT2 inhibitor has the most clinical data to date, and other SGLT2 inhibitor are actively being
developed [7]. However, long-term use of this medicine might cause genital infections, ketoacidosis and dehydration [8,9]. As a result of these adverse effects, we are exploring for natural substances that work similarly to SGLT2i.

SGLT2 was validated with dapagliflozin with a binding affinity of 9.0 kcal/mol. The standard interacted with SGLT2 at the residues Asn75, Gly79 and His80. From 422 samples, 29 had lower binding affinities than dapagliflozin, but only ECG had similar binding interaction with dapagliflozin at all three residues. ECG in *Averrhoa carambola* was predicted to be a more potent SGLT2i than dapagliflozin based on computational analysis [10].

*Averrhoa carambola* L. (sweet star fruit) has high primary and secondary metabolites such as polyphenols that can modulate the gut microbiota [11]. From an *in silico* study, *Averrhoa carambola* L. (star fruit) contains a secondary metabolite (ECG) that can interacts with the SGLT2 protein, as same dapagliflozin as at Asn75, Gly79, and His80 [10]. Methanol was the best solvent for the extraction of ECG [12]. Therefore, we used star fruit extracted with methanol. So far, there has not been reported the content of ECG in star fruit. Thus this study aimed to identify ECG and other phytochemicals in methanol extracts of fresh and dried star fruits.

## 2 Research Methods

### 2.1 Extraction of Star Fruits

Ripened star-fruits (RSFs) in this study were purchased from a farmer at Demak, Central Java. Before extracted, RSFs were washed carefully with tap water and divided randomly into fresh and dry parts. Both parts were chopped into small slices (± 0.5 cm), but only the dry part was oven-dried at 40°C for 36 hours. Then fresh and dry RSFs were made simplicia by using a disintegrator for 3 min. Simplicia of fresh RSFs was extracted using an existing method with some modifications [12–14]. A total amount of fresh RSFs Simplicia was mixed with chilled methanol for 5 min with a ratio of 1:2. After centrifugation, the suspension was filtered using 0.45 µm membrane paper, and the supernatant was dried using a vacuum evaporator at 45°C for 4 hours and a blower evaporator for 24 hours. Meanwhile, Simplicia of dry RSFs was extracted using the maceration method with methanol solvent. This method was adopted from Kallithraka *et al.* (1995) with slight modification. One part of Simplicia was dissolved in three regions of methanol solvent [12]. The dissolved solution was filtered using 0.45 µm membrane paper to get the supernatant. To obtain a solid extract, the supernatant was dried as same as the fresh RSFs extract.

### 2.2 Identification of ECG Compound

The standard ECG compound was obtained from Sigma-Aldrich USA. For ECG analysis using GC-MS, fresh and dry RSFs extracts were diluted in methanol to reach 100 ppm final concentration. One µl diluted sample was injected into a ZB-5MS (30 m x 0.25 mm x 0.25 µm) column (Phenomenex®, Torrance, CA, USA), linked to a Trace IQS LT mass detector (San José, CA, USA) (GC-MS) and a Thermo Scientific AI 1310 automatic injector (San José, CA, USA) at 300 °C. A flow rate of chemical analysis was set up at 1 ml/min. The spectrum of chemical compounds in the samples was identified using the standard chemical compounds in the NIST library.
Another method used to identify ECG compounds in the fresh and dry RSFs extracts was the LC-MS with a C18 reverse-phase BioSuite column (4.6 x 150 mm, Waters Corporation). The mobile phase was made up of (A) 0.5 % formic acid in water and (B) acetonitrile was used to separate ECG from other chemical compounds, and a 20 μL sample was injected into the column with 0.6 mL/min flow rate. The following was the concentration gradient of mobile phase: 0–5 min, 90:10 (A:B); 5–7 min, 90:10 to 86:14 (linear gradient); 7–17 min at 86:14; 17–19 min, 86:14 to 75:25 (linear gradient); 19–24 min at 75:25; 24–25 min, 75:25 to 10:90 (linear gradient); 25–31 min held at 10:90; 31–32 min, 10:90 to 90:10, 32–40 min at 90:10 [15]. Data of peak and retention time of fresh and dry RSFs extracts were compared with the Waters Masslynx 4.1 library data.

2.3 Quantification of ECG Compound

A UV-visible spectrophotometer was used to determine ECG compounds in the fresh and dry RSFs extracts compared to the diluted standard ECG from 0 to 20 mg/L. The standard ECG and RSFs extracts were diluted with methanol to make various concentrations. Three different samples of fresh and dry RSFs quotes were measured with a spectrophotometer at 277 nm. A regression linear was drawn to calculate ECG concentration in the new and dry RSFs extracts.

2.4 Statistical Analysis

Data of ECG concentrations in fresh and dry RSFs extracts were provided as mean ± standard deviation (S.D.) and statistically analyzed with the independent t-test. A statistical difference used P-value <0.05.

3 Results and Discussion

3.1 Fresh RSFs Yielded More Extract than Dried RSFs

<table>
<thead>
<tr>
<th></th>
<th>RSFs (g)</th>
<th>Simplicia (g)</th>
<th>Solvent Ratio</th>
<th>Time (min)</th>
<th>Extract (g)</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>44.44</td>
<td>-</td>
<td>1 g: 2 ml</td>
<td>20</td>
<td>12.70</td>
<td>28.58</td>
</tr>
<tr>
<td>Dried</td>
<td>6,000.00</td>
<td>2,357.77</td>
<td>1 g: 3.33 ml</td>
<td>3</td>
<td>801.64</td>
<td>13.36</td>
</tr>
</tbody>
</table>

Table 1 summarized the extract yield of fresh and dried RSFs. Fresh RSFs yielded 2.14 times higher extracts than dried RSFs because high temperatures may lead polymers (e.g., carbohydrates and proteins) to degrade and labile compounds (e.g., glucosinolates or lipids) to oxidize [16]. During the drying process, the proportion of phenolic compounds in dried RSFs also reduced because it could be attributed to the degradation of heat-sensitive phenolic compounds [13].

The research finding in our study is different from a previous study in that freeze-dried RSFs with chloroform-methanol combination yielded a 7% fraction [17]. Pothasak et al. (2020) found that RSFs extraction using a freeze-drying technique produced 5.33% extract, lower than the yield of our RSFs section [18]. Another study also reported that extraction using an air-dried method yielded 14.86% extracts, but Chinese researchers used star fruit leaves [19].
3.2 Identification of ECG Compound

Based on GC-MS's chemical analysis and library data, we found different peaks and retention times (R.T.) between the standard ECG and methanol extracts of fresh and dried RSFs (Figure 1a-c). From Figure 1a, the highest relative abundance of chemical compounds in the standard ECG is Dodecanoic acid methyl ester with 13.73 min R.T. In contrast, the most elevated close lot of chemical compounds fresh and dried methanol extracts RSFs have different R.T. (Figure 1b & c). In the methanol extract of fresh RSFs, 2,3-Butanediol, [S-(R*, R*)]- was detected at 4.18 min R.T. and 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- had 10.12 min R.T., which were more dominant than other chemical compounds. Moreover, the three highest relative abundance of chemical compounds was observed in methanol extract of dried RSFs were 2,3-Butanediol, [S-(R*, R*)]- with 4.26 RT, 4H - Pyran- 4 - one, 2, 3 – dihydro - 3, 5 – dihydroxy – 6 – methyl - with 10.12 RT and 5 – Hydroxymethylfurfural with 11.14 mins R.T.s. Unfortunately, we did not find any ECG compound among the three chromatograms.

Comparing to previous studies, the results of our RSFs extracts' GC-MS analysis differed. According to a research study conducted in Malaysia, Tridecane, 4-methyl- compound has the highest peak with 13.75 min R.T. At the same time, GCMS analysis of RSFs extracts from Bogor Indonesian, Egypt, and India indicated that the highest peak was Nerylacetone at 4.43 min R.T., Methyl caproate at 7 min R.T. and 9-Octadecenoic acid (Z)-, methyl ester at 22 min R.T. respectively [20,21]. Despite limitations of GC-MS analysis in terms of the mass range and metabolites polarity, using the derivatization technique has expanded the range of separable and detectable chemical compounds in high-throughput profiling research. In addition, several artifacts caused by the derivatization reagent were observed in the GC-MS chromatograms. Therefore, N-methyl-N-(trimethylsilyl)-trifluoroacetamide (MSTFA) or N,O-bis(trimethylsilyl) trifluoroacetamide (BSTFA) is often used for artefacts removal during derivatization [22].
Fig. 1. GC-MS chromatogram results of methanol extract derived from ECG high purity (a), fresh (b), and dried RSFs (c).

To identify ECG compounds in both RSFs extracts, we tried to analyze them using the LC-MS equipment (Figure 2a-c). The three highest peaks of ECG standard were observed at 293.66, 441.84, and 442.05 m/z, while fresh and dried RSFs extracts had the same peaks at 293.60 m/z. The other highest peak in fresh RSFs extracts were 311.68 and 237.36 m/z, whereas the dried
RSFs extracts had 293.73 and 294.69 m/z, based on the library of MassBank of North America (MoNA) [NP C2 126 p4 G08 POS iTree 06]. (-)-epicatechin 3-O-gallate has 447.0864 molecule weight and two fragmented ions [327.0553 and 295.0933 m/z] [23]. In previous reports, parent ion with 441 m/z corresponds to monomeric epicatechin gallate, identified as (-)-epicatechin gallate by direct comparison to ^1^H and ^13^C NMR spectral data [24]. However, the parent ion with 441 m/z was low and was not detected in Figure 2b-c.
Fig. 2. Results of LC-MS analysis of (a) standard ECG, (b) fresh and (c) dried RSFs extracts analyzed using LC-MS.

Table 2 shows nine chemical compounds found in fresh and dried RSFs extracts. 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl and 2,3-Butanediol, [S-(R*, R*)]- were the highest proportion of chemical compounds (16.72 and 15.54 %) in the fresh RSFs extracts, followed by D-Glucose, 6-O-à-D-galactopyranosyl- (12.23 %) while the dried extracts were only glycerine (27.61 %). Other chemical compounds with both RSFs sections had a proportion of < 10 %.

The presence of compounds with pharmacological value was revealed by GC-MS analysis. As a result, fresh and dried RSFs extract yielded a total of 20 compounds. Based on previous studies, glycerine possess antibacterial activity [25]. 4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy-6-methyl- has anti-oxidant, anti-microbial and anti-inflammatory activities [26]. 2,3-Butanediol, [S-(R*, R*)]- is a vicinal diol and chiral compound that can act as antifreeze agents. As a vital chemical, it can produce important derivatives, such as 1,3-butadiene and methyl ethyl ketone [27]. Honey contains a high level of isomaltose (D-Glucose,6-O-à-D-galactopyranosyl-), which when heated could improve immunosuppressive conditions. Heated isomaltose may have a therapeutic role in patients with compromised immunity as a result of chemotherapeutic agents [28].
Table 2. Chemical compounds identified in fresh and dried RSFs extracts.

<table>
<thead>
<tr>
<th>No</th>
<th>Retention Time (min)</th>
<th>Peak Height (mAU)</th>
<th>Area (%)</th>
<th>Nomenclature</th>
<th>Formula</th>
<th>M.W.</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fresh</td>
<td>Dried</td>
<td>Fresh</td>
<td>Dried</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4.18</td>
<td>4.26</td>
<td>160,932,511.21</td>
<td>164,595,000.46</td>
<td>15.54</td>
<td>4.59</td>
<td>2,3-Butanediol, (R*,R*)-</td>
</tr>
<tr>
<td>2</td>
<td>6.84</td>
<td>7.55</td>
<td>8,876,450.23</td>
<td>85,412,847.24</td>
<td>2.41</td>
<td>27.61</td>
<td>Glycerin</td>
</tr>
<tr>
<td>3</td>
<td>10.12</td>
<td>10.12</td>
<td>144,688,126.82</td>
<td>234,968,483.55</td>
<td>16.72</td>
<td>8.19</td>
<td>4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy-6-methyl-</td>
</tr>
<tr>
<td>4</td>
<td>11.15</td>
<td>11.14</td>
<td>29,379,407.98</td>
<td>149,812,870.81</td>
<td>3.73</td>
<td>5.78</td>
<td>5-Hydroxymethylfurfural</td>
</tr>
<tr>
<td>5</td>
<td>11.69</td>
<td>12.13</td>
<td>29,549,604.02</td>
<td>8,576,113.84</td>
<td>12.23</td>
<td>0.77</td>
<td>D-Glucose,6-O-α-D-galactopyranosyl-</td>
</tr>
<tr>
<td>6</td>
<td>13.09</td>
<td>13.28</td>
<td>21,790,168.80</td>
<td>37,786,571.98</td>
<td>7.05</td>
<td>4.64</td>
<td>Sucrose</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>7</td>
<td>14.96</td>
<td>11,219,522.35</td>
<td>3.78</td>
<td>Cyclooctasiloxane, hexadecamethyl-1,3,5-trimethylene C16H40O8Si8</td>
<td>592</td>
<td>Antimicrobial</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>19.01</td>
<td>16,318,537.00</td>
<td>79,936,279.59</td>
<td>2.24</td>
<td>3.74</td>
<td>n-Hexadecanoic acid C16H32O2</td>
<td>256</td>
</tr>
<tr>
<td>9</td>
<td>13.13</td>
<td>78,414,479.65</td>
<td>7.32</td>
<td>4H-Pyran-4-one,5-hydroxy-2-(hydroxymethyl)- C6H6O4</td>
<td>142</td>
<td>Kojic acid, catechol oxidase inhibitor, antibiotic, antioxidant, skin lightening agent</td>
<td></td>
</tr>
</tbody>
</table>
3.3 Quantification of ECG Compound

![Graph showing standard curve of standard ECG measured using a spectrophotometer at 277 nm.](image)

**Fig. 3.** A standard curve of standard ECG measured using a spectrophotometer at 277 nm.

<table>
<thead>
<tr>
<th>Extract concentration (mg L⁻¹)</th>
<th>ECG concentration (mg L⁻¹)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>100</td>
<td>1.65 ± 0.25</td>
</tr>
<tr>
<td>Dried</td>
<td>100</td>
<td>6.2 ± 0.6</td>
</tr>
</tbody>
</table>

The mean data are presented ± S.D. Significant differences between fresh and dried samples were determined using an independent t-test. *P*-value indicates a substantial difference.

Further analysis using a spectrophotometer was used to quantify the ECG concentration in fresh and dried RSFs extracts [Figure 3 and Table 3]. A linear regression formula $y=0.0221x + 0.0065$, generated using some diluted standard ECGs, was needed to calculate ECG concentration in both extracts. Fresh and dried RSFs extracts had $1.65 ± 0.25$ % and $6.2 ± 0.6$ % ECG concentrations. Statistically, the ECG concentration in dried RSFs extracts was significantly higher than the ECG concentration in fresh RSFs extracts with $P=0.002$. Based on the authors' knowledge, we firstly reported the ECG concentration in fresh and dried RSFs extracts. By water removal in the dried RSFs extract, the ECG concentration increases 3.76 times higher than fresh RSFs extract. Another reason for increased ECG concentration in dried RSFs extracts is that the ECG compound has thermal stability during the drying process [29].
4 Conclusion

Extraction of fresh RSFs has a greater yield than the extraction of dried RSFs. However, ECG compound is detected in dried RSFs extract, consisting of different phytochemicals from fresh RSFs extract. In addition, the dried RSFs section has a $6.2 \pm 0.6 \text{ mg/L}$ ECG compound, which is more significant than the fresh RSFs extract ($1.65 \pm 0.25 \text{ mg/L}$). Therefore, it becomes a potential herbal drug for diabetes patients against the high expression of SGLT2 protein.

Acknowledgments. We want to thank the Department of Pharmacology and Therapy staff, Faculty of Medicine, Public Health and Nursing, Gadjah Mada University, Yogyakarta, for making RSFs extracts. Department of Chemistry, Faculty of Mathematics and Natural Sciences, Sriwijaya University for GC-MS analysis. Integrated Laboratory of Mathematics and Natural Sciences, Universitas Sebelas Maret, Surakarta for HPLC-MS analysis. Technical Implementation Unit of Integrated Laboratory, Universitas Sebelas Maret, Surakarta for UV-visible spectrophotometer analysis.

References

The Effect of Consumption of Whole Fruits before Meals and Walking 10 minutes after Meals on Daily Food Intake in Overweight Adults

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Abstract. Increased consumption of whole fruits and physical activity are inversely correlated with energy intake and weight gain. This study aimed to analyze the daily consumption of whole fruits before meals and walking 10 minutes after meals on dietary intake in overweight adults. Twenty-two overweight adults in Surakarta city were randomly divided into two groups: the T1 group ate a combination of five different fruits/day before meals and walking 10 min after meals. The other group only ate a combination of five different fruits/day before meals for 30 days. The average of energy and fat intake in T1 and T2 groups after intervention decreased significantly than that of before intervention (p=0.016 and p=0.019; p=0.002 and p=0.021). In addition, both groups had a higher average of fiber intake after the intervention compared before intervention (p<0.001). In conclusion, consuming whole fruits before meals decreases energy and fat intake and increases fiber intake in overweight adults but walking 10 min after meals does not affect their daily food intake.

Keywords: Whole fruits consumption, Walking 10 min, Daily food intake, obesity

1 Introduction

During the last three decades, the global prevalence of overweight and obesity has increased rapidly across countries worldwide in all ages groups and gender [1]. Similarly, data from the Indonesian Basic Health Research show that overweight and obesity in adults aged >18 years old has increased from year to year. The prevalence of adult overweight remains stable at about 13.5% in 2013 and 2018, while most obesity rose from 15.4% in 2013 to 21.8% in 2018. In addition, the prevalence of obese women increases more rapidly than the prevalence of men obese [2, 3].

Unhealthy diets such as excessive consumption of fast food, low consumptions of fruits and vegetables, and low physical activity are essential determinants to the incidence of obesity [4]. A study shows that a high frequency of fast food has a 1.46 times risk of increasing the incidence of abdominal obesity [5]. Meanwhile, consumption ≥ one time/day of whole fruits reduces obesity and metabolic syndrome compared to an adult who rarely consumed whole fruit.
In addition, individuals with low physical activity tend to be obese [7]. In the future, obesity may cause medical comorbidities, including type II diabetes mellitus, dyslipidemia, coronary heart disease, and cancer [8, 9].

WHO recommends increasing fruits and vegetables consumption and physical activity for reduction of body weight in adults obese. It has to consume 150g fruits and 250g vegetables [10], but most Indonesian people consume fruits and vegetables more minor than the recommended consumption of fruits and vegetables [3]. According to recent studies, increased consumption of whole fruits is inversely correlated with weight gain and macronutrients intake [11, 12]. WHO also recommends performing the physical activity at least 150 minutes/week with aerobic moderate-intensity. Walking, for instance, is a popular physical activity for weight management and reduced stress and depression [13]. Moreover, walking is easily performed by obese people to manage their body weight [14]. Routine 1,000 steps walking will burn about 400 kcal/day and affect adipokines release, resulting in reduced adipose tissue mass and increased energy metabolism [15]. Therefore, this study aimed to investigate the effect of whole fruits consumption before meals and walking 10 minutes after meals on energy, fat, carbohydrate, and fiber intake in overweight and obese adults.

## 2 Research Methods

This randomized controlled trial (RCT) study with the pre-posttest group design was conducted in 22 adults in Surakarta city, which matched criteria: aged 20-29 years old, low levels of physical activity (METs ≤ 600), and Body Mass Index > 23 (overweight and obese nutrition status). The independent variables were fruit consumption and walking, while the dependent variable was energy, fat, carbohydrates, and fiber intake. Before the study began, all participants who take part in this study signed informed consent. The research protocol of this study was approved by the Health Research Ethics Commission (KEPK), Faculty of Medicine, Universitas Sebelas Maret, Surakarta (No. 042 / UN27.06.6.1 / KEPK / EC / 2020).

Before the intervention began, all participants were educated about their nutrition management in obesity and physical activity. Then the selected participants have randomly divided into two groups: 11 participants in the Treatment 1 (T1) group and 11 participants in the Treatment 2 (T2) group. T1 group consumed five types of fruits/day before meals and walking 10 minutes after meals, while the T2 group only consumed five types of fruit/day before meals for 30 days. Daily consumption of other foods was based on their habits. We used 13 different fruits, which were arranged in a seven-day cycle, and every day, the participants received ±500g/day five slices of fruits before meals which were consumed five times in the breakfast, snack time, lunch, snack time, and dinner.

Fruit intake data were collected using fruit consumption compliance, adopted from the Comstock method, and walking data were obtained from a form of walking compliance. Meanwhile, data of energy, fat, carbohydrate, and fiber intake were obtained from personal interviews using a 24-hour food recall form and processed using Nutrisurvey software.

The Statistical Package for Social Sciences (SPSS) program version 25 software was used to analyzing all the data. All data were presented as mean ± standard deviation. Data normality was verified using the Shapiro Wilk test. The Independent and Paired Student T-tests were used to evaluating the mean difference of fat, carbohydrate, and fiber in both groups. For energy intake, the Wilcoxon and Mann Whitney tests were used to analyzing those abnormal data. The p-value < 0.05 was recognized as a significant difference.
3 Results and Discussion

The characteristics of research participants and the daily intake of energy, fat, carbohydrates, fiber were presented in Table 1. In general, basic characteristics and daily food intake in the T1 group were similar to that of the T2 group except for age (p = 0.053). The T1 group had a higher mean of age, energy, fat, carbohydrate, and fiber intake than the T2 group, but there were no significant differences. Meanwhile, the average body weight, BMI, and physical activity in the T1 group were lower than in the T2 group, but there were no significant differences. It is not surprising that research participants in both groups have overweight nutrition status since their physical activity and fiber daily intake are lower than the recommended physical activity and fiber daily intake in adults.

Table 1. Characteristics of Research Participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>T1 (n=11)</th>
<th>T2 (n=11)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>24.63 ± 2.41</td>
<td>22.72 ± 1.90</td>
<td>0.053</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>75.01 ± 15.36</td>
<td>76.35 ± 19.23</td>
<td>0.859</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28.79 ± 4.16</td>
<td>29.02 ± 5.76</td>
<td>0.693</td>
</tr>
<tr>
<td>Physical Activity (METs)</td>
<td>248.31 ± 169.5</td>
<td>305.13 ± 164.4</td>
<td>0.434</td>
</tr>
<tr>
<td>Energy (cal/day)</td>
<td>1752.69 ± 353.3</td>
<td>1682.22 ± 219.02</td>
<td>0.922</td>
</tr>
<tr>
<td>Fat (g/day)</td>
<td>72.42 ± 19.58</td>
<td>65.25 ± 13.11</td>
<td>0.325</td>
</tr>
<tr>
<td>Carbohydrate (g/day)</td>
<td>216.24 ± 41.57</td>
<td>213.57 ± 34.47</td>
<td>0.974</td>
</tr>
<tr>
<td>Fiber (g/day)</td>
<td>10.66 ± 2.02</td>
<td>9.32 ± 1.77</td>
<td>0.114</td>
</tr>
</tbody>
</table>

The average energy, fat, carbohydrate, and fiber intake in T1 and T2 groups were evaluated to determine the effects of whole fruits consumption before meals and walking 10 minutes after meal (Table 2). The average daily carbohydrate and fiber intake in T1 and T2 groups increased, whereas the average daily energy and fat intake averages decreased. In the T1 group, the averages of energy and fat intake after treatment decreased significantly compared to the averages of energy and fat intake before treatment (p = 0.016 and p = 0.002, respectively). A higher average of fiber intake was observed after treatment (18.24 ± 5.08 g/day) than before treatment (10.66 ± 2.02 g/day), and it reached significantly (<0.001). The same pattern of daily intake changes also occurred in the T2 group. The averages of energy and fat intakes after treatment were significantly lower than the averages of energy and fat intakes before treatment (p = 0.019 and p=0.021, respectively). After treatment, the average fiber intake significantly increased compared to the average fiber intake before treatment (p <0.001). In contrast, the average carbohydrate intake before treatment in both groups did not differ from carbohydrates after treatment.
The comparison of changes in food intake in type II diabetes mellitus [16]. Our results, physical activity is a modifiable factor for obesity prevention [24]. In this study, a combination of whole fruits consumption and physical activity reduces energy and fat intake more significantly than whole fruits consumption only. But, the mean differences in the food intake are not significant. The results of our study are in contrast to the previous research that the combination of whole fruits consumption and jumping jacks increases energy and fat

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>T1 Before</th>
<th>T1 After</th>
<th>p-value</th>
<th>T2 Before</th>
<th>T2 After</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (cal/day)</td>
<td>1752.69 ± 353.3</td>
<td>1524.75 ± 215.64</td>
<td>0.016*</td>
<td>1682.22 ± 219.02</td>
<td>1495.95 ± 316.08</td>
<td>0.019</td>
</tr>
<tr>
<td>Fat (g/day)</td>
<td>72.42 ± 50.54 ± 10.62</td>
<td>220.15 ± 30.92</td>
<td>0.594*</td>
<td>213.57 ± 34.47</td>
<td>16.40 ± 216.43</td>
<td>0.657*</td>
</tr>
<tr>
<td>Carbohydrate (g/day)</td>
<td>19.58 ± 65.25 ± 13.11</td>
<td>216.24 ± 5.08</td>
<td>0.001&lt;</td>
<td>21.88 ± 17.82</td>
<td>9.32 ± 1.77</td>
<td>0.001&lt;</td>
</tr>
<tr>
<td>Fiber (g/day)</td>
<td>41.57 ± 30.92</td>
<td>18.24 ± 5.08</td>
<td>&lt;0.001</td>
<td>10.66 ± 2.02</td>
<td>16.91 ± 4.34</td>
<td></td>
</tr>
</tbody>
</table>

*Wilcoxon Test was used to compare the average of energy and carbohydrate intake within T1 and T2 groups while other averages of food intake used the Paired T-Test

Table 3 indicated the comparison of changes in daily energy, fat, carbohydrate, and fiber intake between the T1 and T2 groups. Overall, the changes in daily food intake in the T1 group were similar to the changes in daily food intake in the T2 group with p > 0.05. Decreased energy intake in the T1 group (-227.94 ± 302.58 cal/ day) was more significant than the T2 group (-186.27 ± 220.12 cal/ day). Similarly, decreased fat intake in the T1 group (-21.88 ± 17.82 g/day) was more significant than the T2 group (-15.32 ± 18.49 g/day). In addition, the T1 group had a higher increase of carbohydrate intake changes (3.91 ± 39.98 g/day) compared to the T2 group (2.86 ± 28.50 g/day). In contrast, the changes in fiber intake in the T1 group were slightly different from the T2 group.

In this study, whole fruits consumption before meals reduces energy and fat intake by 13% and 30%, respectively, and increases fiber intake by 81%. This result is in line with Fitri’s study that consumption of 300g whole fruits before a meal can reduce energy intake and increase fiber intake in patients with type II diabetes mellitus [16]. Our result findings also support the previous results that eating a salad before carbohydrates reduces energy intake by 165.6 ± 87.0 kcal/day in prediabetes adults than the nutritional balance group by 206.4 ± 113.8 kcal/day [17]. Another study has also shown a decrease in energy intake by 11% after consuming 300g vegetable salad before lunch eating [18]. However, the research method, whole fruits consumption, and research participants in our study are different from the previous studies discussed above.

Whole fruits have a high fiber content which contributes to human health during regular consumption. Other benefits of whole fruits consumption improve gastrointestinal tract activity and weight management and prevent cardiovascular disease risks such as type II diabetes mellitus and metabolic syndrome [19]. The fiber in the human gut provides a good source for bacterial fermentation by which generates high levels of Short-chain Fatty Acids (SCFAs). Therefore, it increases satiety hormone release such as GLP-1 and PYY, resulting in a more prolonged feeling of fullness and reduction of energy intake [20, 21]. Subsequently, it will increase body weight loss as reported by other studies that higher fruit intake contributes to weight loss and waist circumference in overweight adults [22, 23].

Meanwhile, physical activity is a modifiable factor for obesity prevention [24]. In this study, a combination of whole fruits consumption and physical activity reduces energy and fat intake more significantly than whole fruits consumption only. But, the mean differences in the food intake are not significant. The results of our study are in contrast to the previous research that the combination of whole fruits consumption and jumping jacks increases energy and fat
intake in patients with type II diabetes mellitus [25]. The discrepancies of research findings are due to the different research methods, participants, whole fruits consumption, and physical activity. However, the limitations of our study do not use control groups with the daily habit of food intake and only walking 10 minutes after meals, which probably has a more pronounced effect compared to the combination of whole fruits consumption and walking 10 minutes.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>T1</th>
<th>T2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (cal/day)</td>
<td>-227.94 ± 302.58</td>
<td>-186.27 ± 220.12</td>
<td>0.974*</td>
</tr>
<tr>
<td>Fat (g/day)</td>
<td>-21.88 ± 17.82</td>
<td>-15.32 ± 18.49</td>
<td>0.407</td>
</tr>
<tr>
<td>Carbohydrate (g/day)</td>
<td>3.91 ± 39.98</td>
<td>2.86 ± 28.50</td>
<td>0.944</td>
</tr>
<tr>
<td>Fiber (g/day)</td>
<td>7.58 ± 4.03</td>
<td>7.59 ± 3.29</td>
<td>0.993</td>
</tr>
</tbody>
</table>

*The difference of energy intake between T1 and T2 groups was analyzed using Mann Whitney Test while other food intake used the Independent T-Test

4 Conclusion

Whole fruits consumption before meals decreases daily energy and fat intake and increases daily carbohydrate and fiber intake in adults with obesity. Meanwhile, physical activity added whole fruits consumption does not influence the daily food intake. The change of fruits consumption order will be an important strategy for reducing daily food intake in patients with obesity. Biochemical analysis of blood serum is required to detect critical biomarker changes during whole fruits consumption before meals.

Acknowledgments. The authors would like to thank the Faculty of Medicine, Universitas Sebelas Maret Surakarta for providing a postgraduate research grant. Secondly, we thank all Surakarta city participants for giving permission and collaborating well during this research study.

References


Fractionation of Snake Fruit Seeds Pondoh for Development of Anemia Treatment

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Abstract. In a recent study, snake fruit seed (SFS) flour was found to enhance haemoglobin levels in a rat model of anemia. Still, it increases leucocyte number and its differential count. The purpose of this study was to fractionate SFS Pondoh and to analyze phytochemical compounds in SFS fractions. Simplicia of SFS was separated into lipid, water, and organic fractions using tetrahydrofuran, methanol and ethyl acetate reagents, and then dried using a vacuum evaporator. Chemical components in the SFS fractions were analyzed using gas chromatography-mass spectrophotometry (GC-MS). We got 77.8%, 16.5%, and 7.5% fractions of water, organic, and lipid. The water fraction contained 13 active compounds with 19 to 22 min retention time (RT). The organic fraction also had 13 active compounds with 19 to 29 min RT. The last lipid fraction contained 15 active compounds with 3 to 25 min RT. In conclusion, SFS Pondoh generates the highest water fraction, followed by organic and lipid fractions.

Keywords: Snake Fruit Seed, Fractionation, Phytochemical, Anemia

1 Introduction

Snake fruit (Salacca edulis Reinw.) is a domesticated Indonesian plant that grows in a variety of locations [1]. Snake fruit Pondoh is a prominent variety of snake fruit that found in Donokerto village, Turi district, Sleman Regency, Yogyakarta. However, snake peels and seeds become waste and are get ride to the land [2]. The utilization of snake fruit seeds has become necessary because the snake seeds occupy 30% of the whole snake fruit [3].

From recent studies conducted by Melati et al. (2019) and Ristanti et al. (2019), they have successfully extracted snake fruit seed (SFS) flour with ethanol solvent, and it was administrated to female wistar rats with anemia. Administration of 3.5 g/kg body weight SFS for 28 days improves hemoglobin (Hb) levels from moderate anemia to normal condition in
female wistar rats with anemia. However, the increased Hb levels in those rats are also followed by the increased number of leukocytes and lymphocytes, which probably results from various secondary metabolites [4, 5]. A drop in iron levels can hamper erythrocyte synthesis, resulting in an increase in leukocytes. Because hypoferremia keeps the quantity of iron available for other metabolic demands during infection, glucocorticoid activity rises, causing the release of numerous nucleated leukocytes from the bone marrow to be blocked. In addition, inflammatory cytokines have a direct effect on the immune system [6, 7, 8]. In comparison, lymphocytes are associated with virus infections and hypersensitivity reactions. But it has not been confirmed that a hypersensitivity reaction caused the increase in lymphocytes due to the administration of Fe and SFS extract supplements, which were considered foreign bodies, or due to increased stress from cage conditions other stress factors [5]. Therefore this study aimed to fractionate SFS Pondoh and analyze phytochemical compounds in SFS fractions to minimize secondary metabolites in lipid fraction. The method used to separate secondary metabolites such as phenols, flavonoids, and tannins has 229.27 ± g/mL IC50 for antioxidant activity in SFS flour [3].

2 Research Methods

2.1. Fractionation of SFS
Snake fruit seeds produced by a home food company in Donokerto village, Turi district, Sleman Regency, Yogyakarta, were used as raw materials in this study. All of the seeds were air-dried in direct sunlight and then dried for 8 hours in a cabinet dryer and 90 minutes in an oven. To make simplicia, dried snake fruit seeds were crushed and sieved. The simplicia was then extracted to distinct lipid, water, and organic fractions using tetrahydrofuran, methanol, acetic acid, hexane, and or ethyl acetate reagents, as previously described. We made a minor change to a study done by Tang and colleagues (2018) [9]. SFS Simplicia was first dissolved in a tetrahydrofuran solution and centrifuged at 4,200 g for 10 minutes at 37°C in a water bath. To collect the supernatant as a lipid-soluble fraction, the extraction was repeated using the same reagent. At 37°C for 30 minutes in a water bath, collected residues were dissolved in 50: 3.7: 46.3 volume/volume methanol-acetic acid-water solutions. The supernatant was collected after centrifugation, and the residue was re-extracted to get a water-soluble fraction. The leftover residue was resuspended in a buffer solution containing 2 M NaOH, ten mM EDTA, and one percent ascorbic acid, and then acidified to pH 2 6 M HCl solution at 37°C in a water bath for 30 minutes. To remove fatty acids, the mixture was extracted twice with 5 mL n-hexane, then twice with 5 mL diethyl ether and 5 mL ethyl acetate mixtures. After 10 minutes of centrifugation, the supernatant was collected as the organic-soluble fraction. A vacuum evaporator was used to dry the snake fruit seed filtrate, and the extract was then preserved in a refrigerator until further examination. The formula was used to compute the yield of SFS fractions:

\[
\text{Yield} = \frac{\text{Weight of fraction (g)}}{\text{Weight of simplicia (g)}} \times 100\% 
\]

2.2. Identification of Chemical Compounds in the SFS Fractions
The method reported by Javadi et al. (2014) was modified slightly for the GC-MS analysis of SFS fractions. A DB 5MS column (250 m inner diameter and 250 m film thickness)
containing 5% phenyl methyl siloxane was used to examine the samples, which was connected to an Agilent 5973 quadrupole and mass selective detector (Agilent, Santa Clara, United States) [10]. In a nutshell, 1 liter of sample was fed into the GC-MS, which was heated to 180°C for 10 minutes before increasing to 20°C/minute for 5 minutes. The next step was to increase the temperature at 315°C with 30°C/minute for 10 minutes so that the total running time was 30.16 minutes. The mass spectrum was set up at a 50–550 m/z specific range. The peak and retention times of identified compounds were compared and matched to the peak spectra from the NIST14 standard library.

3 Results and Discussion

3.1. The yield of SFS Fractions

This present study first documented the SFS fractionation using a Tang et al. method [9].

<table>
<thead>
<tr>
<th>Table 1. The yield of SFS Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicia (g)</td>
</tr>
<tr>
<td>Water Fraction</td>
</tr>
<tr>
<td>Organic Fraction</td>
</tr>
<tr>
<td>Lipid Fraction</td>
</tr>
</tbody>
</table>

Table 1 indicated that the yield of the SFS water fraction (77.8%) was higher than the yield of SFS organic (16.5%) and lipid fraction (7.5%). The more significant result produced, the more efficient the treatment is applied without neglecting other properties. Based on the yield of SFS fractionation, it can be assumed that the active compounds in the water fraction are more than the lipid and organic fractions. In our present study, Dewatisari et al. (2017) study that a high yield value indicates the high number of active compounds within the extract. They were extracted using simplicia of sansevieria (Sansevieria cylindrica and Sansevieria trifasciata) with a combination of Hexane, Acetone, and Ethanol solvents. However, their method yielded 7.89% S.trifasciata extract, higher than 6.79% S.cylindrica [11]. Therefore, the water SFS fraction potentially becomes an alternative supplement for anemia.

3.2. Bioactive Chemical Compounds in SFS Fractions

Figure 1 A-C showed that peaks and retention times were detected in water, organic, and lipid SFS fractions. In water and organic particles, we got many primes, and it wasn't easy to separate from each other. At the same time, we observed some of the highest peaks in the lipid fraction with different retention times. There were 18.67, 19.90, 20.29, 22.81, and 24.19 minute retention times.
A. Chromatogram of Water Fraction

B. Chromatogram of Organic Fraction

C. Chromatogram of Lipid Fraction
Figure 1. Chromatogram of Water, Organic and Lipid SFS Fractions

The most active compounds contained in each fraction can be seen in the following table:

Table 2. The Highest Bioactive Compounds were Detected in Water, Organic and Lipid SFS Fractions

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Compounds</th>
<th>Retention Time (sec)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14.alpha.-Cheilanthes-13(14)-enic Methyl Ester</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1H-Purin-6-amine, [(2-fluorophenyl)methyl]- (CAS)</td>
<td>20.73</td>
<td>11.76</td>
</tr>
<tr>
<td></td>
<td>(Trifluoromethoxy)nitrobenzene 6-Heptadecyl-5,6-dihydro-2H-pyran-2-one</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Fraction</td>
<td>2,2'-Aminobis(1,3,5-triazine), 4,4'6,6'-tetra(dimethylamino)-SILICONE OIL</td>
<td>20.13</td>
<td>18.58</td>
</tr>
<tr>
<td></td>
<td>1,4-Epoxynaphthalene-1(2H)-methanol, 4,5,7-tris(1,1-dimethylethyl)-3,4-dihydro- (CAS)</td>
<td>23.54</td>
<td>9.50</td>
</tr>
<tr>
<td></td>
<td>SILIKONFETT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SILICON GREASE, SILICONFETT</td>
<td>20.18</td>
<td>7.99</td>
</tr>
<tr>
<td>Lipid Fraction</td>
<td>Tridecanedial</td>
<td>24.19</td>
<td>40.87</td>
</tr>
<tr>
<td></td>
<td>HAHNFETT</td>
<td>22.81</td>
<td>24.96</td>
</tr>
<tr>
<td></td>
<td>2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl- (CAS)</td>
<td>19.9</td>
<td>5.65</td>
</tr>
<tr>
<td></td>
<td>1,2-Benzene dicarboxylic acid, bis(2-Ethylhexyl) ester (CAS)</td>
<td>18.67</td>
<td>5.02</td>
</tr>
<tr>
<td></td>
<td>Cholest-5-en-3-ol (3.beta.),- acetate (CAS)</td>
<td>20.29</td>
<td>4.39</td>
</tr>
</tbody>
</table>

Based on the NIST14 database library, we got the five highest proportions of chemical compounds in water, organic, and lipid SFS fractions (Table 2), and all chemical compounds belong to secondary metabolites. In water and organic SFS fraction, the highest proportion of chemical compound was 2H-3,9a-Methano-1-benzoxazine, octahedron-2,2,5a,9-tetramethyl-, [3R- (17.42%) and 2,2'-Aminobis(1,3,5-triazine), 4,4'6,6'-tetra(dimethylamino)- (18.58%) compounds which functions as anti-microbe, anti-inflammation [12]. Two other chemical compounds in the water SFS fraction were 14.alpha.-Cheilanthes-13(14)-enic Methyl Ester (15.37%) and 1H-Purin-6-amine, [(2-fluorophenyl)methyl]- (CAS) (11.76%) compounds with an antibacterial activity and anti-cancer [13]. The remaining chemical compounds in the water SFS fraction and four chemical compounds in the organic SFS fraction had less than 5% proportion. However, the lipid SFS fraction had different proportions and chemical compounds from the water and organic SFS fractions, which were Tridecanedial (40.87%) and HAHNFETT (24.96%) with anti-microbial and anti-inflammatory activities [12].

We have reported that chemical analysis and fractionation of SFS were firstly performed in this present study. Comparing to the Saleh et al. (2018) study, we similarly evaluated the chemical compounds in snake fruits, but we fractionated the SFS extract while the Saleh study extracted snake fruit peels. Primary metabolites were identified in ethanol extract of snake.
fruit peels: sucrose (17.07%), D-fructose (12.05%), and D(-)-Tagatose (11.05%), while secondary metabolites of snake fruit peels were phenolic, phytosterol, fatty acid, and organic acids. In addition, ethanol extract of snake fruit peels has high antioxidant and α-glucosidase inhibitory properties, indicating health benefits. Phenolic compounds reduce digestive enzymes and help oxidize fats of the body due to their thermogenic properties [14]. Based on the literature, searches documented that the identified compounds have reported various biological activities, considered antioxidant, anti-inflammatory, anti-bacterial, and anti-diabetic [15].

4 Conclusion

Fractionation of SFS using hexane and ethyl acetate solvents yields a higher water fraction followed by organic and lipid fractions. From chemical analysis, the three SFS fractions have different chemical compounds and proportions. Further investigation is required to determine chemical compound's activity and their beneficial effects on the human body.

Acknowledgments. The authors would like to express their gratitude to the Indonesian Minister of Research, Technology, and Higher Education for providing a research funding for a thesis in 2020. We also appreciate the chemical testing of our SFS simplicia and fractions by the Integrated Laboratory of Food and Nutrition, Gadjah Mada University, Yogyakarta, and the Chemistry Laboratory, Faculty of Life Sciences, Semarang State University, Ahmad Dahlan University, and Setia Budi University, respectively.

References


Comparison of Ethanol and Methanol Extracts of Bay Leaves (Syzygium polyanthum) in Terms of Vitamin C, Iron and Phytochemical Levels

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Department of Physiology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta2,
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Abstract. Bay leaves are Indonesian plants, which are often used for cooking spices and have beneficial properties for human health. This study aimed to compare micronutrient and phytochemical contents in bay leaves extract with ethanol or methanol solvent. Vitamin C and tannins levels were measured using a spectrophotometer, while Fe levels used an Atomic Absorption Spectrophotometer (AAS). The results showed that bay leaves Simplicia contained 14.81±0.07 % (w/w) Fe and 29.42±3.76 % vitamin C. Higher levels of Fe, vitamin C, and tannins were also observed in ethanol extract of bay leaves (9.39 ± 0.05%, 0.15 ± 0.10 ppm, and 3,522.63 ± 39.73 ppm), compared to the methanol extract (5.34 ± 0.04%, 0.09 ± 0.11 ppm and 2,306.84 ± 18.98 ppm. In conclusion, ethanol is a better solvent for extracting bay leaves than methanol to obtain vitamin C, Fe, and tannins. Further research is required to confirm the anti anemia effect of that extract.

Keywords: Bay leaves, Ethanol extract, Vitamin C, Iron, Anemia.

1 Introduction

Anemia is a global public health and nutrition issue that affects both poor and industrialized countries. World Health Organization (WHO), anemia affects more than 1.62 billion people worldwide [1]. Anemia affects over 60% of the world's population, with iron deficiency accounting for the majority of cases [2]. Young women have ten times the risk of anemia than young men [3]. In Indonesia, the prevalence of anemia is 23.9% in women and 18.4% higher than in men [4]. Anemia incidence in adolescents in 2013 was 37.1% and increased to 48.9% in 2018, with the highest rate in the 15-24 year age group (84.6%) [5]. To control anemia, World Health Organization (WHO) targets a 50% reduction in anemia in women of childbearing age 15-49 years by 2025 [6].

Anemia diseases can have an impact on human health, social development, and economic growth [3]. Inadequate iron consumption, poor iron absorption, and increased iron requirements during pregnancy, development, and nursing can lead to iron deficiency anemia (IDA) [7]. Iron loss during menstruation puts women of reproductive age at risk for IDA, with an average loss of 35 mL of blood equivalent to 16 mg of iron every month [2]. Anemia is also a common sign of micronutrient deficiency and a country's poor health [8]. Oral iron supplementation hasn't
completely cured the condition. Alternatives to anemia treatment need due to side effects such as diarrhea, nausea, vomiting, and headaches [9].

In recent years, herbal medicine has been used to reduce the incidence of anemia. Bay leaves are widely spread in Indonesia and are widely used for a cooking spice because it has a distinctive taste [10]. Bay leaves can be an alternative treatment for anemia because they contain complete nutrients such as protein, iron, vitamin C, riboflavin and niacin, which can play a role in metabolism. Every 100 g of dry bay leaves simplicia contains 44.1 mg of iron [11] [12]. The results of in vivo research with a duration of administration of bay leaf extract for 14 days at a dose of 2.2 mg can increase Hb levels by 2.4 g%, an amount of 4.4 mg by 1.55 g%, and a dose of 6.6 mg with an increase in Hb levels of 2.65 g% in Wistar strain mice, comparable to the standard treatment of blood supplemented tablets [13]. Bay leaves are safe for consumption because they are proven not to show toxic, teratogenicity, and genotoxic effects in experimental animal [14]. However, the micronutrient content in bay leaves extract is still unknown. Therefore, this study aimed to identify Fe, vitamin C, and tannins contents in the bay leaves.

2 Research Methods

2.1 Materials

Fresh bay leaves were obtained from the herbal sales canter of Merapi Farma Pakem, Sleman Yogyakarta. All reagents used in the study were bought from Merck Germany unless otherwise stated, whereas HNO3, aqua dest, Na2CO3, and Folin Ciocalten reagents were provided by the Laboratory of Pharmaceutical Biology and Pharmacology, Ahmad Dahlan University, Yogyakarta.

2.2. Extraction of Bay Leaves

Fresh bay leaves were washed with tap water and then dried in a closed room for seven days. Selected dry leaves were grounded using a hammer mill and then sieved with 40 mesh. Bay leaves Simplicia were extracted with 70% ethanol or 100% methanol using the maceration method with a 1:5 ratio. The extraction step was repeated twice to get a higher iron concentration. Bay leaves suspension was then filtered with 0.45 µm membrane paper, and the supernatant was dried with a rotary vacuum evaporator at 50 °C 60 minutes. The yield of bay leaves extracts was calculated with a formula:

\[ \text{Yield} = \frac{\text{Weighted extract}}{\text{Weighted Simplicia}} = 100\% \]

2.3 Quantification of Micronutrient Levels in Bay leaves Simplicia and Extract

Iron and vitamin C levels in a bay leave Simplicia were measured using Atomic Absorption Spectrophotometry (AAS) and titration assay conducted at the Chem-Mix Pratama Laboratory Yogyakarta. 0.125 g bay leaves extract was added into 15 ml HNO3, add aqua dest 25 ml, and Atomic Absorption Spectrophotometry (AAS) analyzed with a wavelength of 248.4 nm. To measure vitamin c using the titration method, 10g of bay leaves Simplicia was dissolved with aquadest 100 ml and then filtered by centrifugation. The diluted solution was input into 5- 25 ml Erlenmeyer and added with 2 ml of 1% alum. Finally, the mixed solution was titrated with
0.01N iodine until it turns blue-violet [15].

For quantification of iron levels in bay leaves extract was conducted at the Integrated Research and Examination Laboratory Gadjah Mada University Yogyakarta with the same method as described before. In contrast, Vitamin C levels were examined using the spectrophotometer method. In brief, 100 mg bay leaf extract was dissolved in 5 mL aquabidest and directly measured using a spectrophotometer at 200-400 nm wavelength [16].

2.4 Quantification of Tannins Levels

A total amount of 100 mg bay leaves extract was dissolved in 2 ml aqua dest and was filtered to get a clear supernatant. After that, the supernatant was diluted with aqua dest to achieve a 5 ml final concentration. 300 µL diluted bay leaves extract was added to 1.5 mL Folin Ciocalteau reagent and shook thoroughly for 3 minutes. 1.2 mL of 7.5% Na2CO3 solution was added into the previous solution and was then incubated for 1 hour at room temperature. Finally, the mixed solution was read with a spectrophotometer at 600-800 nm wavelength.

3 Results and Discussion

Table 1 presented the results of bay leaves extraction using ethanol 70% and 100% methanol. The extract yield using 70% ethanol was similar to the extract yield using 100% methanol. Our research findings

<table>
<thead>
<tr>
<th>Fresh Weight (kg)</th>
<th>Dry Weight (kg)</th>
<th>Simplicia (g)</th>
<th>Extract (g)</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol 2.000</td>
<td>1.200</td>
<td>250</td>
<td>83.7</td>
<td>33.2</td>
</tr>
<tr>
<td>Methanol 2.000</td>
<td>1.200</td>
<td>250</td>
<td>80.6</td>
<td>32.12</td>
</tr>
</tbody>
</table>

Where different from the previous research findings ethanol and methanol. The yield of ethanol extract of bay leaves in our study was higher than in the last survey (10.56%) [17]. The yield of methanol extract with a ratio of bay leaves simplicia and solvent (1:1) obtained a yield of 27.03% [18]. One of the causes of the high yield in this study is the comparison of the number of samples with solvent. The results showed that the yield of ethanol was 33.3% and methanol 33.12%, with a comparison of simplicia bay leaves with solvent (1:5). The more solvent is added, the contact between the material and the solvent that serves as the extraction medium will result in a high extract yield [19].

To figure out the macronutrient composition, we analyzed Fe and vitamin C levels in bay leaves simplicia. Table 2 indicated that the Vitamin C levels in basin leave Simplicia were higher than the Fe levels in bay goes simplicia. In comparison to the food composition from the Indonesian ministry of health, Fe levels in our simplicia were lower than Fe levels in the food composition (44.1 mg/100g), while the vitamin C levels were higher than that of the food composition (0.40 mg/100g). Fe analyzed method by AAS and vitamin C with titration [12]. While the results of the study in Table 2 obtained Fe of 14.81 ± 0.07 mg/100g analyzed with the AAS method and vitamin C 29.42 ± 3.76 mg/100g by titration. The research finding in our study is different from the Basir study [20], in which vitamin C levels in bay leaves simplicia are 0.55%.
<table>
<thead>
<tr>
<th>Bay Leaves Simplicia</th>
<th>mg/100g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe</td>
<td>14.81±0.07</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>29.42±3.76</td>
</tr>
</tbody>
</table>

Iron levels in a bay leave simplicia from our study are only 14.81 ± 0.07 mg/100g, which is insufficient to meet the iron daily need for adult women (18 mg/day) [21]. Iron (Fe) is a micromineral necessary for the formation of red blood cells [22]. Therefore, it requires extraction of bay leaves simplicia to enhance iron concentration [23]. The result of our study shows that ethanol extraction of bay leaves contains 30.09 mg/100g Fe, more significant than the methanol extract of bay leaves. Ethanol solution has OH group polar and CH2CH3 group non-polar, which the opposing group can attract active compounds in the bay leaves extract. In addition, ethanol solvent has several characteristics: low toxicity, neutral charge, and sound absorption. The ethanol can be mixed with water in various ratios that can inhibit > 20% germs growth [24]. Meanwhile, methanol solvent is avoided further extraction because of its acute and chronic toxicity [25].

We further analyzed the Fe, vitamin C, and tannin levels in bay leaves extract using the 70% ethanol and 100% methanol with the maceration method (Table 2). In general, ethanol extract of bay leaves had higher levels of vitamin C (9.39 ± 0.05%) and tannins (3,522.63 ± 39.73 ppm), compared to methanol extract of bay leaves (5.34 ± 0.04% and 2,306.84 ± 18.98 ppm respectively). To our knowledge, we have not yet found any publication related to Fe and vitamin C levels in bay leave extract. Bay leaves are a rich vitamin C source that can help iron absorption by converting Fe$^{3+}$ into Fe$^{2+}$ in the presence of the duodenal cytochrome B reductase (DCYTB) enzyme [22].

Bay leaves also contain phytochemical compounds. Tannins are one of the phenolic compounds and also in plants act as a defense against microorganisms [26]. Another study showed that the tannin content with ethanol solvent was 0.1688%, acetone 0.1452%, and water extract 0.62% by maceration method with a ratio of 50g sample and 500 ml solvent until a liquid extract is obtained [27]. The higher the amount of solvent used, the removing the target compound into the solvent can occur more optimally [19]. The results of our research in the form of thick extract using maceration method with a ratio of sample and solvent (1:5) obtained tannin content (3.522.63 ± 39.73 ppm) ethanol and (2.306.84 ± 18.97 ppm) methanol solvent.

Fresh bay leaves sample used in this study was a mixture of old and young leaves. The category of leaves can influence the high tannin of bay leaves. Old leaves have very high tannins

Table 2. Results of Fe and Vitamin C levels in Bay Leaves Simplicia.

<table>
<thead>
<tr>
<th>Bay Leaves Simplicia</th>
<th>mg/100g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe</td>
<td>14.81±0.07</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>29.42±3.76</td>
</tr>
</tbody>
</table>

Table 3. Results of Fe, Vitamin C, and Tannins Concentrations in Bay Leaves Extract.

<table>
<thead>
<tr>
<th></th>
<th>70% Ethanol</th>
<th>100% Methanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe</td>
<td>30.09 mg/100 g</td>
<td>0.09 ± 0.11 (ppm)</td>
</tr>
<tr>
<td>Vitamin C (%)</td>
<td>9.39 ± 0.05</td>
<td>5.34 ± 0.04</td>
</tr>
<tr>
<td>Tannins (ppm)</td>
<td>3,522.63 ± 39.73</td>
<td>2,306.84 ± 18.98</td>
</tr>
</tbody>
</table>

$^a$ AAS
$^b$ Spectrophotometer
$^c$ Spectrophotometer
compared to young leaves [28]. The environment in which it grows can also affect plant analysis of the chemical content of plants [27]. Cultivated crops may be more controlled for various aspects that reduce the quality [25].

4 Conclusion

Maceration of bay leaves using ethanol and methanol solvents yields similar extracts, but the ethanol extract has higher Fe, vitamin C, and tannins levels than the methanol extract. In addition, bay leaves Simplicia has lower Fe and vitamin C levels than the bay go excerpts. In the future, ethanol extract can be used for Fe supplementation combined with other high Fe extracts.

Acknowledgements. The authors would like to thank the Laboratory of Pharmaceutical Biology and Pharmacology, Ahmad Dahlan University, Yogyakarta, Integrated Research and Examination Laboratory Gadjah Mada University Yogyakarta, and Chem-Mix Pratama Laboratory Yogyakarta for testing micronutrients and phytochemicals in our extractions and simplicia.

References


Promoting Students Critical Thinking through Massive Open Online Course

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Abstract. The process of transmitting knowledge and educational paradigms are evolving as a result of advancements in information technology. Various remote education systems, often known as MOOCs (Massive Open Online Courses), have evolved in tandem with the advancement of the times. MOOC is an alternative to formal education in today's environment, with a learning paradigm and certifications that are similar to conventional education that can promote the students critical thinking. Certain strategies promoted during MOOCs may improve learners' critical thinking abilities. Learners were apparently encouraged to participate in questioning activities, encourage interaction, and develop a sense of critical thinking.

Keywords: Technology, MOOC, Critical Thinking.

1 Introduction

The function of the education community cannot be isolated from developments in the field of educational technology, which are always changing. The rapid development of information technology, which may produce software and hardware, is one of the aspects that supports the achievement of educational goals or concepts. Currently, the educational paradigm has evolved to include information technology as a medium for knowledge acquisition, both in the classroom and through academics and research [1].

There is currently no official record establishing the official launch of e-Learning in Indonesia. Efforts to establish e-Learning have been proposed since early 1995, according to numerous interviews, but e-Learning was forced to be discontinued until the early 2000s due to the economic and political crisis that hit Indonesia in mid-1997 [2].

Various educational institutions conduct large E-Learning learning during the Covid 19 Pandemic, beginning with the use of LMS (Learning management systems, video conferencing, social media groups, etc.) [3]. Massive Open Online Courses (MOOCs) are a type of E-Learning that has been developed but is yet rarely used (MOOC) [4]. MOOCs are a type of online training that is mass-produced with the goal of improving participant performance in specific subjects. The participation of users in the forums provided on the service site is one of the most significant features of MOOC-based learning [5].

Participants in a MOOC can select from a selection of classes based on their subject of interest. MOOC classes include a wide range of topics, including education, economics, computers, and biology. Participants will receive video lectures and important materials on the area after enrolling in the class. Furthermore, most MOOCs include projects that can be completed to have a better knowledge of the topic being taught. Because flexibility is an
important feature of MOOCs, participants are given the option of when they can access course materials and assignments.

2 Research Methods

A review of the literature was utilized as the methodology of investigation in this study. As a research study, a literature review, also known as a literature study, is a kind of inquiry that contains concepts that are connected to the topics under examination [6]. The ideas and assumptions given in this section are evaluated in light of the current literature, which is comprised of articles from a range of scientific journals and other publications [7]. After everything has been said and done, the ultimate goal of a literature review is to create concepts or ideas that will serve as the basis for future research endeavors.

Following the gathering of all of the information, the next step is to evaluate it in order to reach a conclusion on the subject matter under consideration and content analysis techniques throughout the data analysis process was used. [8]

3 Results and Discussion

3.1 MOOC for promoting students’ critical thinking

The massive open online course concept (MOOC) is very new and provides free internet classes for large-scale student registrations. Although most students don’t get the college credit, MOOCs draw millions of students to take various courses each year [9]. The new environment of the MOOC leaves instructors with thousands of enrollments to educate, some without knowing how to teach in the new online setting. Many see teaching MOOCs as experimental, and educators thus employ a range of methods to promote engagement and learning of students.

Massive Open Online Course (MOOC) is a kind of online learning that allows for the scaling of a huge and diverse group of learners spread over many and distant places [5]. This MOOC-style learning activity is often conducted online, through a website that is accessible over the internet. MOOC is already proved increasing the students’ critical thinking.

Critical thinking is more than simply the act of thinking; it has also become an essential talent to have [10]. Critical thinking was rated higher than creativity or information and technology expertise as an essential talent greatly needed in future job experience. Considering all of the critical thinking definitions presented above, as well as its essential advantages in the workplace, it is reassuring to know that the feeling of critical thinking is linked with cognitive ability and the process of higher level thinking. Before entering the professional world, one must first get experience in critical thinking in school.

Students who participate in MOOCs may feel more confident in their ability in increasing their critical thinking skill. Most of the theoretical arguments in favor of the asynchronous interactions accessible in MOOCs for the purpose of encouraging critical thinking have focused on the students' chances to actively absorb material, ponder, and explore issues before replying to them [11]. Recapitulating all of the reasons, it can be claimed that MOOC is more popular, conducive, and compatible than conventional pedagogical approaches in terms of improving students’ critical thinking in contemporary educational environment than some others.

3.2 Some MOOC Activities for asingincrcritical thinking
There are some activities through MOOC that can improve the students critical thinking. The activities are

1. Discussion Forum
   Discussion forums are utilized in a variety of ways by teachers to facilitate and promote student engagement and social learning [12]. While techniques of forcing students to post are likely to boost student participation on forums, they do not encourage reading, commenting, or participating in meaningful discussion. Furthermore, teachers tried to encourage student involvement on forums through modeling, in which an instructor would make a forum post, wait for a response, and then engage a student or a few students in a conversation.
   Another technique for enhancing social learning in forums was the practice of student modeling, which required students to complete assignments through a dedicated forum [13]. This may not work for every kind of class — a quantitative course with assignments that clearly yields right or incorrect responses would be giving away the correct answer after a few postings.

2. Students peer assessment
   Student peers assessed each other's work anonymously, using a criteria given in the course to determine how well they do on their assignments [14]. A point system is used to assess whether or not the work fulfilled specific requirements, and students are asked to award points on a scale. A student was required to provide a numerical evaluation, as well as a justification for the grade they received. Using incentives to encourage student engagement during peer evaluations is another method of ensuring student interaction. In order to pass the course, students are needed to participate in peer evaluation activities [15].
   Students are asked to develop future research ideas based on course contents as part of an individual class project, which has been assigned by the instructors. In addition to grading the projects, peers are permitted to provide comments and had the option of sending the project to the instructors for evaluation. The teachers then evaluated the most popular projects and select the top three students to receive awards.

3. Social activities
   When students feel more connected or socially engaged with an online course, their learning improves. A variety of techniques were employed in the MOOCs examined to make students feel like they were part of a class or more aware of their fellow students [4]. These exercises, if effective, may have helped decrease the psychological distance pupils felt from one another. Other social learning techniques, such as group work, may certainly have enhanced a student's sense of connection to other students, but this category to include activities that appeared to have no other function than enhancing social presence [16]. With the exception of a few techniques, it was impossible to tell whether one was more or less likely to enhance a sense of social presence than another.

4 Conclusion

In conclusion, including critical thinking into MOOCs covers all the bases of contemporary education. All of the critical thinking's essentiality and positivity are becoming desirable skills in the globalized age. Teachers emphasize the ideals, concepts, and behaviors associated with critical thinking as the goal of today's higher education environment. Additionally, the presence of technology, such as MOOCs, is seen as an unavoidable element influencing many dimensions of teaching-learning systems. Whether instructors like it or not, they must get acquainted with technology. MOOC has been proven to be an effective tool for fostering students' critical thinking.
References


Critical Review Of Darwin Evolution Theory And Debilitating Facts

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Abstract. Science is not an eternal building, because science is actually something that is never finished. Although science is based on an objective, rational, systematic, logical and empirical framework, in its development, science cannot be separated from the mechanism of openness to correction. In other words, the truth of science is not absolute truth. The truth of science is a relative truth. That is why, humans are required to always look for development alternatives, both those concerning the methodological, ontological, axiological, and epistemological aspects. Therefore, every scientific development that is born, at least its validity and truth can be accounted for both based on the context of justification and context of discover. Although the theory of evolution is considered by many scientists as a challenge to the beliefs of some religious, ethical, and even scientific beliefs of its time, referring to all the verses of the Qur'an regarding the creation of man, we find that the Qur'an will not face these challenges at all. This is because the verses in it correspond to the direct creation of man, rather than the gradual and gradual creation, or can be taken as an implied meaning. Humans from Adam's generation can be considered the exception to this theory. However, if there are Muslim scholars who accept the theory of evolution, they believe that the structural uniformity of living things is the result of divine thought rather than mere random coincidences in nature.

Keywords: Critical Review, Darwin Evolution Theory, Debilitating Facts

1 Introduction

A scientist must be capable of figuring out facts from observation and use other scientist thoughts that not limited to his/her field of science, to became integrated scientific thought. This is what Charles Darwin did when he developed his natural selection theory. In advancing his thoughts about the origins of species, Darwin show his brilliance about it. He also show his greatness on respect to another finding from people before him. Beside he shows courage to not defending common known and rooted opinion, if as a scientist he founds facts that not in accordance with common opinions and means he could face the risk of blasphemy (Nasoetion, 1988 : 159 – 160).
Science is not an eternal building, because science is actually something that is never finished. Although science is based on an objective, rational, systematic, logical and empirical framework, in its development, science cannot be separated from the mechanism of openness to correction. In other words, the truth of science is not absolute truth. The truth of science is a relative truth. That is why, humans are required to always look for development alternatives, both those concerning the methodological, ontological, axiological, and epistemological aspects. Therefore, every scientific development that is born, at least its validity and truth can be accounted for both based on the context of justification and context of discover (Fannie, 1994: v – vi).

History has shown that at first the branch of science was rooted in philosophy. With the release of this bond from philosophy, specialism becomes increasingly intensive on the one hand, but on the other hand makes us no longer recognize the source of philosophical thought, so that emerge scientists who lose their vision and philosophical orientation (Siswomihardjo, 1994: 17-18). Furthermore, it is explained that philosophy that will encourage us to expand our knowledge horizons, the sharpness of our reflection, the depth of our imagination, the sensitivity of our intuition in such a way as to avoid us from the sickening simplistic thinking, from intellectual haziness, drifting in the currents of the scientific tradition. It is very dangerous if we think that science is a finished product, stagnant-finished, closed from any possible change and renewal.

Higgins (2004: 42) explains the thought of Philo of Alexandria (± 20 BC - 50 BC) that God constantly regulates all things through His mind. His thinking did not precede His creation, and never once did He not create. The forms themselves have been with Him from the beginning. So by constantly thinking He creates and completes all visible things with their principle of existence so that they coexist: the Divine Mind which is always creating and everything sensuous and visible to which it was given a beginning could be exists. From pre-elemental matter God created all things, without holding them, for it is not justified for Him who is happy and blessed to touch chaotic and limited matter. Instead, He uses immaterial powers, to create forms that have been completely designed, so that each genus acquires its corresponding form. God, as God, has foreordained that a beautiful imitation cannot be produced except from a beautiful pattern and that no sensuous object will be perfect if it is not shaped according to an ancient and understandable idea.

One new force involved in this war is Intelligent Design, which we will hereinafter call ID. Between the two warring sides, scientific creationism on the right and evolutionism neo-Darwinism on the left, Intelligent Design enters the battlefield in the middle. Here, it is important to avoid the repeated mistake of the media and scientific organizations that say ID is just another variant of creationism, because it is not. Creationists reject macroevolution—they deny evolutionary development from one species to another. This group accept microevolution—they accept the kinds of mutations and natural selection that we can see in experiments using fruit flies in the laboratory. The creationists' theological commitment is this: God created each species as independent of each other at the time of creation. On the other hand, the theoretical commitment of the ID group is that evolutionary development is designed by a Transcendent Designer. This kind of creation allows for macroevolution, although it does not necessarily require it (Peters, 2006: 106).

The group that is often considered contrary to Darwin's theory of evolution is creationism, which believes that living things of all kinds were created by God. Living things are created separately (there is no common ancestor, or that one kind of living thing is not descended from another kind of living thing). The creationist group first emerged among Literalist Christians who could not accept Darwin's theory of evolution because it was considered contrary to the
narrative of the six-day creation story in the Book of Genesis in the Old Testament, but later it also emerged among Muslims (even though in fact there is no such thing in the Qur'an, specific creation narrative as in Genesis). The reason for the rejection of some religious groups may be due to the assumption that evolution eliminates the role of God in creation, or even that Darwin's theory of evolution supports atheism, although Darwin's theory of evolution as a science cannot interfere with the issue of Divine action, which is in the realm of faith, meaning that it is outside science.

The creationist group has done a lot of criticism of Darwin's theory of evolution. The creationist group explains that if Darwin's theory of evolution is correct there should have been a large number of transitional species during the very long period of change as transitional forms. The remains of these transitional creatures should be in the fossil record. Until now the transition form is very difficult to find. Likewise, transitional areas that have transitional living conditions are currently not found in transitional species with close kinship. So according to the group of creation each species first appeared in a perfect state as we find it today, through the process of creation. Thus the creationist group also believes that it is impossible for an animal to have a structure and habit formed from the modification of a previously living animal with a completely different structure and habit.

As for the instincts possessed by animals, it is impossible to obtain from being modified through natural selection because these instincts are possessed by animals gifted from the Creator. Likewise, nowadays it is known that there are strict boundaries between different species in mating, therefore it is difficult to accept that new species can be obtained by interbreeding their varieties. The creation group also provides an explanation that the oldest layer of the earth where the fossils of living things were found simultaneously is the Cambrian layer, which is estimated to be 500-550 million years ago. From the findings of these fossils, it is known that living things appeared simultaneously so that in the geological literature it is called the Cambrian Explosion (Cambrian Explosion).

2 Literature Review

The discipline of evolutionary biology can be defined to some degree as the continued efforts of Darwin's intellectual heirs to arrive at terms with the strong influence of Darwin's theory of evolution. Darwin based his theory of natural selection, which is a core component of his view, on two arguments. First, plants and animals usually produce many offspring beyond the capacity of their environment (Darwin borrowed this idea from the British economist Thomas Malthus). Second, their offspring are slightly different from their parents and from each other (Horgan, 2005: 153).

Although it is recognized that there are doubts about evolutionary events, as stated by Alberts, et al. (1994: 2) that the discussion of cells in terms of evolution can be dangerous, because most of our knowledge about evolution is nothing more than speculations which in their detailed description may be wrong. We cannot go back in time to witness the unique molecular events that occurred billions of years ago. However, it is believed that every organism and all the cells that make it up, must have originated from or descended from an ancient type of cell through evolution. Evolution in this case goes through two main processes: first, the occurrence of random variation of genetic information that is passed from an individual to his offspring, and second, sorting according to genetic information that has
helped the owner survive and reproduce. Evolution, which is a major stepping stone in biology, has helped in understanding why the living world is so full of diversity.

In the book The End of Science, Horgan (2005: 154) explains that Darwin can only guess what causes all the important variations between generations. In The Origin of Species, first published in 1859, written a view by the French biologist Jean-Baptiste Lamarck, that organisms can pass on to their offspring not only inherited traits (from their parents) but also traits that are obtained (from the course of his life). For example, a giraffe's neck that remains stretched out to reach for leaves in tall trees will alter sperm or ovaries so that its young will be born with longer necks. Darwin was clearly uncomfortable with the view that adaptation is self-created. He rather thought that variations in heredity occurred randomly, and only under the pressure of natural selection did variations adjust to eventually lead to evolution.

In 1937, Theodosius Dobzhansky, an orthodox Christian and biologist, published his book The Genetics and The Origin of Species so that Darwin's theory of evolution and Mendelian genetics could be combined to explain the process of evolution and gene change in populations (synthesis theory). Advances in biology continued to increase and confirmed Darwin's theory of evolution. In 1953 James Watson and Francis Crick discovered the structure of DNA (Deoxyribose Nucleic Acid) as hereditary material that contains chromosomes in each cell nucleus. DNA contains hereditary information in the form of amino acid sequences in proteins and enzymes so that molecular biology is born. Molecular biology allows the research of living things on planet earth to be more and more verifiable through their gene frequencies, although of course the slight percent difference is very significant in the final form (phenotype). With a molecular biology approach, human genes are known to be closest to chimpanzees which have 91% similarity (Indriati, 2006: 101-102).

The long-standing stalemate between supporters of natural and artificial classification systems was largely broken in zoological taxonomy through the success of Darwin's theory of evolution, which is based on natural selection. As Darwin pointed out, the species resulted from organic evolution are not eternally immutable natural entities, nor are they mere fictions. Coherent populations, which isolate themselves, have a true, albeit temporary, reality and are protected by the processes of natural selection and the possibility of variation. In some areas of thought the identification and classification of empirical materials has the opportunity to raise philosophical questions that are easy to erupt conflict (Ravertz, 2004: 143).

The change that causes a type of living thing to advance to a higher degree is called macro-evolution, and that is what is generally meant by the word evolution. So, to explain the way of evolution must distinguish between micro-evolution - macro-evolution. Micro-evolution is evolution that occurs within a particular species, or that results from interbreeding with close species. The evolution of this species is one hundred percent justified because it is carried out by humans in breeding sites or in plant laboratories, to improve seeds. Macro-evolution, as explained above, is a change that makes a type of living thing rise to a higher degree. For example, a fish becomes a snake, a snake becomes a bird, and so on. Such changes appear to contain new organs, such as legs, wings, lungs. We must not speak of the facts witnessed here, for man has never witnessed the transformation of a fish into a snake, or a snake into the form of a bird. However, molecular biology confirms that such changes are possible thanks to mutations in the genetic code or the timing of embryonic development (Leahy, 2002: 65-67).

After Jean-Baptise de Monet Lamarck (1744-1829), and especially after Charles Darwin (1809-1882), biologists sought to discover how evolution occurred. The factors used in the nineteenth century can account for, for the most part, micro-evolution alone. Lamark
emphasizes the influence of the environment and the adaptation of living things to that environment. Darwin underlined natural selection through the struggle for life.

To create macro-evolution, biology must be used. The science has seen spectacular advances since it illuminates the radical role of the genetic code etched in the cell nuclei of living things. This code controls the entire development of the organism. It is at this level that the essential processes of evolution, especially macro-evolution, must be placed, because modifications of the genetic code can account for the birth of new organismal structures, but it is still necessary to find the causes of these new mutations. This is not yet satisfactory at all, because it relies solely on accidental mutations to explain the ascending movement, and the finality of the evidence that characterizes that movement. The role of molecular biology was unknown when Darwin dealt with the problem of evolution, and it was also a deficiency that Darwin's current followers, often called neo-Darwinism, attempted to fill.

Science is a way to know things based on descriptions that can be retested and obtained through human interpretation of observable natural data. Science assumes that everything can be explained materially. Evolution extends the scope of materialistic explanations to living things. This theory incorporates positivism in biology, namely by explaining humans and life from the materialistic side.

Evolution is the most important concept in biology. In fact, a geneticist, Dobzhansky (1973), says that nothing makes sense in biology except from an evolutionary point of view. The theory of evolution explains why millions of species can exist. This principle unifies the entire history of life. In summary evolution states that the diversity of life forms arose as a result of changes in their genetic makeup. Modern organisms are descendants of earlier modified life forms. The study of biological evolution requires a great deal of understanding of genetics, biochemistry, embryology, biogeography, geology, biology, paleontology, molecular biology, and so on.

Interestingly, although the idea of evolution has been accepted by most scientists, this idea is widely opposed by society because of its contradiction with some aspects of the teachings of some religions. The most controversial of this theory is its attempt to explain the origin of man from natural processes. Quthub (1986) rejects it on the grounds that there is no purpose in the evolutionary process, even though God created the world with a specific mean and purpose. This theory is also considered to endanger the faith of students. It is feared that students’ religious beliefs will be shaken and may fade. It is further said that the theory of evolution is clearly contrary to the principles of Islamic aqidah, so that Muslims must choose one of two things: faith or evolution. In recent times, the controversy has intensified with the publication of books by Harun Yahya which popularized the contradictions of Islam with evolution.

The situation is made worse by an atheistic interpretation of the theory of evolution. Richard Dawkins (1995) asserted that it was impossible to become a true atheist before the publication of Darwin's book On the Origin of Species. This theory is considered to provide a solid scientific basis for atheistic beliefs. Futuyma (1986) states that religion becomes useless with the explanation of evolution. Conflicts about evolution are very difficult to reconcile because of the vast areas of dispute, namely science, philosophy, and theology. Each group tries to look at it from its own field of specialization without feeling the need to know the point of view or its relationship to other fields. In addition, although this theory has attracted the interest of the wider community, there are still many misconceptions about the idea of evolution.

Today, many efforts have been made to reconstruct the paradigm of the integration of science and technology and Islam. Since evolution is the sharpest thorn in the relationship
between science and religion, it is interesting to examine some important aspects of the theory of evolution and its relationship to religion. This paper aims to describe some important aspects of the theory of evolution and some of its relevance to religious understanding. It is hoped that the correct understanding of the public about the theory of evolution can provide a proportional assessment.

3 Research Methods

Before the emergence of the theory of Evolution by Charles Darwin, there was actually a French-born figure who stated about the existence of evolution in living things, namely Jean Baptist Lamarck. Lamarck stated that living things pass on the traits they acquire during life to the next generation. Lamarck argues that the giraffe we see today is an evolutionary animal that was once a deer-like animal with a small body and short neck. However, because they have to compete for food, they have to crane their necks continuously to get leaves on trees that are taller than their body size. Giraffes that are not able to adapt to these conditions will die, while giraffes that successfully compete will stay alive and produce offspring. Because the competition process took a very long time, only the long-necked giraffes were left alive. It is this long-necked giraffe that has produced the offspring of the long-necked giraffe to this day. According to Lamarck, the shape and nature of physical activity is hereditary, meaning that it can be passed down to offspring.

Lamarck's opinion above, it is very difficult to be accepted by reason or common sense. How is it possible that in the era of millions of years ago short-necked giraffes had to fight for leaves to meet their food needs? Isn't the tree that provides the leaves abundantly available with varying ages so that the size of the tree also varies greatly. This makes it easier for the short-necked giraffe to get the leaves as a food source.

Another thing that causes Lamarck's opinion to be unacceptable is the emergence of Genetics, which was pioneered by Mendel. It is common knowledge that the form and nature of living beings' bodies acquired through activity or practice are things that cannot be passed down. Bears that trained to be able to ride a bicycle, so this kind of ability obviously cannot be passed down to the offspring of the bear. A bodybuilder due to training in physical activity has such a physical form as we see bodybuilders. Of course, the shape and nature of the body of the bodybuilder will never be passed down to their children automatically.

Darwin's Theory of Evolution can be defined that all living things undergo changes in both physical and character changes due to adaptation to the existence of Natural Selection. These changes occur gradually from simple forms and characteristics to more advanced forms and properties in a very long time, so that new individuals are formed that are different from their ancestors.

Based on Darwin's Theory of Evolution as explained earlier, this will result in several consequences that must be answered or fulfilled. The consequences are: (1) There should be many types or intermediate species, both in the form of fossils and those living at this time. (2) Physical changes and characteristics of living things that occur due to evolution are permanent. Of course, these forms and properties cannot change back to the forms and properties that their ancestors had in the past. (3) It is impossible for types or species of living things at this time or at any time to live together or live in the same time as their ancestors. (4) It can no longer be found types or species of living things that have simple shapes and characteristics because all types or species of living things have turned into complex ones. (5)
The first living creatures on earth are found which are the ancestors or pioneer of all living things that inhabit the earth, both those that have become extinct and become fossils as well as billions of types or species of living things that inhabited the earth at the time.

Of the five consequences that arise as a result of Darwin's theory of evolution it turns out that all or none of them can be fulfilled. This shows that Darwin's theory of evolution is scientifically unacceptable. This has led to many responses to Darwin's theory of evolution such as the Father of Genetics Mendel, Georges Cuvier, and Adnan Oktar, better known as Harun Yahya. All of their responses prove the untruth of Darwin's theory of evolution.

4 Results and Discussion

As reported by the Republika Daily, Tuesday, June 27 2006, in the science and technology and health rubric, evidence was found that the Sea King Coelacanth (Latimeria chalumnae) is still alive. Sasongkojati (2007) in the Science rubric published by Kompas Daily reported the rediscovery of the Coelacanth titled Sea King Caught in Manado Bay, as follows:

Heart felt amazed and pity when first saw a Coelacanth caught in Manado Bay, North Sulawesi, Saturday (19/05) morning. This fish is also named Latimeria chalumnae Smith in honor of the fish expert from the University of Rhodes, Prof. J. L. B. Smith. Previously, similar fish were found around the Comoros Islands in the Indian Ocean, Mozambique and Madagascar. This terrifying creature is so famous because of its figure that seems to contradict Darwin's theory of evolution. Imagine, this fish species has not experienced changes in body anatomy for millions of years like the fossils of its ancestors aged between 70 million years to 360 million years.

On that sunny Saturday morning, the Coelacanth weighing 60 kilograms with a length of 130 centimeters (cm) and a width of 46 centimeters was accidentally lured by two local fishermen, namely Justinus Lahama and his son, Delvi Lahama; near Malalayang beach, Manado. They had only been fishing for a few minutes at a depth of 70-100 meters when the fishing line shook and felt heavy. When the fishing line is pulled there is no significant resistance. But this strange female fish with fins that look like small hands only goes berserk after being placed in the boat.

A fisherman then reported the findings to the local authorities. Since then, there has been an uproar on the beach, which is known as the culinary center in Manado City. Finally this news reached the Governor of North Sulawesi SHS Sarundayang, who immediately coordinated the rescue of the Coelacanth. Minister of Maritime Affairs and Fisheries Freddy Numberi (at that time), who happened to be on duty in North Sulawesi, had witnessed the rare fish.

At 13.00 the poor fish were brought to the fish recovery pond at City Extra Restaurant, Kalasey, while receiving treatment by the owner of restaurant, Willem Inkirawang, and observed by a local employee, Saman Kamea. For several hours the fish had improved, indicated by movement in the fins. However, due to injuries, stress, and unsuitable environmental conditions, finally at 23:40 pm, Saman Kamea confirmed the found Coelacanth had stopped breathing. It only survives for 17 hours. His body was then wrapped in plastic and put in the freezer to await further treatment from the expert team.

The discovery of this ancient fossil fish is the latest discovery after a video recording of research results in the waters of the Sulawesi Sea in June 2006. It is known that the first
discovery of a dead Coelacanth in a market in Manado occurred in 1997 by Dr. Mark V Erdmann of the University of California at Berkeley, USA, and his wife, Arnaz Mehta. It was only on July 30, 1998, that Erdmann managed to catch a fish about 1.5 meters long and weighing 45 kilograms which was caught by a fisherman’s net, Lameh Sonathan, around Manado Tua Island, North Sulawesi, which is 10,000 km from the Comoros Island. This fish had lived for about three hours before being preserved and stored in the Zoology Building, Center for Biological Research, LIPI Cibinong, Bogor.

Two other Coelacanths were recorded at a depth of 145 meters on the Sulawesi seabed in 1999, during an expedition carried out by researchers from the Max Planck Institutes using the Baruna Jaya VIII Ship. Even though it was only a video recording, the subsequent findings still shocked the world. Furthermore, in collaboration with researchers from the LIPI Oceanographic Research Center and Aquamarine Fukushima, Japan, they managed to record its presence using an underwater camera carried by a remotely operated vehicle on May 31 – June 4, 2006. At that time the team managed to photograph five coelacanths. The five were caught on camera in several different places at a depth of more than 150 meters. The discovery of the Coelacanth in Manado was very surprising because scientists suspected the fish had become extinct before being rediscovered on the east coast of Africa in 1938 and for the next 60 years it was not found anywhere else in the world.

Prof. Hans Fricke of the Max Planck Institutes, Seewiesen, Germany, is the scientist who is most actively investigating the Coelacanth. After the death of three divers on an expedition in South Africa who managed to find the coelacanth's living habitat at a depth of 100 meters in 2000, he created his own submarine for the sake of safe diving. He managed, for the first time, to find the habitat of this ancient fish at a depth of between 150-200 meters, living in Manado as Latimena menadoensis by the Comptes Rendus de L'Academie des Sciences in March 1999 because of the different morphological and genetic characteristics of the Latimena chalumnae fish species in the Comoros Islands, Africa. Prof. Hans Fricke said the results of DNA tests showed that the Manado Coelacanth was different from the African species, and even came from an older species. From the differences of fin shape, the number of fin fingers, different colors and a total of 52 percent of other differences, clearly proves this fish is a new species in the world.

Seeing the shape of this fish, it is appropriate if we consider it a living fossil. According to Wikipedia, Coelacanth itself comes from the Greek, which means spines with holes in the fins. Coelacanths are also called ancient fossil fish because, based on their fossils, this type of fish first appeared in the Devonian era (about 400 million years ago) or much older than the dinosaurs in the Triasix period (about 200 million years ago). Prof Fricke said that this type of fish is known to live in underwater caves at a depth of 150-200 meters with a temperature of 18 degrees Celsius. Coelacanths are also classified as fish that undergo fertilization in the body and give birth to children. Fricke added that the presence of flesh-lobby fins resembling the protrusions of the legs and arms, this fish is assumed to be more closely related to quadrupeds (tetrapods) and lung fish than to the types of fish commonly seen.

This fish is thought to have a close evolutionary relationship with the first fish that lived on the coast before living on land about 360 million years ago. This is because the shape of the Coelacanth's fin is thought to be the first development of the evolution of fins into limbs. In addition, Prof Fricke also believes that the origin of the Coelacanth is in the Pacific region which then spread to the east coast of South Africa 3.5 million years ago when the Indonesian archipelago was formed. As is known that the Coelacanth including animals that are slow to develop. From the original population of around 650 individuals in the Comoros in 1989, then in 1995 it has shrunk to half and is currently estimated to be only 200 individuals.
Therefore, as a person who cares about the preservation of nature, the author suggests that it is appropriate to establish a special research agency for Coelacanth fish and in line with that conservation efforts should be carried out. LIPI (Indonesian Institute of Sciences) in collaboration with the Ministry of Marine Affairs and Fisheries as well as the North Sulawesi Provincial Government and Sam Ratulangi University must immediately plan and implement activities with the main agenda of saving and preserving Coelancanths. At the 2009 World Ocean Conference in Manado, the Coelacanth will be the mascot.

5 Conclusion

Although the theory of evolution is considered by many scientists as a challenge to the beliefs of some religious, ethical, and even scientific beliefs of its time, referring to all the verses of the Qur’an regarding the creation of man, we find that the Qur’an will not face these challenges at all. This is because the verses in it correspond to the direct creation of man, rather than the gradual and gradual creation, or can be taken as an implied meaning. Humans from Adam's generation can be considered the exception to this theory. However, if there are Muslim scholars who accept the theory of evolution, they believe that the structural uniformity of living things is the result of divine thought rather than mere random coincidences in nature. The facts of human thought are expressed in descriptions and theories in various writings that inspire alongside generations and after. A theory becomes a scientific truth when it can be proven through experimental facts. Likewise the experts and scientists revealed in the historical facts above. There have been many conflicting views since the origination of the term evolution to the present day. However, each argument has its own reason or basis. The science of evolution will continue to evolve and undergo many phases, likely to remain in controversy. It all comes back to how we look and the extent to which we have knowledge and faith. However, it must be remembered that we must still rely on scientific evidence to guide our belief in the truth of a statement.

References


Description of Mathematical Problem-Solving Skills Reviewed from Student Learning Independence

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Abstract. This research aims to describe mathematical problem-solving skills regarding the learning independence of Muhammadiyah Sempor vocational school students during the Covid-19 pandemic. This research includes a qualitative descriptive study. Data is obtained from learning independence questionnaires, tests of mathematical problem-solving skills, and interviews. Students are grouped into three groups based on the results of the learning independence questionnaire, namely students of the high, medium, and low learning independence groups. Selection of research subjects using purposive sampling techniques. From the data presented, the data validity test was conducted using triangulation techniques. Data obtained in the form of test results and interviews are used to describe students' mathematical problem-solving skills using the triangulation technique. The results showed that students with a high learning independence group were able to meet all indicators, i.e., understanding problems, planning solutions, executing plans, and re-examining. In the learning independence group, learning can meet three indicators, namely understanding the problem, planning a solution, and implementing a plan. Meanwhile, the low learning independence group can meet one indicator that is understanding the problem.

Keywords: Mathematical problem-solving skills, Learning independence, SMK Muhammadiyah Sempor

1 Introduction

During the Covid-19 pandemic, the learning process in Indonesia has shifted. In everyday life, we often encounter a problem, so it takes away from solving the problem. Likewise, mathematics also has problems that require a way or strategy to solve them. Thus, students need to master mathematical problem-solving skills. Because the ability to solve mathematical problems is the ability of students to overcome difficulties in solving problems or math problems Allo et al. [1], according to Kesumawati (Mawaddah and Anisah, 2015) through mathematical problem-solving skills, students can devise mathematical models, determine solving strategies, are able to identify known and asked elements and can double-check the answers obtained [2].

In addition to mastering mathematical problem-solving skills, students are also required to have an attitude of learning independence. Especially now still in the condition of covid-19 where students need an independent attitude in learning. Rohman & Herdiman (Ansori & Herdiman, 2019) suggests that learning independence is the ability of students to practice by studying the subject matter without the help of others so as to reduce students' difficulties when solving given problems [3]. To achieve mathematical problem-solving skills and solve these
problems, students need good behavior, one of which is learning independence. This is in line with research (Sulistyani & Roza, 2020), which states that learning independence can be used as one factor affecting learners' mathematical problem-solving ability [1].

SMK Muhammadiyah Sempor is the only vocational high school located in the Sempor District of Kebumen Regency. SMK Muhammadiyah Sempor is located on Jalan Klampok-Gombong Sampang Jurang Jero RT 03 RW 06 Sempor Subdistrict. Based on the researchers' discussions with teachers, the results showed that when the teacher gave examples of problems that were different from the previous issue, students found it difficult to solve them and were still fixated with the way the teacher's solution. The independence of students in learning is still not maximal. This can be seen when students are less active in participating in learning activities, and when teachers give questions to students, many students do not believe in their own abilities so that which affects the high level of mathematical problem-solving ability of students. The purpose of this study is to describe mathematical problem-solving skills in view of the learning independence of Muhammadiyah Sempor vocational school students during the covid-19 pandemic.

Mathematical problem-solving skills are more focused where students process existing information so as to solve mathematical problems. So in this ability, students do not directly solve problems, but there must be stages that must be implemented. According to Polya (Purnamasari & Setiawan, 2019), the location of solving problems is to know the problem, make a plan, and double-check the steps to get the final result [4]. The ability to solve mathematical problems is an ability to understand problems in math subjects that are considered complicated and difficult to do [5]. Math problem solving is the way that students do when going to look for answers to math problems that come from books, the internet, and real problems in everyday life.

The indicators of mathematical problem-solving abilities used by researchers are:

1) Understanding the problem. Students are able to deepen the crisis and identify the known elements and what is asked in the question.
2) Planning a solution. Students are able to determine the strategies and formulas that will be used to answer the given problem. Students can also illustrate images based on issues if the problem is a matter of the story.
3) Implementing the plan. Students can implement the strategies (settlement steps) that have been prepared at the stage of planning the completion to obtain answers.
4) Re-examining, students can draw conclusions on the answers that have been done whether the answers are in accordance with what is asked.

Independence is the attitude possessed by students so that students do not depend on others to achieve their desires. In this case, students can effectively carry out their learning tasks and do their learning activities independently [6]. In addition, Schunk (Sariningsih & Kadarisma, 2016) states that a person who has learning independence will pursue his long-term task until the task is completed and has the ability to manage his motivation, not only external motivators but also internal motivators [7].

From the description above, the researcher took the following indicators of learning independence:

1) Initiative means the attitude or behavior of students who make themselves driven to do something on their own and without orders from others.
2) By determining learning strategies, students create their own learning schedules with discipline and consistency, looking for learning resources other than teachers and friends and self-study.
3) Student learning activities, independent learning activities are owned and carried out by students to facilitate their learning.

4) Evaluation, students examine the learning outcomes that have been done, as well as assess the advantages and disadvantages that exist in students in order to be better at the next activities and learning outcomes.

5) In interpersonal skills, students have good confidence when dealing with others that is smooth and able to communicate with others and express their opinions without fear of being wrong [8].

2 Research Methods

The type of research used is qualitative descriptive. Qualitative descriptive research is used to describe problem-solving skills in view of the learning independence of students of class X TKJ SMK Muhammadiyah Sempor on Trigonometric material. The research implementation time was carried out during the even semester of the 2020/2021 school year. The number of class X SMK Muhammadiyah Sempor there are two classes. The class used as a research subject is class X TKJ based on direction from a math teacher. The number of students of class X TKJ is as many as 33 students. But in its implementation, only 25 students left for school at the time of the study. Instruments used for the study include learning independence questionnaires, tests of mathematical problem-solving skills, and interview guidelines. The results of the three instruments are used to infer students' mathematical problem-solving abilities because of learning independence. In data collection techniques, appropriate methods are needed following the problems to be examined. The methods that researchers will use are Questionnaires, Tests, Interviews, and Documentation [9].

From the data presented, the data validity test was conducted using triangulation techniques. Triangulation means using several different techniques to the same data source, but the goal is not to seek the truth but rather to improve the researcher's understanding of the data and its facts. Triangulation was used in this study using the triangulation technique that uses various data sources such as questionnaires, tests, and then checked with interviews. The triangulation measures in this study are as follows [10]:

1) Distributing learning independence questionnaires to students of class X TKJ SMK Muhammadiyah Sempor to categorize students into high, medium, and low learning independence each 3 in each category

2) Providing a test of mathematical problem-solving ability with the material tested is Trigonometry

3) Interviewed nine respondents

3 Results and Discussion

Results of Student Learning Independence Questionnaire

Data from the students' learning independence questionnaire obtained from 25 respondents quantitatively showed that the total score of questionnaire results amounted to 1606 with an average of 64.24 and a standard deviation of 9.497. The minimum score is 42, and the maximum score is 79. Based on the average results and standard deviation results of the Learning Independence (KB) questionnaire, used to group students into three groups according to
predetermined criteria, it is necessary to calculate the average plus the standard deviation, and the average is reduced the standard deviation.

**Results of Mathematical Problem-Solving Skills Tests and interviews**

The student's mathematical problem-solving abilities are described based on the results of the test description of mathematical problem-solving abilities with trigonometric materials. The test consists of three questions, with each question consisting of 4 questions according to the indicator. Students answer questions on the answer sheet.

<table>
<thead>
<tr>
<th>Respond</th>
<th>Troubleshooting steps</th>
<th>Test results</th>
<th>Interview</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Learning Independence 1</td>
<td>Understanding the Problem</td>
<td>Students are able to understand the problem. This is shown by students being able to write down anything that is known and asked in the question.</td>
<td>Students can re-explain what is known and asked clearly and use their own language.</td>
<td>Data valid</td>
</tr>
<tr>
<td>Planning a Settlement</td>
<td>Students can plan an initial plan or strategy that will be used to solve existing problems by making illustrations according to the problem and writing the formula to be used at a later stage.</td>
<td>Students re-explain how the original plan will be used to go to the next stage.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students can perform calculations with the correct steps according to the previously made plan.</td>
<td>Students are able to re-explain the completion steps when performing calculations.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Check Back</td>
<td>Students have re-examined the answer to the question by drawing conclusions.</td>
<td>Students are able to re-mention the conclusions obtained.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>High Learning Independence 2</td>
<td>Understand the problem</td>
<td>Students are able to understand the problem. This is shown by students being able to write down anything that is known and asked.</td>
<td>Students can re-mention what is known and asked in the question clearly.</td>
<td>Data valid</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Expected Outcome</td>
<td>Valid Data</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students are already able to plan the solution by drawing illustrations according to the problem clearly.</td>
<td>Students are able to explain again how the initial plan will be used to the next stage.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students are already able to carry out calculations with systematic measures.</td>
<td>Students can re-explain how problem-solving steps are using their own language.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Recheck</td>
<td>Students can draw conclusions. But on question number 3, students are not yet right in drawing conclusions.</td>
<td>Students can mention the conclusions they reached. But students are still confused when drawing conclusions on question number 3.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>High Learning</td>
<td><strong>Independence 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the problem</td>
<td>Students have written down what is known and asked briefly and clearly.</td>
<td>Students are able to re-mention what is known and asked in the question item.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students have written the completion plan by drawing illustrations according to the problem and writing the formula that will be used at a later stage.</td>
<td>Students can re-explain how the original plan and formula were used.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students perform calculations correctly and systematically in solving problems.</td>
<td>Students can re-explain the steps taken to solve the problem.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Independence of Learning</td>
<td>Task Description</td>
<td>Student Performance</td>
<td>Data Validity</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------</td>
<td>---------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Understand the problem</td>
<td>Students can write down what they are asked and asked questions.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning a settlement</td>
<td>Students can make the initial plan used by making illustrations in the form of images according to the problem but do not write the formula to be used.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementing a plan</td>
<td>Students write down the settlement steps correctly.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recheck</td>
<td>Students can re-examine by drawing conclusions on question number 1. At number 2, the student does not draw conclusions. And number 3 students are still wrong in drawing conclusions.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Understand the problem</td>
<td>Students have written down important things that are known and asked in the question item.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning a settlement</td>
<td>Students have made an initial plan by making illustrations in the form of images but do not write the formula to be used.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Students can write down the calculation steps correctly.</td>
<td>Students are able to re-explain the problem-solving stages with their own language.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>Recheck</td>
<td>Students can double-check between the answer and the question by drawing conclusions only in the number 2 question item only.</td>
<td>Students can only draw conclusions on question number 2 only, and others are still confused.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Learning Independence Is 3</td>
<td>Students have written down information that is known and asked appropriately.</td>
<td>Students are able to re-mention what is known and asked in the question item.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students are able to write the initial plan for the next stage by making illustrations of the image but not writing the formula to be used.</td>
<td>Students can explain how the initial plan will be used to get to the next stage well.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students perform calculations correctly, and the steps are complete.</td>
<td>Students are able to re-explain the steps of completion.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Recheck</td>
<td>Students are still wrong when drawing conclusions.</td>
<td>Students don't understand how to draw conclusions.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Low Learning Independence 1</td>
<td>Students are able to write down what is known and asked from the question.</td>
<td>Students can mention anything that is known and asked in the question.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students make an initial plan by drawing illustrations, but they are not precise and do not</td>
<td>Students only compose while drawing their illustrations and are</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td>Students do the right calculations on number 1 only.</td>
<td>Students feel confused when doing calculations on the numbers 2 and 3.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students can re-examine by drawing conclusions but still go wrong.</td>
<td>Students can't draw conclusions and just makeup when answering them.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Recheck</td>
<td>Students can write down anything they want and ask questions.</td>
<td>Students re-mention known information and are asked.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Low Learning Independence 2</td>
<td>Students only make illustrations of the picture is still wrong and does not write the formula to be used.</td>
<td>Students are still confused about what to use to solve the problem.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students perform calculations but are not precise because they are wrong in the formula and in substituting the numbers.</td>
<td>Students find it difficult to perform calculations.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students don't check back. Number 2 has checked back by drawing conclusions, but the answer is not correct.</td>
<td>Students still feel confused at an earlier stage, so it is still wrong when drawing conclusions.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Low Learning Independence 3</td>
<td>Students can write down anything they know and ask.</td>
<td>Students mention what is known and asked.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students write the initial plan by making illustrations according to the problem, but the picture is still wrong and does not write the formula to be used.</td>
<td>Students do not understand the formula to be used.</td>
<td>Data valid</td>
<td></td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students are wrong in doing calculations because the formula used is also wrong.</td>
<td>Students still find it difficult to do calculations.</td>
<td>Data valid</td>
<td></td>
</tr>
</tbody>
</table>
Based on the results of the validity test conducted, researchers describe mathematical problem-solving skills in view of the learning independence of muhammadiyah sempor vocational students as follows:

Table 2. Mathematical Problem Solving Ability Reviewed from Student Learning Independence

<table>
<thead>
<tr>
<th>Indicators of Mathematical Problem Solving Skills</th>
<th>Learning Independence Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tall</td>
</tr>
<tr>
<td>Understand the problem</td>
<td>Students are already able to understand the problem by writing down important information that is what is known and asked appropriately.</td>
</tr>
<tr>
<td>Planning a settlement</td>
<td>Students are already able to plan the completion by writing mathematical formulas appropriately and can make illustrations according to the problem item.</td>
</tr>
<tr>
<td>Implementing a plan</td>
<td>Students are already able to carry out the plan by writing the calculation steps according to mathematical formulas that have been made correctly and systematically.</td>
</tr>
<tr>
<td>Recheck</td>
<td>Students can re-examine by drawing conclusions and double-checking</td>
</tr>
</tbody>
</table>
whether the answer is in accordance with the question given. written wrong, and I doubt the conclusions. obtained because they are having difficulty at the stage of implementing the plan.

4 Conclusion

Based on the results of research that has been carried out related to mathematical problem-solving ability in terms of the learning independence of Muhammadiyah Sempor Vocational School students during the Covid-19 pandemic, it was concluded that students with high learning independence during the Covid-19 pandemic could already solve the problem well. Students can write down what is known and asked clearly by writing down only the important points. Students also know the formula to be used and can make illustrations in the form of images well. When doing calculations, groups of students with high learning independence can write down the steps of calculation well and systematically so as to produce the correct answer. Students of high learning independence can also re-examine by drawing the correct conclusions because they have checked from the first stage to the stage of doing calculations whether the answer to the conclusion is in accordance with what is asked. Based on this, students of high learning independence have been able to meet the stages of solving mathematical problems, namely understanding problems, planning solutions, implementing plans, and re-examining. During the interview, the student can explain the settlement steps clearly.

Students with moderate learning independence during the Covid-19 pandemic are able to write down important information that is known and asked even though the sentence used is still the same as the problem. But it's still understandable. At the stage of planning completion, students can make illustrations in the form of images well even though they have not written the formula that will be used for the next stage. Because at the time of the interview, they said that they did not write the formula because it was directly applied to the plan. They can also perform calculation steps correctly and systematically. The formula used is right so that it produces the right answer. When re-examining, most students are still wrong when concluding. Because students do not double-check whether the answer is following what is asked, students with learning independence fulfill three indicators of mathematical problem-solving skills: understanding problems, planning solutions, and implementing plans.

Students with low learning independence during the Covid-19 pandemic have been able to understand the problem. Students can write down anything they can. At the stage of planning the completion of the group of students, low learning independence already makes images, but the welcome images are not appropriate. They also do not write down the formula to be used because during the interview said that they do not know what formula is used. Because in the previous stage, students do not know how the formula will be used, then at the stage of implementing the plan, the answers produced by students are also wrong. And the calculation steps are still wrong. Students can't draw conclusions. Therefore, students of low learning independence are only able to reach the stage of understanding the problem only.
References


Description of Students' Mathematical Creative Thinking Skills Reviewed From Gender Differences

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Abstract. The study describes students' mathematical creative thinking skills in terms of gender differences in quadrilateral and triangular materials. The type of research used is qualitative descriptive research. The subjects in this study were students of class VII C of State Junior High School 2 Gumelar using purposive sampling techniques. Researchers took three male students and three female students as research subjects. The data analysis techniques used in this study include data reduction, data presentation, and conclusions. From the data presented, the data validity test was conducted using triangulation techniques. Data obtained of test results of students' mathematical creative thinking skills, interviews, and documentation was used to describe students' mathematical creative thinking skills using the triangulation technique. There are four indicators used in research, namely smoothness, authenticity, detail, and flexibility. The results showed that male students could master one indicator of mathematical creative thinking ability: authenticity. While female students can master indicators of mathematical creative thinking skills, namely smoothness, authenticity, and detail, but cannot master the indicators of flexibility.

Keywords: Mathematical creative thinking skills, Gender, State Junior High School 2 Gumelar

1 Introduction

During the Covid-19 pandemic, the learning process in Indonesia experienced a paradigm shift in the way students learn. This causes learning to be done online either with the guidance of parents or without direction. Therefore, most students have not been able to adapt themselves to face the challenges and activities that they must complete in the learning system that is done online or online. Not all students will be successful in online learning and get maximum results. Nakayama [1]. In education, the ability to think mathematically until now still received less attention from both students and teachers. Zheng Zhu found that one factor can cause the ability to think students mathematically in each individual is different. That factor is the gender factor.

Gender is cited as one of the factors that can affect it because it is suspected that there is a difference in ability between men and women [2]. Gender is the difference between a man and a woman based on society's social and cultural constructs, not from the biological condition of a human being [3]. Gender differences cause some people to have thoughts about whether the way a person thinks and learns is also different. Likewise, with students' mathematical creative thinking skills, most people must think whether students' mathematical creative thinking skills are also different because they are influenced by gender differences [4]. But the gender...
differences also cannot fully conclude more clearly which men and women are superior to their creative mathematical thinking skills [5]. The expected goal in the research conducted by researchers is to describe the mathematical creative thinking skills of 2 Gumelar State Junior High School students in terms of gender differences in covid-19 conditions.

Mathematical thinking, commonly called the ability to think at a high level in mathematics, consists of several abilities: thinking systematically, logically, critically, creatively, analysis, systematic problem solving, reasoning, and communication [6]. High-level mathematical thinking skills need to be continuously improved and developed. One of them is the ability to think creatively. According to Suryadi and Herman (Putra, 2016), creative thinking skills are a form of thinking to express new relationships, form new combinations, and see things from a new and different perspective [6]. Munandar [7] also defines that creative thinking skills are a thinking ability that is used to obtain many alternative answers to problems or problems with the emphasis of the answer focused on accuracy, diversity, and the many alternative solutions provided. In this study, researchers used the following indicators of mathematical creative thinking skills:

1) **Fluency** includes a student's ability to solve problems and provide more than one answer to a particular math problem.
   
   **Flexibility** includes the student's ability to provide answers with many polishing strategies to certain mathematical problems.

2) **Originality** includes students' ability to use new, unique, unusual strategies, and rarely given by most students in solving certain mathematical problems.

3) **Elaboration** includes the student's ability to solve certain mathematical problems by expanding an idea and detailing the details of an answer.

Based on the results of observations made with the Teacher of Mathematics at SMP Negeri 2 Gumelar, in the situation and conditions in the Covid-19 pandemic today, students of State Junior High School 2 Gumelar can think mathematically diverse creatively. This is evidenced by the student learning results in the form of daily assignments and replays given by the teacher of subjects where students' answers when working on the given problems are very diverse [8]. Some students can give varied answers, and some have not been able to develop answers that are given or can be said to be monotonous.

2 **Research Methods**

Qualitative descriptive research is a study that describes data in the form of words to produce a clear and detailed picture of Sugiyono [9]. In this study, researchers analyzed the study's results only to describe the students' mathematical creative thinking skills reviewed from gender differences according to established indicators by analyzing the data and presenting facts systematically. This research was carried out at SMP Negeri 2 Gumelar is a Junior High School (SMP) located on Paningkaban Highway, Paningkaban Village, Gumelar Subdistrict, Banyumas Regency. SMP Negeri 2 Gumelar consists of 18 classes. The number of students of State Junior High School 2 Gumelar is 566 students consisting of 180 students in 7th grade, which is divided into six classes, 197 8th grade students divided into six classes, and 189 9th grade students divided into six classes. In this study, researchers took class 7, class 7C as a research subject. Class 7 consists of 24 students consisting of 11 male students and 13 female students. Researchers conducted the study in grade 7C because a maths subject teacher had suggested it. For the selection of samples in this study, researchers chose to use the Purposive
Sampling technique, which is sampling based on specific goals or considerations. In this study, one class will be selected for a sampling of respondents. In this study, researchers involved the help of teachers to consider samples; the considerations were also seen based on test results on students' mathematical creative thinking skills and selecting students who were easy to interview.

In this study, researchers used data collection techniques in the form of tests, interviews, and documentation. Here is the description of data collection techniques [10]:

1) Written test, in this study, uses written tests to measure the ability of mathematical creative thinking skills in the form of 4 (four) questions of description. This written test is done once students receive quadrilateral and triangular materials to analyze students' mathematical creative thinking skills reviewed from gender differences. The preparation of instruments of students' mathematical creative thinking skills begins by determining the purpose of the test, adjusting the test grid, and creating test questions based on material indicators whose characteristics correspond to the grids that have been created. This mathematical creative thinking ability test is shared with students online through the social media platform WhatsApp by sending a soft file test of mathematical creative thinking skills in the research class. Then students also send back the results of the answers to the mathematical creative thinking skills test through WhatsApp to researchers in the allotted time.

2) Interviews conducted in this study are in the form of structured interviews, where the researcher outlines the subject matter. Still, in the implementation later, the researcher does not ask questions sequentially and in the implementation of the interview uses non-standard sentences so that respondents are relaxed and free in answering questions from researchers. Interviews in the study were conducted to get information on data - qualitative data that researchers could not get from written test results through WhatsApp. In addition, interviews are also conducted to support data that has been obtained based on the results of mathematical creative thinking ability tests from interview guidelines that have been compiled based on indicators of mathematical creative thinking ability. Researchers conduct interview activities to students who have been selected as samples through WhatsApp social media so that interviews can be done through chat or voice messaging features that WhatsApp social media have provided.

3) Documentation is used so that the data obtained from test results and interviews can be trusted because documentation complements the test method and interviews that have been done before—documentation in this study in the form of photos of test results of students.

3 Results and Discussion

Data that has been obtained to explain mathematical creative thinking skills reviewed from the gender differences of students is checked using triangulation techniques to be more trusted. As for the complete triangulation table. From the triangulation table inferred for each indicator and gender is obtained:

Table 1. Triangulation of Mathematical Creative Thinking Skills

<table>
<thead>
<tr>
<th>Subject</th>
<th>Fluency Indicators</th>
<th>Flexibility Indicators</th>
<th>Originality Indicators</th>
<th>Elaboration Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Male respondents</td>
<td>Male</td>
<td>Male</td>
<td>The male</td>
</tr>
</tbody>
</table>
Based on the results of written test descriptions and interviews conducted from six selected students, mastery of indicators of mathematical creative thinking skills students are punctured from gender differences in solving mathematical problems can be described. These aspects of creative mathematical thinking consist of aspects of fluency, flexibility, originality, and elaboration. The following are the research results on the mathematical creative thinking skills of State Junior High School 2 Gumelar students in terms of gender differences. Here is an explanation of the research results on the mathematical creative thinking skills of state junior high school students 2 Gumelar reviewed from gender differences in covid-19 conditions. Based on the results of research from written tests, male students cannot understand problem number 1, which contains fluency indicators. Judging from the three answers from male students, the three gave only one possible answer where two students answered with the right answer and one student answered with the wrong answer. This is shown from the ability of students who can only provide one possible answer to determine one side of the flower garden in the form of a right triangle or rectangle with the size of one side and the area already known.

Overall, the three male students were unable to provide another possible answer to problem number 1. As for problem number 2, male students are able to understand the problem well so that they can get the right information from problem number 2. The three male students were already able to meet the indicator of originality. Because the three male students are already able to give answers that they think are new and unique, this was shown by the answers of the three male students who differed from each other to solve problem number 2 related to drawing a combination of flat wakes that include quadrilateral and triangles that have a circumference of 140 cm. Of the three male student answers related to question number 2, overall, it appeared that all three male students were able to give new and unique answers. Still, only two male students answered with the right answer, and one male student answered incorrectly. This shows that male students have been able to master the indicator of originality because they can provide answers that they think are new and unique.

In addition, for the elaboration indicator on question number 3 of the three male students, only one male student met the elaboration indicator. This is indicated by the answer from one male student who can calculate the circumference of the field and the cost of installing rectangular field barriers in a sequence or detailed way. The three male students, only one male student, gave answers in a sequenced or detailed way, while two male students were unable to answer in a sequenced or detailed way.
Overall, male students are unable to answer in such a sequenced or detailed manner that it can be said that male students cannot master elaboration indicators. As for problem number 4, which contains flexibility indicators, it is seen that male students are unable to understand problem number 4. The three male student answers show this, all three of which cannot provide an alternative solution of more than one or only provide one alternative solution. Although the three male students were only able to provide one alternative solution, the three male students were able to correctly determine the area shaded from waking flat on question number 4. This shows that male students cannot master the flexibility indicator because they are only able to provide one alternative solution to problem number 4. Based on the research results on written tests, female students can understand problem number 1, which contains fluency indicators. It is seen that female students can provide other possible answers that are different and also true. The three female students provided two different possible answers to look for the size of the other side of the right triangle-shaped flower garden and the other side of the rectangular flat wake.

Overall, the three female students were able to complete it with different possible answers. The results were also correct, so it could be said that female students could master the fluency indicator. For problem number 2, which contains originality indicators, the three female students can understand the problem well. Of the three female students, all three provided answers that they thought were new and unique. This can be seen from the three answers of female students in resolving the problem of problem number 2, who was asked to draw a combination of flat wakes that include quadrilateral and triangular and determine the size of the circumference so that it becomes 140 cm where all three female student answers are correct and also according to the new and unique.

Overall that female students have been able to master the indicators of originality. In addition, for the elaboration indicator on question number 3 of the three female students were able to meet the elaboration indicator. This is indicated by the answers of the three female students who have the ability to calculate the perimeter of the field and the cost of installing rectangular field barriers in a sequence or detailed way and also true overall that the three female students were able to answer in a sequenced or detailed way and with the correct answer so that it can be said that female students are able to master elaboration indicators. As for problem number 4, which contains flexibility indicators, it is seen that female students are not able to understand problem number 4. This is shown by the three answers of female students, and all three are not able to provide an alternative solution of more than one or are only able to provide one alternative solution only. Although the three female students were only able to provide one alternative solution, the three female students have been able to give the correct answer in determining the area shaded from waking flat on question number 4. This shows that female students are not able to master the flexibility indicator because they are only able to provide one alternative solution to problem number 4.

The results of this study are in line with the results of the study Suciyati et al. (2017) that the mathematical creative thinking ability of female students is higher, or it can be said that female students master more indicators of mathematical creative thinking skills compared to male students. Where male students are only able to master one indicator, namely details, and female students master three indicators, namely smoothness, flexibility, and authenticity. In addition, the results of this study are also in line with the results of Novianti' research et al. 2018) that students who have high thinking skills are able to meet two aspects of creative thinking skills, namely aspects of affability and flexibility, students with creative thinking skills are being able to meet one aspect of creativity only, while students with low creative thinking skills are not at all able to meet all aspects of creative thinking ability. From the results of research
conducted by researchers, it is seen that the mathematical creative thinking ability of male students and also female students in covid-19 conditions is the same as before the condition of covid-19 where male students are able to meet the indicators of mathematical creative thinking skills less than female students who are able to meet the indicators of mathematical creative thinking skills more.

4 Conclusion

Based on the results of research on the description of mathematical creative thinking skills of state junior high school students 2 Gumelar reviewed from gender differences in the condition of covid-19 in class 7C can be drawn some conclusions that male students are not able to provide various other different possible answers, able to provide answers in new ways or strategies, unable to solve problems in a sequence or detailed way, And unable to provide an alternative answer to the given problem. In addition, the male students are already convinced by their respective answers. So, it can be concluded that male students are able to master the indicator of originality only. It is seen that the ability to think mathematically for male students in the condition of covid-19 is the same as the condition before covid-19, i.e., fewer male students meet the indicators of mathematical creative thinking skills. Female students are able to provide a variety of other different answer possibilities, provide answers in new ways or strategies, solve problems in a sequenced or detailed way, and are unable to provide alternative answers to other problems given. Female students are also confident in the answers they are working on and can re-explain the ways they have been used to solve problems. So, it can be concluded that female students are able to master indicators of fluency, originality, and elaboration. It is seen that the mathematical creative thinking ability of female students in covid-19 conditions is the same as the conditions before covid-19.

References

Recommendation System Using User-Based Collaborative Filtering and Spectral Clustering

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Abstract. Recommendation systems are tools that can solve this problem by classifying people using User-Based Collaborative Filtering and Spectral Clustering approaches, resulting in more accurate recommendations. Preprocessing the data is the first step in the recommendation process, after which the data is grouped using the Spectral Clustering method. In the process of creating rating predictions and film recommendations based on similarity derived using the Pearson Correlation and Cosine Similarity algorithms, the clustering results are used to determine which users will be neighbors. Based on system experiments that have been conducted using variations in the number of clusters 3, 5, and 7, variations in the number of neighbors 1, 2, 3, 5, and 10, and comparing the results of MAE calculations of rating prediction results using a combination of spectral clustering methods with Pearson correlation, spectral Clustering with cosine similarity, with Pearson correlation and with cosine similarity, get results where the combination of methods with cosine similarity using 3 clusters and two neighbors becomes the method that has the best accuracy in making movie recommendations, namely with an MAE value of 0.3114. This is because the combination of methods has the smallest MAE calculation value. In other words, it has a minimal recommendation error rate. Meanwhile, the recommendation system with spectral Clustering only gets an MAE value of 0.3611, namely by a combination of spectral clustering methods with cosine similarity using 5 clusters and two neighbors. The result of the accuracy of the combination of spectral clustering method with Pearson correlation gets the lowest MAE value of 0.4109 with an average MAE value of 1.159, the combination of spectral clustering method with cosine similarity gets the lowest MAE value of 0.3611 with an average MAE value of 1.190, the combination of a method with Pearson correlation gets the lowest MAE value of 0.4711 with an average MAE value of 0.911 and the combination of methods with cosine similarity get the lowest MAE value of 0.3114 with an average MAE value of 0.807.

Keywords: Recommended System, User-Based Collaborative Filtering, Spectral Clustering, Pearson Correlation, Cosine Similarity

1 Introduction

A recommendation system is a system used to predict items to be communicated to the user based on the user's relationship to other items or to other users. Recommendations relate to various decision-making processes, such as items to buy, music to be listened to, or what information to read [1]. Searches for items that will be recommended to the user are done by looking at the similarity, either the similarity of an item with other items based on content or
similarity of taste between one user and another based on the rating given to the item. As the times progress, much research has been done on recommendation systems to find new approaches to addressing more and more complex problems. Recommendation system approaches commonly used in recommendation systems are content-based filtering and collaborative filtering approaches.

Research conducted by Hadi et al. (2020) on film recommendation systems using User-Based Collaborative Filtering and K-Modes methods for user grouping [2]. Calculation of accuracy in this study using the Mean Reciprocal Rank (MMR) method and get a result of 0.17 with a data train and test ratio of 80%; 20% and 0.15 with a data train and test ratio of 60%; 40%. The accuracy of this study is quite low because, based on the MRR rule, the recommendation is said to be less precise if the value is close to 0 with a limit of 0.5 and is said to be appropriate if the value is above 0.5 and close to 1.

Research conducted by Ahuja et al. (2019) about the film recommendation system using K-Means Clustering and K-Nearest Neighbor [3]. In this study, the system accuracy calculation using Root Mean Squared Error (RMSE) and obtained the result that the number of clusters used affects the results of the RMSE calculation, where the smaller the number of clusters used, the smaller the RMSE value produced, with the smallest RMSE value produced is 1.08 using 2 clusters.

Research conducted by Halim et al. (2017) on Film Recommendation System using K-Means Bisecting and Collaborative Filtering [4]. This study resulted in a Mean Absolute Error (MAE) value which is a combination of Bisecting K-Means and User-Based Collaborative Filtering of 1.63, lower than the MAE value, which is a combination of K-Means Noisy and Item-Based Collaborative Filtering. In addition to the recommended method, the distribution of rating values in the dataset also greatly affects the MAE value, where if the distribution of rating values is uneven, it will result in a higher error value in the recommendation system.

Research conducted by Yusuf et al. (2012) on the development of student value predictor software using spectral Clustering and bagging linear regression methods [5]. The study used spectral Clustering and K-means clustering algorithms to group data as comparisons and regressions with Bootstrap Aggregating Linear Regression using student value data. The calculation of the accuracy of predictions in this study is calculated by the RMSE method. The results of this study showed that software developed with a spectral clustering algorithm that supports bootstrap aggregating linear regression algorithm proved capable of predicting student grades with RMSE error values of about 0.05-0.08 compared to using K-Means Clustering, which obtained RMSE error results of about 0.1.

Based on the description above, researchers created a movie recommendation system using User-Based Collaborative Filtering and using the Spectral Clustering method in user grouping. This is so that the system can recommend movies based on users in the same group so that the results of the recommendations given become better. The accuracy of the recommendation system made will be calculated by the Mean Absolute Error (MAE) method.

Collaborative filtering (CF) is an approach to the recommendation system. This approach provides recommendations on an item by looking for similarities between users to the item. The main idea in this approach is to find out information about past user behavior and opinions of a group of users who are then used to predict which items will be liked or attractive to the user [6]. The term user in Collaborative Filtering refers to the person who gives an assessment of the items in the system, who will later receive recommendations from the system.

Ratings can be collected by explicit, implicit, or by both. An explicit rating is when a user is directly asked to provide an assessment of an item. The implicit rating means the system automatically gains user preferences passively by looking at user behavior. The assessment
given is only based on user behavior; for example, when a member in a library decides to borrow a book item, then the member is considered interested or likes the item, and vice versa is considered disinterested or disliked if he does not borrow a book. In this way, the user profile is formed without involving the additional role of the user. The disadvantage of this way is, of course, that the alleged assessment given may be inappropriate [6].

User-Based Collaborative Filtering is a method of recommendation system that provides item recommendations based on similarities between users with each other. Recommended items are items favored by other users who bear similarities to the main user [2]. To find an item that is favored by one user, it must look for other users who have similar tastes or favorites. Here is an illustration of the User-Based Collaborative Filtering method in providing recommendations in the following figure 1.

![Figure 1. Illustration of User-Based Collaboration Filtering](image)

The most commonly used method is the nearest neighbor method. This method is based on items that have been selected by nearby neighbors or other users that bear similarities to the main user, thus producing predictions of items that are likely to be selected by the main user in the future [7].

The similarity is a method in machine learning that serves to calculate similarities between 2 or more data. Similarity calculations use algorithmic methods such as Pearson correlation, cosine similarity, and many more. Pearson Correlation is one of the algorithms commonly used in calculating the similarity between users and other users. Correlation is a measurement technique that determines the closeness of relationships between two sets of different numbers. Correlation calculations have a condition where the set of numbers calculated must have a fixed order and pair with each other between the two sets. The results of measurement can be either positive relationships or negative relationships. Positive relationships indicate that both sets have a tendency to increase or increase equal values. In contrast, the negative relationship shows that both sets have a tendency to decrease or decrease in equal value [8]. Here is the Pearson Correlation equation for calculating the similarity between users:
Where:
• \( PC(u, v) \) is the similarity value between user \( u \) and user \( v \)
• \( r_{ui} \) and \( r_{vi} \) is the user rating \( u \) and \( v \) to item-\( i \)
• \( \bar{r}_u \) and \( \bar{r}_v \) is the average rating \( u \) and \( v \) to item-\( i \)
• \( n \) is the number of items

Cosine similarity is a method used to calculate the similarity of each user with each other. Different rating scales between different users will result in different similarity values \[8\]. Here is the Cosine Similarity equation for calculating similarity between users:

\[
Sim(u_i, u_k) = \frac{\sum_{j=1}^{m} r_{ij} r_{kj}}{\sqrt{\sum_{j=1}^{m} r_{ij}^2} \sqrt{\sum_{j=1}^{m} r_{kj}^2}}
\]  

Where:
• \( Sim(u_i, u_k) \) is the similarity value between the \( i \)th user and the \( k \)th user
• \( u_i \) and \( u_k \) is the \( i \)th user and the \( k \)th user
• \( r_{ij} \) and \( r_{kj} \) is the \( i \)th user rating and the \( k \)th user
• \( m \) is the number of items

The calculation of rating predictions on the recommendation system is used to find predictions of rating values given by users against specific items. This predictive calculation is implemented as the final step of the Collaborative Filtering approach in providing recommendations. After the similarity value between users or items has been obtained, the next step is to determine the number of neighbors to determine the predicted value of the rating. One method of calculating rating prediction is the weighted average method \[7\]. Here is the weighted average formula for calculating predictions:

\[
P_{(a,i)} = \bar{r}_a + \frac{\sum_{a=1}^{n} (r_{aj} - \bar{r}_a) \times sim(a,u)}{\sum_{i=1}^{n} sim(a,u)}
\]  

Where:
• \( P_{(a,i)} \) is the user's rating prediction of item-\( i \)
• \( n \) is the number of neighbors.
• \( \bar{r}_u \) is the average user rating.
• \( r_{ui} \) is the user rating \( u \) to item \( i \)
• \( \bar{r}_u \) is the average user rating \( u \)
• \( \text{sim}(a,u) \) is the similarity value between user \( a \) and user \( u \)

Mean Absolute Error is one method for calculating the accuracy rate of system recommendations based on the magnitude of errors from the results of the system’s rating predictions against the actual rating that the user gives to an item [1]. MAE evaluation uses a simple calculation technique, which is to calculate the difference of all items that have been rated by the user and have a rating prediction value. The difference will be absolutely (become a positive value) then averaged. From the results of MAE calculations, it is clear how far the difference in the value of the rating prediction is given by the system with the actual rating value. The greater the value produced by MAE, it can be interpreted that the value of the rating prediction by the system is increasingly inaccurate; conversely, if the resulting MAE value is close to 0, then the prediction by the system is more accurate [8]. Here is the formula for calculating MAE.

\[
MAE = \frac{1}{N} \sum_{i=1}^{N} |p_i - q_i|
\]

Where:
• MAE is the magnitude of the error of the prediction result
• \( p_i \) is a prediction rating.
• \( q_i \) is the real rating.
• \( N \) is many original ratings and predictions.

Clustering is one of the methods of data exploration used in finding patterns in a dataset. In general, the pattern can be seen from the similarity of properties, characteristics, or characteristics of the records in the dataset [5]. The clustering process will group data items into a small number of groups in such a way that each group has an essential similarity that will later facilitate the search for data based on existing similarities [10].

Spectral Clustering is one of the clustering methods that grouping based on the similarity of each data. These similarities are seen from the relationship between data with each other. Spectral Clustering has formed a graph of existing data. Where the vertex of the graph is every record on the data and edge is the relationship between data which is usually in the form of distance from two related records [5]. The steps in doing Spectral Clustering are as follows [11]:

1) Forming a similarity matrix (\( W \))

The similarity matrix is formed based on the relationships between data. If there is a relationship, then there is a value between data with each other, while if there is no relationship will be worth 0. The diagonal value in the similarity matrix will be worth 0 because there is no relation to the data itself. Calculation of similarity values is calculated by exponential distance equation using the formula:
\[ W_{ij} = \exp \left( -\frac{\|S_i - S_j\|^2}{2\sigma^2} \right) \]  \hspace{1cm} 5) 

Where:
- \( W \) is a similarity value.
- \( i \) and \( j \) is a data number.
- \( S \) is data
- \( \sigma \) sigma value as a scale parameter to control similarities

2) Forming a diagonal matrix (\( D \))

The diagonal matrix contains the number of edges connected to each diagonal data. The formula for calculating diagonal values is:
\[ D_{ij} = \sum_{j=1}^{n} W_{ij} \]  \hspace{1cm} 6) 

Where:
- \( D \) is a diagonal value.
- \( n \) is the number of data
- \( i \) is the data line number
- \( j \) is the data column number
- \( W \) is a similarity value.

3) Forming a Laplacian matrix (\( L \))

The Laplacian matrix is formed using the result of a degree matrix (\( D \)) minus the similarity matrix (\( W \)). For certain datasets, the Laplacian matrix can also be calculated using the following normalization formula:
\[ L_{\text{sym}} = D^{-\frac{1}{2}} W D^{-\frac{1}{2}} \]  \hspace{1cm} 7) 

Where:
- \( L \) is the Laplacian value
- \( D \) is a diagonal matrix.
- \( W \) It's a similarity value.

4) Calculates the value of \( k \) eigenvectors of the Laplacian matrix (\( L \)), where \( k \) is the parameter of the number of clusters. The \( k \)-Eigen matrix is the first \( k \) eigenvectors of the Laplacian matrix.

5) Normalize data with a \( k \)-Eigen matrix so that a new matrix will be formed that represents each value of the normalization result.

6) The results of the normalization data are then clustered with K-Means Clustering. The \( i \)-th data will be entered in a cluster if and only if the \( i \)-year normalization data enters the same cluster.
2 Research Methods

In this study, the item that became the object of the recommendation was a film from a data set of MovieLens.org that had been passed by the user. MovieLens.org is an open data set for development and research in the field of recommendation systems managed and run by GroupLens, a research laboratory at the University of Minnesota (https://movielens.org/). The data source used in this study is in the form of ratings, and movies data from movielens.org. The data used consists of 1,048,575 rating data, 7120 user data, and 14,026 movie data. The data used has a CSV format (comma separated values) and is contained in 2 files, namely "ratings.csv" and "movies.csv." For data, "ratings.csv" contains userId, movieId, rating, and timestamp. As for the data, "movies.csv" contains movieId, title, and genres.

System design is created with the aim of determining the system workflow to be created and minimize the occurrence of errors in the flow of program processes. The design of the system in this study can be seen in figure 2.

![Design of User-Based Collaborative Filtering System with Spectral Clustering](image)

Figure 2. Design of User-Based Collaborative Filtering System with Spectral Clustering
In the design of this system, data input comes from "ratings.csv" and "movies.csv" files. After the data is entered, then it will be continued with preprocessing data divided into two, namely preprocessing data for Clustering and preprocessing data for recommendation systems. The next stage is to cluster data with the Spectral Clustering method, where the results of the clustering process will be used to determine movie recommendations with User-Based Collaborative Filtering which will later produce a prediction of the user's rating of a particular film and the accuracy of the film recommendation accuracy will be calculated using the Mean Absolute Error (MAE) method.

3 Results and Discussion

The preprocessing stage is done to prepare the data so that it is ready for use. The preprocessing stage is divided into 2, namely data preprocessing for the clustering process and data preprocessing for the recommendation system process. The initial stage in both preprocessing processes is to form a pivot table that contains the user rating value for each existing film so that a pivot table measuring 7120 rows × 14026 columns will be formed. This aims to find out which movies have been and have not been given a rating by each user.

This data preprocessing process is done using a previously formed pivot table. Then the NaN value on the pivot table is changed to 0. In the new pivot table, the process of standardizing data using the StandardScaler() function, which then results in the standardization of data in normalization using the normalize() function, and finally, the normalized data is reduced in dimension using the Principal Component Analysis (PCA) method by using the PCA function with the number of components formed is 2, resulting in an output of data dimensions of 7120 × 2. Preprocessing data is used in the clustering process using the spectral clustering method.

The process of data clustering is done using preprocessing data. The clustering process is carried out using two methods, namely spectral Clustering with variations in the number of clusters, namely 3, 5, and 7. The results of this clustering method will be compared to the results in calculating user rating predictions against certain films and in making movie recommendations. Here is the code in the clustering process using spectral Clustering. The clustering process is carried out using the python library: cluster class, the Spectral Clustering function for clustering data with the Spectral Clustering method. In the method used, the parameters of the cluster are changed according to the number of clusters that have been determined, namely 3, 5, and 7.

In the clustering process using the spectral clustering method, the similarity matrix is calculated using the Nearest Neighbors method specified in affinity parameters so that the Spectral Clustering function used has directly formed a similarity matrix, diagonal matrix, Laplacian matrix, eigenvalue and eigenvector, and data clustering. Here are the results of data visualization and the division of the number of members for each cluster:

<table>
<thead>
<tr>
<th>k=3</th>
<th>Data Visualization</th>
<th>Spectral Clustering (k=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>518</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Data visualization and division of the number of cluster members (k=5)

<table>
<thead>
<tr>
<th>Cluster</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>2852</td>
<td>1993</td>
<td>2275</td>
</tr>
</tbody>
</table>

Table 3. Data visualization and division of the number of cluster members (k=7)

<table>
<thead>
<tr>
<th>Cluster</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>1200</td>
<td>1665</td>
<td>2015</td>
<td>937</td>
<td>1303</td>
</tr>
</tbody>
</table>
Data Sharing

Spectral Clustering

<table>
<thead>
<tr>
<th>Cluster</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>1180</td>
<td>1254</td>
<td>1425</td>
<td>591</td>
<td>1256</td>
<td>482</td>
<td>932</td>
</tr>
</tbody>
</table>

Based on system experiments that have been conducted using variations in the number of clusters 3, 5, and 7, variations in the number of neighbors 1, 2, 3, 5, and 10, and comparing the results of MAE calculations of rating prediction results using a combination of spectral clustering methods with Pearson correlation, spectral Clustering with cosine similarity, with Pearson correlation and with cosine similarity, get results where the combination of methods with cosine similarity using 3 clusters and two neighbors becomes the method that has the best accuracy in making film recommendations, namely with MAE value 0.3114. This is because the combination of methods has the smallest MAE calculation value. In other words, it has a minimal recommendation error rate. Meanwhile, the recommendation system with spectral Clustering only gets an MAE value of 0.3611, namely by a combination of spectral clustering methods with cosine similarity using 5 clusters and two neighbors.

The result of accuracy combination spectral clustering method with Pearson correlation gets the lowest MAE value of 0.4109 with an average MAE value of 1.159, The combination of spectral clustering method with cosine similarity gets the lowest MAE value of 0.3611 with an average MAE value of 1.190. The combination of the method with Pearson correlation gets the lowest MAE value of 0.4711 with an average MAE value of 0.911 and the combination of methods with cosine similarity gets the lowest MAE value of 0.311 with an average MAE value of 0.807.

In terms of making movie recommendations, based on the system testing that has been done, it can be seen that each combination of methods used will produce different film recommendation results. In addition, the difference in the number of clusters used also affects the results of the resulting film recommendations. This can occur due to differences and member changes in each cluster generated by the spectral clustering method, thus changing the list of users used in performing rating predictions.

4 Conclusion

Based on research that has been done, it is research on comparing user-based CF methods and CF item-based methods in providing better recommendations on data sets in the form of movie objects. The user-based CF method and the item-based CF method can be used to predict a user's rating of a movie. User-based CF and item-based CF methods have the potential to be
applied to a website film recommendation system. Based on system experiments that have been conducted using variations in the number of clusters 3, 5, and 7, variations in the number of neighbors 1, 2, 3, 5, and 10, and comparing the results of MAE calculations of rating prediction results using a combination of spectral clustering methods with Pearson correlation, spectral Clustering with cosine similarity, with Pearson correlation and with cosine similarity, get results where the combination of methods with cosine similarity using 3 clusters and two neighbors becomes the method that has the best accuracy in making film recommendations, namely with a value of MAE 0.3114. This is because the combination of methods has the smallest MAE calculation value. In other words, it has a minimal recommendation error rate. Meanwhile, the recommendation system with spectral Clustering only gets an MAE value of 0.3611, namely by a combination of spectral clustering methods with cosine similarity using 5 clusters and two neighbors. The result of the accuracy of the combination of spectral clustering method with Pearson correlation gets the lowest MAE value of 0.4109 with an average MAE value of 1,159, the combination of spectral clustering method with cosine similarity gets the lowest MAE value of 0.3611 with an average MAE value of 1,190, the combination of the method with Pearson correlation gets the lowest MAE value of 0.4711 with an average MAE value of 0.911 and the combination of methods with cosine similarity gets the lowest MAE value of 0.3114 with an average MAE value of 0.807.

Acknowledgments. The authors would like to express their gratitude to Universitas Muhammadiyah Purwokerto for allowing us to assist and support in completing this research.

References


User-Based Collaborative Filtering Using Agglomerative Clustering on Recommender System

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Abstract. Content-based, collaborative filtering, demographic, knowledge-based, and hybrid recommender systems are the five categories of recommendation systems. User-based collaborative filtering and item-based collaborative filtering are the two types of collaborative filtering. However, the user-based approaches can be claimed to represent the user; researchers will employ them here. This method is more concerned with the user's likeness, or similarity than with the user's evaluated item. The accuracy of user-based collaborative filtering approaches employing agglomerative Clustering with similarity computations, i.e., cosine similarity, is improved in this study. MovieLens (https://grouplens.org/datasets/movielens/) provided the researchers with the data they needed. Between January 9, 1995, and October 16, 2016, a total of 100004 ratings for 9,125 films were collected from 671 individuals. At least 20 movies have been rated by each user. Each rating has a value of 1 to 5. The data utilized for testing is five value data from each user. In other words, 3,355 data points were tested in total. Using the single linkage clustering approach to cluster films in the user-based method has been shown to improve the accuracy of results that differ significantly between scenarios one and two, namely 3,409 and 3.26. MAE and RMSE are the accuracy gauges utilized in the analysis, and the smaller the value (closer to zero), the better the program results. The findings of two trials (2 Scenarios) revealed significant differences between scenario 1 and scenario 2, namely 3,409 and 3.26. This is because in scenarios 1 and 2, only neighbors with similarity values greater than zero are utilized to find predictions, regardless of whether the neighbor has scored the film to be forecasted or not. In scenario 1, however, the results produced by adding the single linkage clustering approach to the user-based method as mentioned above are not as good. As the value obtained grows larger, the system's level of accuracy decreases. However, the results achieved in scenario 2 are smaller, but the differences are not significant.

Keywords: Recommended System, User-Based Collaborative Filtering, Agglomerative Clustering

1 Introduction

Advances in technology have made the digital search easier. Over time various sites that use search engines, be it selling sites or other sites, also use a recommendation system. The recommendation system can be used in various areas, such as movies, news, music, books, and others. According to Casey (2014), the recommendation system utilizes the history of user behavior such as articles that have been read, products that have been assessed or purchased,
music that is often played, and so on to identify the user's preferences which are then used as references to produce final recommendations in the form of items or products [1]. The recommendation system works based on previously stored user information. This information itself can be a numeric value, an ordinal value, or a binary value [2].

According to Ricci et al. (2015), the recommendation system is divided into five types: content-based, collaborative filtering, demographic, knowledge-based, and hybrid recommender system [2]. The general principle of content-based filtering is to identify common traits of an item that gets a high rating from the user and recommend that using the item's characteristics. Collaborative filtering uses assessment information from users and other goods. Demographics recommend items based on the demographic profile or region of that user. Knowledge-based systems recommend goods based on specific information of how much an item meets needs and is useful to users. In comparison, the Hybrid Recommender System is a combination of the recommendation systems above.

Collaborative filtering is divided into two types: user-based collaborative filtering and item-based collaborative filtering [3]. However, researchers will use user-based methods because this method can be said to represent the user. This method pays more attention to the similarity or similarity of the user than the item that the user has assessed. In contrast, item-based pay more attention to the assessment of goods. This method is included in the neighborhood model that directly uses stored assessments to predict.

Some of the advantages of using neighborhood-based methods [2] are
1) Simplicity, neighborhood-based methods are relatively easy to implement
2) Justifiability, this method also provides a concise and intuitive basis of truth on the computing of its predictions.
3) Efficiency, one of the advantages of this method is its efficiency. Because this method does not require pre-computing and storage for data, its determination is not too large.
4) Stability, this method is not unduly affected by additional users, items, and ratings.

The several recommendations contained in this method, there are also shortcomings in the scope of its recommendations [2]. This becomes more visible when the data used has a fairly high sparsity. This will then reduce the scalability of this approach itself. There has been a lot of research done to improve the accuracy performance of collaborative filtering. Leben (2008) uses adjusted cosine to calculate similarity. The comparison of both collaborative filtering methods has been made by Sarwar et al. (2001) using adjusted cosine to calculate similarity on item-based and Pearson correlation on user-based [4]. The result obtained is a user-based method with Pearson correlation has higher accuracy. Based on the above, the author will try to contribute to improving the accuracy of user-based collaborative filtering methods using agglomerative Clustering with similarity calculations, i.e., cosine similarity.

A recommendation system is a technique that advises or suggests goods that are in demand by certain users [2]. There are three main processes of this technique, namely: object data collections and representations, similarity decisions, and recommendation computation. Collaborative filtering methods collect and analyze large amounts of information about a user's behavior, activity, or preferences and predict what users will like. This method does not rely on content that can be analyzed. Therefore, this method can recommend complicated items such as movies without understanding the movie itself. This is the advantage of collaborative filtering methods. One of the best-known examples of collaborative filtering is item-to-item or item-based (people who buy x and buy y), an algorithm popularized by the recommendation system Amazon.com [5]. Last.fm recommends music based on comparisons of the same user's listening habits, while Readgeek compared book ratings to recommendations. Facebook, MySpace, LinkedIn, and other social networks use collaborative filtering to recommend friends, groups,
and other social connections (by checking the network of connections between users and their friends). Twitter uses a lot of signals and calculations in memory to recommend to its users who to follow [2],[6].

In collaborative filtering, there is also a user-based method, where this method will recommend goods to users x, which is also liked by other users similar to x [2]. So, between the user-based method and the item-to-item method, it is almost the same. However, the difference lies in what the recommendations are. User-based sees the user's resemblance to other users, while item-based looks at it in terms of goods.

Agglomerative Clustering has a way of working with the assumption that n items want to be clustered and matrix distance or similarity N*N. The basic process, according to Johnson (1967), is as follows:

1) Create clusters for each item so that if it has n items, it will now have n clusters, which contain one item. Let the similarity between clusters equal the similarity between the items in it.
2) Find the nearest (most similar) cluster pair and combine the two into one cluster, so we now have one fewer cluster
3) Calculate the similarity between the new cluster and each of the old clusters.
4) Repeat steps 2 and 3 until all items are grouped into one group with size N

Step 3 can be done in several different ways, namely minimum proximity, maximum proximity, average proximity, and centroid proximity. At minimum proximity (single-linkage), the shortest distance (largest similarity) is used to create clusters, while at maximum proximity (double-linkage) used is the largest distance (smallest similarity).

Pearson Correlation Coefficient and Cosine Similarity are commonly used and well-known similarity methods. That's why I use both methods. Pearson correlation coefficient will be used for calculation of final prediction of goods (recommendations) and cosine similarity for similarity calculations to create clusters.

The similarity is a method in machine learning that serves to calculate similarities between 2 or more data. Similarity calculations use algorithmic methods such as Pearson correlation, cosine similarity, and many more. Pearson Correlation is one of the algorithms commonly used in calculating the similarity between users and other users. Correlation is a measurement technique that determines the closeness of relationships between two sets of different numbers. Correlation calculations have a condition where the set of numbers calculated must have a fixed order and pair with each other between the two sets. The results of measurement can be either positive relationships or negative relationships. Positive relationships indicate that both sets have a tendency to increase or increase equal values. In contrast, the negative relationship shows that both sets have a tendency to decrease or decrease in equal value [8]. Here is the Pearson Correlation equation for calculating the similarity between users:

\[
P_C(u, v) = \frac{\sum_{i=1}^{n} (r_{ui} - \bar{r}_u)(r_{vi} - \bar{r}_v)}{\sqrt{\sum_{i=1}^{n} (r_{ui} - \bar{r}_u)^2 (r_{vi} - \bar{r}_v)^2}}
\]

Where:
- \(P_C(u, v)\) is the similarity value between user u and user v
- \(r_{ui}\) and \(r_{vi}\) is the user rating ui and vi to item-i
Cosine similarity is a method used to calculate the similarity of each user with each other. Different rating scales between different users will result in different similarity values [8]. Here is the Cosine Similarity equation for calculating the similarity between users:

\[
Sim(u_i, u_k) = \frac{\sum_{j=1}^{m} r_{ij} r_{kj}}{\sqrt{\sum_{j=1}^{m} r_{ij}^2 \sum_{j=1}^{m} r_{kj}^2}}
\]

Where:
- \( Sim(u_i, u_k) \) is the similarity value between the ith user and the kth user
- \( u_i \) and \( u_k \) is the ith user and the kth user
- \( r_{ij} \) and \( r_{kj} \) is the ith user rating and the kth user
- \( m \) is the number of items

Different similarity indicators will result in different prediction scores. Mean absolute error (MAE) and root mean square error (RMSE) are two common indicators for measuring the accuracy of similarity methods. The smaller the value, the better the prediction accuracy. It is defined as follows:

1) Mean absolute error (MAE) is the average of the absolute error of the user’s predicted score and the true score in the scoring test set \( q_i, p_i \).

\[
MAE = \frac{\sum_{i=1}^{n} |p_i - q_i|}{n}
\]

2) Root-mean-square error (RMSE) is the mean square root of the true score value and the predicted score value of the user in the test set: \( p_i, q_i \).

\[
RMSE = \sqrt{\frac{\sum_{i=1}^{n} (p_i - q_i)^2}{n}}
\]
2 Research Methods

The data used by the researchers was obtained from a site called MovieLens (https://grouplens.org/datasets/movielens/). The dataset consists of 100004 ratings of 9,125 films obtained from 671 users between January 9, 1995, and October 16, 2016. Each user has rated at least 20 movies. Each rating is worth from 1 to 5. For testing, the data used is five value data from each user. In other words, the total data testing used is 3,355 data.

The test scenario is done by conducting the experiment twice. First, implement the user-based method directly by using 100 neighbors regardless of whether the neighbor has judged the film to be predicted. Second, implement the user-based method directly by using a maximum of 100 neighbors who have assessed the film to be predicted on the implementation of Clustering. In experiments one and two, all films will be clustered first into 5 clusters because the rating value used is nominal 1 to 5. Clustering is done using the agglomerative clustering technique (single linkage). After that, it will be implemented user-based methods in the same way in the first and second scenarios. For more details, you can see it in figure 1.

---

Figure 1. Scenario Illustration
3 Results and Discussion

The implementation of process blocks in a class is in table 1, and the implementation of process blocks in functions is in table 2. While in table 3 contains the implementation of functions in the following classes:
### Table 1. Implementation of process blocks in a class

<table>
<thead>
<tr>
<th>Process Block</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminates the first 5 values from each user</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>Convert data to user matrix form x movie</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>Calculate the predicted value rating</td>
<td>Pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>Calculate the MAE value and RMSE</td>
<td>Pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>Find the similarity value between each movie</td>
<td>nilai_cosine.m</td>
</tr>
<tr>
<td>Clustering (Agglomerative - Single Linkage)</td>
<td>AHC.m</td>
</tr>
</tbody>
</table>

### Table 2. Implementation of process blocks on functions

<table>
<thead>
<tr>
<th>Process Block</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate the average rating</td>
<td>m(nilaiRata2)</td>
</tr>
<tr>
<td>the difference in rating value with the average value</td>
<td>m(rai)</td>
</tr>
<tr>
<td>the difference in rating value with the average square</td>
<td>m(raikuadrat)</td>
</tr>
<tr>
<td>Hitung similarity</td>
<td>m(pearson)</td>
</tr>
<tr>
<td>Looking for neighbors</td>
<td>finding_topN</td>
</tr>
</tbody>
</table>

### Table 3. Implementation of functions in the class

<table>
<thead>
<tr>
<th>Function</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>m(nilaiRata2)</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>m(rai)</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>m(raikuadrat)</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>m(pearson)</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
<tr>
<td>finding_topN</td>
<td>pearson.m, pearson1.m, pearson_cluster.m and pearson_cluster1.m</td>
</tr>
</tbody>
</table>

The detailed usability of each class is in table 4, while table 5 contains the usability of each function in the system.
Table 4. Class and its uses

<table>
<thead>
<tr>
<th>Class</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>Search for rating predictions using 100 neighbors without seeing if the neighbor has passed the movie. It will be predicted or not.</td>
</tr>
<tr>
<td>Pearson1</td>
<td>Search for rating predictions using a maximum of 100 neighbors who have rated the film to be predicted</td>
</tr>
<tr>
<td>Pearson_cluster</td>
<td>Search for rating predictions using 100 neighbors without seeing if the neighbor has passed the film to be predicted or not by implementing agglomerative Clustering</td>
</tr>
<tr>
<td>Pearson1_cluster</td>
<td>Search for rating predictions using a maximum of 100 neighbors who have rated the film to be predicted by implementing agglomerative Clustering</td>
</tr>
<tr>
<td>Nilai_cosine</td>
<td>Search for the cosine similarity value of all movies</td>
</tr>
<tr>
<td>AHC</td>
<td>Useful for clustering movies using techniques agglomerative clustering</td>
</tr>
</tbody>
</table>

Table 5. Its functions and uses

<table>
<thead>
<tr>
<th>Function</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND</td>
<td>Useful for finding weight values between two films</td>
</tr>
<tr>
<td>m_nilaiRata2</td>
<td>Search for the average rating of each user</td>
</tr>
<tr>
<td>m_rai</td>
<td>Find the difference in rating value by the average value</td>
</tr>
<tr>
<td>m_raikuadrat</td>
<td>Searches for the difference in the value of the rating with the average square.</td>
</tr>
<tr>
<td>m_pearson</td>
<td>Search for Pearson value(similarity)between all users</td>
</tr>
<tr>
<td>finding_topN</td>
<td>Search for the 100 neighbors with the greatest similarity value of all users</td>
</tr>
<tr>
<td>cari_cluster</td>
<td>Search for movie clusters to predict</td>
</tr>
<tr>
<td>cari_user</td>
<td>Search for users – users who have rated movies in the movie cluster to predict</td>
</tr>
</tbody>
</table>

Class pearson_cluster (scenario 1)

In the pearson_cluster class will be used a user-based method by applying agglomerative Clustering (single linkage). Where the steps to cluster the entire film have been done first.

1) Read data from ratings1.csv.
2) Eliminate the first five ratings from each user that will be used for data testing.
3) Convert to the form of user matrix x movie.
4) Look for the movie cluster to predict and the users-users who have ranked the movie-the movie that is in the cluster. Then convert the data into the form of a user matrix x movie.
5) Calculate the average rating of each user, the difference in the rating value with the average value, the difference in the rating value with the average value of the square.
6) Calculates the similarity between each user using the Pearson correlation algorithm
7) Search for 100 neighbors of all users using the similarity value you've searched for
8) Look for the user index and the movie to predict. This is because the presence of users and movies that will be predicted cannot match the value of rows or columns.
9) Perform a neighbor selection process to calculate a user's rating prediction of a movie (out of 100 neighbors of that user, will be used whose similarity value is only large from zero).

10) Then calculate the rating prediction using the user-based method. In a way, all neighbor ratings are multiplied by the similarity value, then divided by the same amount of the entire neighborhood. This step will continue until all data testing has been predicted.

11) Calculate MAE and RMSE to determine the system's error value or accuracy rate after all the testing data is calculated or predicted.

Class pearson_cluster1 (scenario 2)

The steps in this class are nearly identical to those in the Pearson cluster class. It's only that this class has a different approach to selecting neighbors. The neighbors sought are the users who will be predicted's neighbors, with a maximum of 100 persons, each of whom has judged the movie to be forecasted. MAE and RMSE are the accuracy gauges utilized in the analysis, and the smaller the value (closer to zero), the better the program results. From two trials (two situations), a significant difference was found between scenario one and scenario 2, namely 3,409 and 3.26. This is because, in scenarios 1 and 2, only neighbors with similarity values greater than zero are utilized to check for predictions, regardless of whether the neighbor has scored the movie to be forecasted or not. In scenario 1, however, the results produced by adding the single linkage clustering approach to the user-based method as mentioned above are not as good. As the value obtained grows larger, the system's level of accuracy decreases. However, the results produced in scenario two do get smaller, but the differences are not significant.

4 Conclusion

The employment of the single linkage clustering approach to cluster movies using the use-based method has been shown to enhance the accuracy of findings that differ significantly between scenarios 1 and 2, namely 3,409 and 3.26. MAE and RMSE are the accuracy gauges utilized in the analysis, and the smaller the value (closer to zero), the better the program results. From two trials (two situations), a significant difference was found between scenario one and scenario 2, namely 3,409 and 3.26. This is because, in scenarios 1 and 2, only neighbors with similarity values greater than zero are utilized to check for predictions, regardless of whether the neighbor has scored the movie to be forecasted or not. In scenario 1, however, the results produced by adding the single linkage clustering approach to the user-based method as mentioned above are not as good. As the value obtained grows larger, the system's level of accuracy decreases. However, the outcomes achieved in scenario 2 grow smaller, although the changes are not too significant.

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References


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ISBN: 978-1-63190-316-8
ISSN: 2593-7650

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