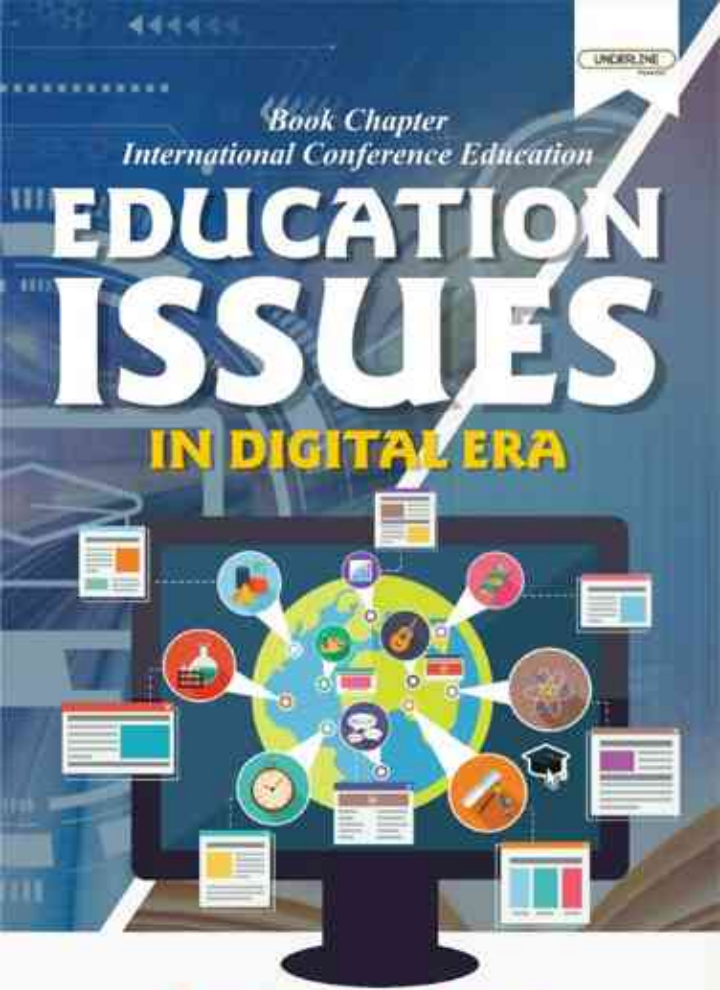
*Book Chapter*
*International Conference Education*

# EDUCATION ISSUES

## IN DIGITAL ERA



Dr. Singgih Subiyantoro, M.Pd., dkk.

BOOK CHAPTER

INTERNATIONAL CONFERENCE EDUCATION

# EDUCATION ISSUES IN DIGITAL ERA

Undang-Undang Republik Indonesia Nomor 28 Tahun 2014 tentang Hak Cipta

Pasal 1:

1. Hak Cipta adalah hak eksklusif pencipta yang timbul secara otomatis berdasarkan prinsip deklaratif setelah suatu ciptaan diwujudkan dalam bentuk nyata tanpa mengurangi pembatasan sesuai dengan ketentuan peraturan perundang undangan.

Pasal 9:

2. Pencipta atau Pengarang Hak Cipta sebagaimana dimaksud dalam pasal 8 memiliki hak ekonomi untuk melakukan a. Penerbitan Ciptaan; b. Penggandaan Ciptaan dalam segala bentuknya; c. Penerjemahan Ciptaan; d. Pengadaptasian, pengaransemen, atau pentransformasian Ciptaan; e. Pendistribusian Ciptaan atau salinan; f. Pertunjukan Ciptaan; g. Pengumuman Ciptaan; h. Komunikasi Ciptaan; dan i. Penyewaan Ciptaan.

Sanksi Pelanggaran Pasal 113

1. Setiap orang yang dengan tanpa hak melakukan pelanggaran hak ekonomi sebagaimana dimaksud dalam Pasal 9 ayat (1) huruf i untuk Penggunaan Secara Komersial dipidana dengan pidana penjara paling lama 1 (satu) tahun dan/atau pidana denda paling banyak Rp100. 000. 000, 00 (seratus juta rupiah).
2. Setiap Orang yang dengan tanpa hak dan/atau tanpa izin Pencipta atau pemegang Hak Cipta melakukan pelanggaran hak ekonomi Pencipta sebagaimana dimaksud dalam Pasal 9 ayat (1) huruf c, huruf d, huruf f, dan/atau huruf h untuk Penggunaan Secara Komersial dipidana dengan pidana penjara paling lama 3 (tiga) tahun dan/atau pidana denda paling banyak Rp500. 000. 000, 00 (lima ratus juta rupiah).

UNDERLINE
Penerbit

BOOK CHAPTER

INTERNATIONAL CONFERENCE EDUCATION

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**Singgih Subiyantoro, Muhlis Fajar Wicaksana, Suyahman, Sri Muryati, Moh. Zain Musa, Suwarto, Mohd Hafiz MD Hanif, Para Mitta Purbosari, Agus Purwanto, Ratna Dewi Eskundari, Suwarto, Anas Urbaningrum, Herry Agus Susanto, Andhika Ayu Wulandari, Diyah Ruswanti, Sarno, Dahlan Susilo, Fatahillah, Afri Mardicko, Irawan, Catur Atmojo, Zhilal Al Islah, Antonia Vincent Rosali, Lutfhi, Sugiyanto, Hafidh Ihza Pramudya, Luluk Khoirurohmah, Arin Arianti, Isna Nuraini Lathifah Hanum, Annisa Prima Exacta, Meli Triani, Eka Farida Fasha, Sofri Rizka Amalia, Anwar Ardani, Puput Amillia, Tri Sutrisno, Putri Nur Zuhroh, Riska Satya Graha Putrimulya, Tri Wiharti, Siti Suwadah Rimang, Nurratri Kurnia Sari, R. Adi Deswijaya, Agus Efendi, Harsono, Tri Widiatmi**

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9. Prof. Dr. Herry Agus Susanto, M.Pd., Universitas Veteran Bangun Nusantara, Indonesia
10. Prof. Eko Madyo Susilo, M.Pd. Universitas Veteran Bangun Nusantara, Indonesia
11. Dr. Singgih Subiyantoro, M.Pd., Universitas Veteran Bangun Nusantara, Indonesia
12. Dr. Dewi Kusumaningsih, S.S., M.Hum., Universitas Veteran Bangun Nusantara, Indonesia

13. Dr. Muhlis Fajar Wicaksana, M.Pd., Universitas Veteran Bangun Nusantara, Indonesia
14. Dr. Agus Efendi, S.Sn.,M.Sn., Universitas Veteran Bangun Nusantara, Indonesia
15. Dr. Mukti Widayati, M.Hum., Universitas Veteran Bangun Nusantara, Indonesia
16. Dr. Benedictus Sudiyana, M.Pd., Universitas Veteran Bangun Nusantara, Indonesia
17. Dr. Suyahman, M.H., M.Si., Universitas Veteran Bangun Nusantara, Indonesia

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Design Kover: Tim Penerbit Underline
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(**Anggota IKAPI No.267/JTE/2023**)
Srikaton, Rt.003, Rw.001, Pucangmiliran, Tulung, Klaten, Jateng
Hp. 089520328216 Email: penerbit_underline@yahoo.com
Website: penerbitunderline.com

# KATA PENGANTAR

Puji syukur kami ucapkan ke hadirat Allah Swt., karena dengan rahmat, karunia, dan hidayah-Nya kami dapat menerbitkan Bookchapter yang bertemakan *"**Education Issues In Digital Era" 1st International Conference on Education***. Sebuah karya *Bookchapter* ini menjadi salah satu wujud pengembangan profesionalitas Fakultas Keguruan dan Ilmu Pendidikan (FKIP) Universitas Veteran Bangun Nusantara untuk dapat berbagi informasi ilmiah yang dapat diterapkan oleh seluruh pihak. Aspek-aspek yang dikaji dalam *Bookchapter* ini adalah: 1) Bidang Pendidikan dan pengajaran; 2) metode pembelajaran; 3) bidang evaluasi pembelajaran; 4) kurikulum; 5) Lesson study. Keberadaan Bookchapter ini merupakan bentuk dari pelaksanaan tridarma pendidikan oleh dosen. Tentu saja *Bookchapter* ini ditulis sebagai refleksi hasil riset sederhana para dosen dan mahasiswa sesuai dengan bidangnya masing-masing. Pada gilirannya, penerbitan semacam ini, selain dapat dimanfaatkan oleh para mahasiswa dan dosen dalam proses pembelajaran, juga merupakan wujud kontribusi keilmuan fakultas dan program studi bagi pengembangan ilmu secara umum. Terbitnya *Bookchapter* ini, Fakultas Keguruan dan Ilmu Pendidikan Universitas Veteran Bangun Nusantara mengucapkan terima kasih kepada penerbit atas kerja samanya dalam penerbitan ini. Semoga ke depan sinergi antara penulis dan penerbit dapat terjalin lebih optimal lagi.

Tim Penulis

# DAFTAR ISI

# STRENGTHENING STUDENT CHARACTER THROUGH PROJECT-BASED MKWU LEARNING IN THE ERA OF DIGITAL TRANSFORMATION

Muhlis Fajar Wicaksana[1], Suyahman[2], Sri Muryati[3]
muhlisfw@univetbantara.ac.id[1] ; suyahman@univetbantara.ac.id[2] ;
srimuryati411@gmail.com[3]

*This study aims to explore strengthening student character education through project-based learning of General Compulsory Courses (MKWU) in the era of digital transformation. Digital transformation has had a significant impact on education, presenting new challenges that require innovative approaches to improve the quality of learning. In this context, character education becomes very relevant in forming students who not only excel academically, but also have ethical values, integrity, and adaptability to change. MKWU's project-based learning offers opportunities for students to develop character through hands-on experience and active involvement in challenging projects. This research uses a qualitative approach with a case study method. Data was collected through in-depth interviews with lecturers and students involved in project-based MKWU learning. Data analysis is carried out with a triangulation approach of data sources. Data derived from interviews continued with observational data and document analysis. The results showed that project-based MKWU learning positively had an impact on strengthening student character education. Students report valuable experience developing collaboration, creativity,*

*project-based learning, and critical thinking skills. In addition, they also report improvements in responsibility, integrity, and adaptability to technological developments in the era of digital transformation. Lecturers also reported positive changes in student behavior and attitudes during project-based MKWU learning. They observed increased student involvement in the learning process, the ability to work in teams, and willingness to take on challenges. This study concludes that project-based MKWU learning can be an effective strategy in strengthening student character education in the era of digital transformation. The results of this study contribute to the development of a higher education curriculum that is oriented towards building the character of students who are adaptive, innovative, and ethical in facing changes and complexity in a globalized world that continues to develop.*
***Keyword:*** *MKWU,PJbL, Character*

## Introduction

Universitas Veteran Bangun Nusantara (hereinafter referred to as Univet Bantara) is one of the universities in the of Higher Education Service Institutions (LLDIKTI) 6 Jateng Under the organizer of the college, Yayasan Pembina Pendidikan Perguruan (YPPP) Veteran Sukoharjo. Univet Bantara which was previously Institut Keguruan dan Ilmu Pendidikan (IKIP) Veteran Sukoharjo (IKIP Veteran Sukoharjo was established on 28 Maret 1968), since year 1993 Based SK Direktur Jenderal Pendidikan Tinggi Nomor 36/D/O/1993 tanggal 20 April 1993 IKIP Veteran changed its form to Universitas Veteran Bangun Nusantara.

Based on the RENSTRA 2023-2027, Univet Bantara as a higher education institution in the institutional development plan is based on a philosophical spirit as a "warrior educator, educator warrior" in order achieve a vision of excellence, character, independent and struggle value. Univet Bantara is required to have initiative, way of thinking, behaving, and acting proactively in developing the dignity and dignity of students and building the nation. Axiologically, the

development of Univet Bantara is based on the basic values that become its reference, namely excellence, character, independence, value of struggle and benefits for the people and nation of Indonesia in effort to position Univet Bantara to be *The Smart Choice University*.

As a university that upholds the rules imposed by the state, Univet Bantara has long (around 1993) even before the promulgation of Law Number 12 of 2012 concerning Higher Education, has enforced in its curriculum the courses of Religion, Pancasila, Citizenship, and Indonesian as mentioned in Article 35. These four courses have proven to be very important in shaping student character to strengthen the profile of Pancasila students.

Realizing that learning compulsory university courses (MKWU) at Univet Bantara from year to year has not been maximally developed. Referring to the curriculum used, it has not been integrated with four other courses involved in one assignment project. These four compulsory courses seem to stand alone with their respective courses and the assignments also stand alone. In addition to the curriculum, human resources (HR), namely MKWU lecturers, in the application of the MKWU learning model have not been project-based. The majority of lecturers who teach this compulsory course conduct learning with a lecture system. There are no project-based assignments. Most of these assignments are text-based (compiling papers with a specific theme). As for learning media, the majority of MKWU lecturers in learning often use power point media. This power point media is the only form of learning media used.

In relation to the development of MKWU courses, in this case raised the theme of Moral Decadence in the Community. Such as theft, murder, corruption, drugs, alcohol, promis and a hedonistic lifestyle. This is completely contrary to the character of Indonesians who have the spirit of Pancasila. The Western lifestyle of hedonism is actualized through shameless and awkward daily associations, giving birth to abnormal generations of poor ahklak. Hedonism can make a person selfish and focus on self-satisfaction, as well as ignore

important moral and ethical values in life, such as integrity, respect, and empathy. This is contrary to the values of Pancasila. Therefore, the hedonistic lifestyle needs to be overcome.

Based on the problems above, the implementation of learning MKWU courses at Univet Bantara requires the development of a project-based learning model. In addition, project-based learning is one of the learning models that can help students to understand the substance of the material better and form skills that are relevant to present and future needs. This learning model can also help students understand the relationship between theory and practice, as well as improve the ability to think critically, solve problems, and apply noble values. On the other hand, this project-based learning also contributes and makes a real contribution to students (universities) in solving problems in an increasingly complex society. Therefore, the development of project-based learning through MKWU is considered very important.

**Research method/study method/problem solving method**

Participatory Action research method is a research approach that involves active participation of participants or stakeholders in the entire research process. *Participatory Action Research (PAR*) is a research method carried out in a participatory manner among citizens in a community in the lower realm whose spirit is to encourage transformative actions to liberate society from the shackles of ideology and power relations (changes in better living conditions) (Junaedi, 2012)

Participatory Action Research also equips itself with many working methods and tools. To collect field data and analyze it, PAR has methods of sharing stories, in-depth interviews and *focus group discussions* (FGDs) (Junaedi, 2012) This process involves various stages, such as participatory analysis, reflection, and continuous action. Participants are considered an integral part of the research and have an active role in formulating and implementing solutions to the identified problems.

**Result**

The results showed that project-based MKWU learning had a positive impact on student morality. After participating in project-based learning, students show an increased understanding of ethical values, positive attitudes, and the ability to face and solve social problems critically. The portrait of project-based MKWU learning conditions as a countermeasure to moral decadence is carried out through several stages, namely: 1) Planning; 2) Implementation; 3) Follow-up. The description is as follows.

**Learning Planning**

Project-based MKWU learning planning begins with the preparation of a Semester Learning Plan (RPS) and lecture contract. In accordance with the standard of learning implementation, learning is planned for 16 meetings. With details of 14 meetings, 1 meeting for the midterm exam (UTS) and 1 meeting for the final semester exam (UAS). The first meeting was filled with lecture contracts for 16 meetings. The learning implementation plan with the theme of moral decadence was carried out for 5 meetings. This meeting began with socialization about the MKWU project with the theme of moral decadence and the ultimate goals of the project to be implemented. The ultimate goals of this learning will be that students can make a video about moral decadence.

Furthermore, at the second and third meetings, students completed a mutually agreed project. At the fourth meeting, students delivered the final result of the projects they had completed. Furthermore, at the last meeting stage, namely the fifth meeting, students reflect on the results that have been delivered in front of their friends. In the planning stage of project-based MKWU learning with the theme of moral decadence, a portfolio-based assessment rubric is also prepared for each student. Starting from the instrument that will be used to assess the progress made by students, the assessment rubric used by peers / between students, or the assessment if the product of developing the final project results with the theme of moral decadence has been completed.

**Learning Implementation**

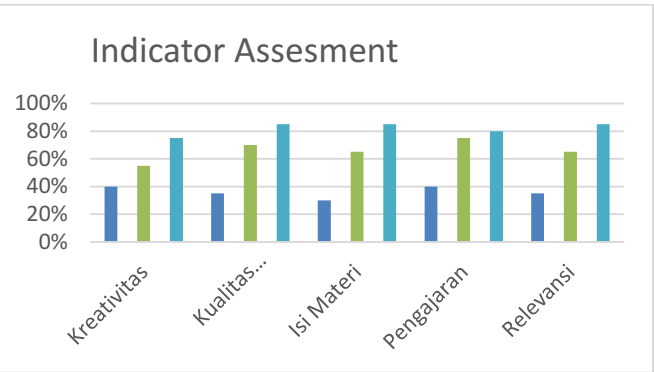
MKWU learning with the theme of moral decadence is a learning process designed to help students develop a simple life character despite living a well-off life. This project-based learning prioritizes process assessment over outcomes. In a sense, the main success is seen from understanding student attitudes towards hedonism and how to overcome it.

In this learning, students will come up with ideas and ideas to see the current conditions related to the *hedonism lifestyle*. Based on this hedonistic hudi style, students will make videos on how to overcome it. In this process, creative ideas will be brought up to be realized in the form of creative videos through project-based. This reinforces what is stated (Efstratia, 2014) that the core idea of the PjBL Model is to connect students' experiences with school life and to provoke serious thinking as students acquire new knowledge

The valuation techniques used through portfolio valuation techniques. Starting from the third and fourth weeks, students began to compile creative videos on overcoming *hedonism*, moral decadence of students. The fifth meeting will be filled with an assessment of the results of the video that has been compiled and given feedback.

Project-based learning sparks social learning as students practice 21st-century skills, at least in terms of communication, negotiation, and collaboration skills. When working on projects, students should brainstorm and act as good listeners. Active listening skills can improve collaborative ability as well as creativity. Students also learn basic skills of productive communication, respect for others, and teamwork while generating ideas together. Negotiating ways to solve problems collectively is also part of project-based learning. At the end of the project, students are expected to conduct a self-evaluation, not only learning, but also the success of their social interactions, their communication skills, and other skills (Zubaidah Siti, 2019)

The results of the indicator assessment showed that from 40 students divided into 8 groups, indicator assessment was carried out three times to determine the progress of the development of projects carried out by students. Assessment is based on video creativity, production quality, material content, teaching for viewers, and relevance to the context of the current situation. The progress of its development can be seen in the following diagram.




**Gambar 1. Diagram Persentase Hasil Penilaian**

It can be seen from the figure of diagram 1 that the indicator assessment carried out always increases. Student creativity increased starting from 40% on the first assesment sheet, increased by 15% in the second assessment, and at the end of the assessment increased by approximately 20%. In terms of video production quality, overcoming *hedonism* in the moral decadence of students showed a significant improvement. Starting at 35% on the first portfolio sheet, increasing by 25% on the second portfolio assessment. The final assessment increased by approximately 15%. The third component of portfolio-based assessment is about the content of the material. Based on the diagram, it shows that the content of the material compiled by students in the final video increased from 30% to 65%. On the last portfolio sheet increased by approximately 20%. The increase was higher in the first meeting to the second assessment.

The fourth portfolio assessment technique is focused on the teaching side in the video for the wider community. In this portfolio assessment also always increases. It can be see that starting from 40% on the first portfolio sheet, increasing by 35% on the second portfolio assessment, and at the end of the assessment increasing by approximately 5%. This increase can be seen when students are facilitated with guidance on the teaching side that must be raised in the video. Final Portfolio assessment on the component of its relevance to current conditions. The video that has been compiled can show the results that the relevance of the video to the current context starts from 35% on the first portfolio sheet, increases 30% in the second portfolio assessment, and finally the portfolio assessment increases by approximately 20%.

In this case, based on the results, the percentage of research shows a positive trend. Students learn to define problems and do independent research, learn to work with others when working on group projects, students understand that real-world problems are not easy and require effort and time to solve, can see mathematics as a research science, and learn to write research reports (Hendikawati et al., 2016)

In addition, it provides a strong impetus to achieve language competence by pouring ideas into joint project writing. This implementation is supported by the autonomy of lecturers who are given the flexibility to carry out learning. This condition is relevant to the finding (Lam et al., 2010) that when teachers are given autonomy and supported by competence then they have a higher motivation for project-based learning and a stronger willingness to persist in innovation. In addition, from the side of the students themselves as learners, they get challenges and confidence so that for adequate potential and competence they will learn better than limited to listening to lectures on language materials. This is in line with what was found (Van Dinther et al., 2011) that self-efficacy affects student motivation and learning.

Based on the percentage of project-based assessment results through portfolio techniques, there is a change in student attitudes in completing their assignments. In project-based assignments, students have carried out well, so that there is a student understanding of the project to overcome moral decadence through the completion of project-based videos. Referring to these results, there is an increase in the percentage of each component of the indicator used to conduct the assessment. Hopefully, this video can later become a learning video related to overcoming students' moral decadence related to a hedonistic lifestyle.

**Follow-up**

The follow-up to MKWU learning with the theme of moral decadence is the action taken after students complete a video-based project. Video containing material understandings of overcoming moral decadence, hedonism lifestyle. This action aims to evaluate the success of learning and ensure that students have a deep understanding of the material that has been taught. Some steps that can be taken as a follow-up learning include:

Provide feedback to students about their performance during the project-based learning process. This feedback can provide insight into strengths and weaknesses, as well as provide direction on areas for improvement in completing learning videos.

Reflecting on the learning process, both by students and by lecturers. This reflection can help to refine the learning process to the front it and identify components that need repair. Provide additional assignments or exercises to students to strengthen their understanding of the material that has been taught.

Hold additional consultation sessions or tutors for students who need additional help understanding the material. Develop advanced learning plans or more specific curricula for students who need different learning challenges or approaches. By conducting effective learning follow-up, students can get optimal benefits from this learning process and can strengthen their understanding of the material that has been taught.

## CONCLUTION AND RECOMENDATION

The main objective of the results of this study is to explore the effectiveness of project-based moral, character, and ethical learning in building superior morality in students. The project-based MKWU learning method is implemented with the aim of bringing a good impact on morality, and student character. The results of this study show that project-based MKWU learning has several significant benefits in building superior morality in students. Increased understanding of moral values through a project-based approach. Students are more involved in understanding moral and ethical values. Students can experience real situations and interact with ethical issues, which enriches their understanding of moral concepts.

In addition, MKWU Learning is a means of developing students' social skills and empathy. Projects carried out through collaboration in team projects benefit students in learning to communicate effectively and appreciate the perspectives of others. These skills build empathy and social awareness, enabling them to become more tolerant and caring individuals towards the needs of others.

In a project-based learning environment, students can take full sense of responsibility and professional ethics for the task or project at hand. This helps develop professional ethics, integrity, and commitment to the work they do. Indirectly, this project-based MKWU learning helps hone student character, such as perseverance, creativity, self-confidence, and the ability to face challenges. Students can overcome obstacles in completing projects, which strengthens student character.

Increased self-reflection by reflecting on the role of students working as a group on projects and interacting with team members, can be an exercise for deeper self-reflection. This helps them recognize their values and increase their self-awareness of moral aspects that need to be improved. In the end, it can be concluded that project-based MKWU learning is an effective method in building superior morality in students. Through this project-based MKWU

learning, students can improve their understanding of moral values, develop social skills, strengthen character, and build professional ethics. The results of this research can also provide a foundation for educational institutions to apply project-based learning as a tool to develop student morality holistically.

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# HUMAN RESOURCE DEVELOPMENT: EDUCATION IN KHMER ISLAM SOCIETY[1]

Moh. Zain Musa, Ph.D.
Founder of SEPAMA Cambodia
mzenbm@gmail.com

## INTRODUCTION

Kampuchea, also known as Cambodia in English, is a country which is a member of the *Association of Southeast Asian Countries* (ASEAN). The majority of its population are the *Khmer* practicing Buddhism. Another group of its population, not less important in the history of Kampuchea, though very much smaller in number, is known as the *Khmer Islam*, which simply means the Khmer who adhere to the religion of Islam. The national language of Kampuchea is Khmer; besides the national language, the *Khmer Islam* also speak Cam and Malay (Bahasa Indonesia or Bahasa Malaysia also known as Bahasa Melayu). Some are very fluent in Arabic.

[1] This Book Chapter is for a book published by FKIP - Universitas Veteran Bangun Nusantara.


The picture above is the Royal Arms of Cambodia with its national motto "Nation, Religion, King". It is in this respect that the nation of Kampuchea formulates in 1954 by the then King Norodom Sihanouk the name of *Khmer Islam*[2] and give the total freedom to its population to practice any religion to wish to.

The *Khmer Islam* consist mainly of the Cam and the Malay, though there are a very small number of Indians, Pakistanis, Afghans, Arabs and a number of reverts[3]... The Cam are mostly refugees of the once famous Kingdom of Campa existed between the year 192AD to 1835 in the Peninsula of Indochina, which now has become part of the Vietnam. As for the Malay, they have been in Kampuchea since the 14th century and continue to come till the present day. They were mostly traders and missionaries. The Cam and Malay form a homogenous community - as they belong to the same ethnolinguistic

[2] The Khmer Islam term was given by king Norodom Sihanouk in 1954 through a royal decree, which is no longer found in the national archives of Kampuchea.

[3] See Ysa Osman. **2010**. Navigating the Rift

group practicing the same religion, Islam - and since serve faithfully the Khmer court. They become the most trustworthy group of people to be recruited to serve in the security service to the Khmer kings and the court.[4] This service perpetuates until the present-day Kampuchea under the leadership of Samdach Decho Hun Sen.


As for their number, it is difficult to get a correct figure; but it is estimated to be around 700,000 souls out of 18 million of the total population. They can be found throughout Kampuchea. Since the 1980s[5], 608 villages were indentified where mosques and *suraus* have been established. Of the 700,000, 31% reside in Thbong Khmum province.[6] Thbong Khmum province was part of Kompong Cham province before 2018. Whatever the name given to them, the *Khmer Islam* are the Kampuchean people who along with Khmer majority have received the same fate in the long history of Kampuchea. They are also ready to develop and defend their beloved country.[7]

[4] See Mohamad Zain Musa 2012. *Cam-Melayu Abad ke-19. Pemberontakan dan Diaspora*.

[5] See Mohamad Zain Musa 2011. *Diaspora Melayu Cam*.

[6] Kampuchea Islamic Supreme Council - Office of the Mufti, 2018.

[7] See Mohamad Zain Musa & Mohammad Yamin Ismail. **2022**. *Orang Islam Kampuchea.*

Intermarriage with Khmer Buddhists is no longer foreign among members of the Muslim and Buddhist Khmer communities. A study conducted by Ysa Osman has shown that parents of non-Muslim brides or grooms do not prevent their children from marrying Muslims, because according to them, Buddhism does not prevent them changing their religion and mary anyone they love so long as they are happy.

**Dakwah Works**

As usual, when a Cam-Malay (*Khmer Islam*) village is established, the community initial effort was to establish a *musallah* in the house of a member who was more knowledgeable in the teachings of Islam. This is followed by the building of *surau* and then a mosque if their number becomes large. *Musallah*, these *suraus* and mosques are the center of their social and religious activities, such as congregational prayers, teaching children to read and memorize the Qur'an, *fardhu ain* and others. Now the data obtained from the Mufti's office has shown that there are more than 800 places of Islam worship in the entire kingdom. The *Khmer Islam* are very grateful to the many who contributed to the construction of the mosque, *surau* and schools

Imam Musa (1916 – 1975)

Any *dakwah* works in Kampuchea is not complete without mentioning the name of Imam Musa.[8] He was born Ly Mousa in 1916 in Phum Peuh, Kroch Chmar, Thbong Khmum. He is pionneer in developing thedynamic Islamic education in Cambodia. At the very young age of twelve, he was sent by his parents to study Islam in Fatoni, now part of the Southern Thailand. He returned to his village in 1948. Two years later he started teaching Islam systematically to the village folks of his wife village, Svay Khleang, in his quest to develop education among the old fashion old folks. His early religious classes were held in the village *surau*. His first school he ever built was a national primary education, in order to get the children into the mainstream of national education. The school was named the *Sangkum Ly Mousa School*. New methodology of teaching Islam and interpretations of the holly Quran were brought forward until at one point he was given the title of the head of *Kaum Muda*, a group that had only a small number of followers. The rest of Kampuchean Muslims were called *Kaum Tua*. From 1948 to the year of 1970 when the Kampuchean civil war broke out he could gather only a handful followers spread very thinly in villages along the Mekong river, from Kratie to Phnom Penh. His *dakwah* word ended in 1975 with his very painful death after the Khmer Rouge took over the whole country.

**Religious and Integrated schools**

After the Khmer Rouge were evicted from power, there are many schools established after 1993, among them there are religious schools, *tahfiz* schools and later integrated schools. The number of integrated schools, especially after 2012 is increasing rapidly. The most famous school is the Chom Chao Islamic Orphanage Center, established in 1994 as a religious school, but since 2012 it offers several subjects of the Kampuchea's national high school.

Another orphanage is located in Chrok Rimiet, Kompong Chhnang province. The Chrok Romiet Orphanage Center was

[8] See Mohamad Zain Musa 2008. "Dynamics of Faith: Imam Musa in the revival of Islamic Teaching in Cambodia".

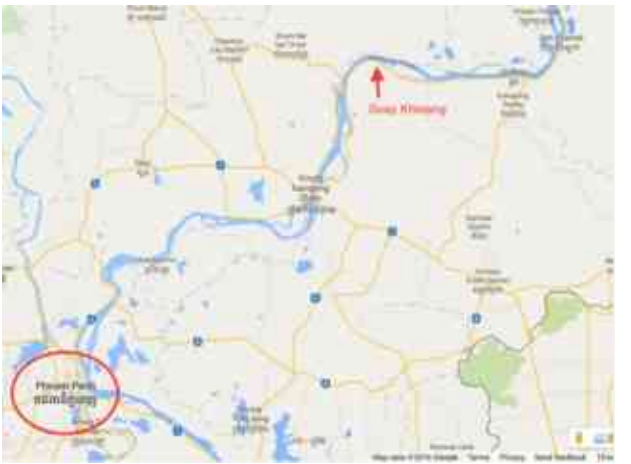
established in 2005. At its initial stage the center handled only the orphans in the area and the children of the *Cam Bani*[9] people. Thus, many among the Bani people got the opportunity to receive the true teachings of Islam. If before that many among the *Cam Bani* people only prayed once a week and only the Tok Imam (Imam) fasted in Ramadan. Due to the persistence of Ust. Adam A. Razak, many have practiced their more perfect worship. Since then, many more integrated schools are being developed. We are very happy for the development of this integrated education. We pray for the success of the community development plan through education and the growth for the good sake of humanity. The third one is the *Institute of Integrated Tahfiz Cambodia* (INTAC). It started in 2015 and in Phum Speu, Stung Trâng, Kompong Cham Province. Its curriculum consists of *Kurikulum Bersepadu Dini* (KBD), Islam and Arabic language curriculum, *tahfiz* al-Quran, and Kampuchea national curriculum. Besides these schools, there are many more throughout the country such at The *Maahad Haji Fikri*, in Jumnik, Kroch Chmar; it has both primary and secondary integrated system, the *Sekolah Nuruliman*, in Russey Chroy, a primary and secondary integrated school. A secondary integrated school exists in Kompot, the *Sekolah Azzamil*. The latest in the long list of educational establishments run by the Khmer Islam with the help of their bothers worldwide, there exist the Cambodian University of Management & Technology (CUMT), established in 2022.

**Musa-Asiah Integrated School (SEPAMA)**

This discussion of the development of education among the Muslim community is not complete without mentioning a school that is considered a pioneer in Integrated Education in Kampuchea. The school was established in a remote village, in Svay Khleang, Srok Kroch Chmar, Thbong Khmum Province, about 170km from the capital city of Phnom Penh. This school was named *Sekolah*

[9] See Mohamad Zain Musa 2004. "Islam as Understood and Practiced by the Muslims in Indochina".

*Bersepadu Musa-Asiah* (SEPAMA) and opened on 1st October 2012. It is now in its eleventh year. Starting from primary school (*Sekolah Rendah Bersepadu Musa-Asiah*, SERPAMA), now it is in the second year of its secondary education (*Sekolah Menengah Bersepadu Musa-Asiah*, SEMPAMA). Apart from the combination of the Kampuchea national academic syllabuses and the Islamic religious syllabus, a *Jabatan Kemajuan Islam Malaysia* (JAKIM) curriculum, for its registered students, the schools offers other programs for the village folks and elderly people. The study the Quran and pray for adults classes are organised for the less fortunate, that are those who were born and raised during the Pol Pot era. The Stories of the Prophets (*Qisasul Anbiya*') classes are also offered. However, all classes in SEPAMA have been disrupted when Covid-19 which spread throughout the country.



SEPAMA is open to all Kampuchean children regardless of their race and religion. The *Khmer Islam* community is also grateful to the leadership of the government of Kampuchea for its understanding that the preaching and development of education among Muslims is a commendable effort in the development of human resources, the humans with noble character, for the beeterment of development of their beloved country of Kampuchea.

Finally, the country of Kampuchea is the *Khmer Islam* motherland as they were born and raised together with the Khmer Buddhists. Since their arrival in Kampuchea, they strive together with other communities to build and defend the kingdom for a very long time. May their works be useful and may they progress together and become the best Kampuchean ummah.

Mr. Musa and Mme. Asiah Heritage house (Oct 2012)

Present day SEPAMA Campus


**SEPAMA and Bahasa Indonesia**

As the primary education curriculum of the Islam course are conducted in Malay, SEPAMA was offered full time Malay language, Bahasa Indonesia, teachers through the Program *Pengabdian Kepada Masyarakat Kemitraan Internasional* (PkM-KI). The first teacher of this program was Mas Muhammad Rafi Siregar, M.SEI (S1); Magister (M.SEI) (S2), serving at SEPAMA from December 2016 to December 2017. Bapak Rafi now is a lecturer at the *Institut Bisnis Muhammadiyah Bekasi*, under the leadership of Dr. Jaenudin, S.Ag.,M.Pd. In the same year a Universitas Ahmad Dahlan, Bapak Muhammad Hafiz Kurniawan and his wife Wikandari Marselina @ Selina were sent there by the university to teach Bahasa and Civilisation Indonesia for a periode of four months, May to August 2017. This program was under the administration of Minister of Education and Culture of the Republic of Indonesia, and led by the Development Center of Strategy and Language Diplomacy.

The third batch was two young men from the Pondok Hajjah Nuriyah Shabran - Universitas Muhammadiyah Surakarta (OHNS-UMS). Mas Jajang Nurzaman, S1 Hukum Ekonomi Syariah (S.H), Universitas Muhammadiyah Surakarta together with Mas Sidiq Saiful Anwar, S.Ag. They were stationed at SEPAMA from 8 Augus 2022 to 1 August 2023. Our thanks to the almighty for allowing them to serve

the less fortunate community through SEPAMA. As their service ends, they were replaced by another young man, Mas Wahyu Bagus Sadewa, S1 in *Ilmu Al-Qur'an dan Tafsir*. His service at SEPAMA will be also a one year term starting 1 August 2023 to 31 July 2024.

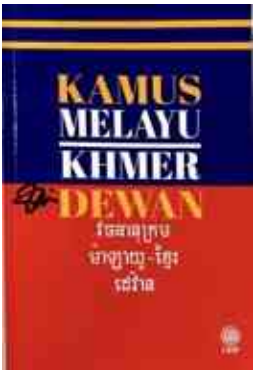
This program is very successful as the SEPAMA children benefit a lot from their presence and their teachings. The SEPAMA teachers and many other young people in the village who have the interest in learning this language spoken by some 300 million of their brothers in Southeast Asia. Besides the Bahasa Indonesia, they also teach Indonesian Civilisation and other subjects they are good at. We need them for the SEPAMA students and development.

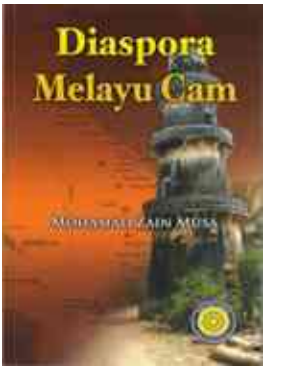
Besides this academic curriculum, SEPAMA is offered by colleagues in Indonesia the course of Indonesian and Civilisation for Foreign Speaking students (BIPA). This course is organised by the Association of Indonesian Language and Literature Lecturers (*Asosiasi Dosen Bahasa dan Sastra Indonesia*, ADOBSI). The course was carried out online during COVID-19 epidemic. The course was joined by the SEPAMA students and teachers, and other teachers and students from other schools. Overall, the participation was very encouraging. However sometimes the conduct of the classes was discouraging due to the instabilities of the local internet. I sincerely hope that this program would start again soon for the benefit of the Kampuchean in their community and national development.

Some SEPAMA SD, SMP & SMA Students

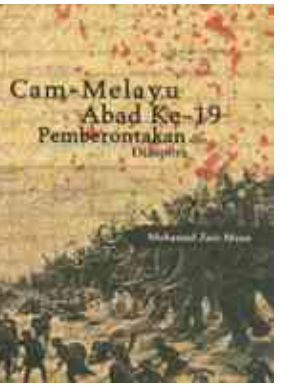

A SEPAMA Drawing by Syed Mukmin Syed Azman

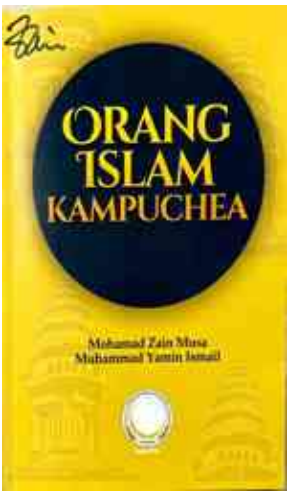
Here are some publications related to the development of education among the Kampuchean muslim community.








The cooperation between SEPAMA and many Indonesian institutions were very fruitful and translated into many MoU and MoA. With these some Universitas Muhammadiyah have sent their students to SEPAMA for their International *Kursus Kerja Nyata* (KKN). We publish here some of the photos of the student participations.

The first KKN batch was a group of students from Universitas Ahmad Dahlan.

Prof Sarbiran and some UAD KKN students at SEPAMA (20130821 - 0929)

The first batch of UMPO KKN students (20190702 - 27)

The second batch of UMSU KKN Students (20220912 - 29)

Prior to these, many joint-programs SEPAMA and Universitas Muhammadiyah, were held including many visits especially by Prof Akhsanul In'am and his teams which pave the ways to many very good relation with many Universitas Muhammadiyah, from North Sumatra to Sorong in the East, many other Indonesian Universitias, *Institut Agama Islam Negeri* (IAIN), *Universitas Islam Negeri* (UIN), technical colleges and *Sekolah Mengah Atas* (SMA). We are versy grateful to him and many of his colleages.

Prof Akhsanul In'am at SEPAMA

And on top of that, any SEPAMA international program with Indonesian institutions got the blessings and very good cooperation with the Indonesian Embassy in Phnom Penh, Kampuchea.

## CONCLUSION

During the last thirty years after Kampuchea was re-established as the Kingdom in 1993 with the help the United Nations Transitional Authority in Cambodia (UNTAC), the Muslim community like other Kampuchean communities was busy rebuilding their lively. With the believe that everything starts with education, they started rebuilding their *pondok, madrasah*, integrated primary and secondary schools. Several schools have been established by Kampuchea individuals or institutions. There are also schools fully built and sponsored by their foreign Muslim brothers. The *Khmer Islam* main goal is to build the community human resources in line with the national program so that they will be able to succesfully participate in the Kampuchean national building. How ever they believe that knowledge should be based on revelation.

Hopefully any Educational Development by the *Khmer Islam*, informal or formal through schools and CUMT will be blessed with Allah *rahmah*. With the support of all parties, we pray that the *Khmer Islam* and Kampuchea will progress on a par with other ASEAN communities.

Mohamad Zain Musa
mzenbm@gmail.com
+6 019 939 5185

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# AN ANALYSIS OF SCIENCE TEST ITEMS

Prof. Dr. Suwarto, M.Pd.
Universitas Veteran Bangun Nusantara, Sukoharjo, Indonesia,
e-mail: suwartowarto@yahoo.com

*The research objective is to describe: the characteristics of science tests based on classical test theory and modern test theory. The research design is quantitative and descriptive. The objects of research are science achievement tests during Covid-19, science teachers, school principals, and deputy principals. The data was obtained from the responses of 280 students to all answer sheets of class VIII SMP MTA Gemolong Sragen as the population of this study. The answer keys for science questions and one package of science questions (50 multiple choice items) were obtained from the science teacher. Research techniques with interviews and documentaries. Data analysis was carried out using the Quest program. Research results: (1). Characteristics of science test based on classical test theory: Content validity is not met, test reliability is 0.960, item difficulty category in percentage is easy: moderate: difficult = 10%: 84%: 6%, item discriminatory category in percentage is poor: enough: good: very good = 2%: 4%: 14%: 80%, so the dominant distractor is very good, while the distractor function in percentage is not effective: effective = 0.70%: 99.30%, so the distractor dominant is effective. (2). The characteristics of the science test are based on modern test theory: the Threshold category for the science test in percentage is very difficult: difficult: medium: easy:*

*very easy = 0%:12%:78%:10%:0%, so the dominant science test Threshold is moderate. The percentage of match between the IPA test items and the Racsh Model is 88%.*
***Keywords:*** *Item difficulty, item discrimination, distractor function, reliability*

## Introduction

Every education at certain times during an educational period always evaluates (Sultana, 2018). This means that the teacher always evaluates the results that have been achieved by students at certain times during the education period. Assessment of student learning outcomes must be carried out continuously in other words the teacher must continuously follow the learning outcomes that have been achieved by students from time to time. The teacher as an educator is to provide feedback to students about their progress and help improve their learning development.

Tests are one of the most effective measurement tools used by teachers to measure the quantity and quality of their learning. Crocker and Algina (1986) describe the test as a standard procedure for obtaining a sample of behavior from a particular domain. Tests are well-crafted instruments that, in total, measure realistic learning outcomes that represent expected behavioral traits. Etsey (2004) suggests that comprehensive learning objectives include observable behavior, conditions under which the intended behavior must be manifested, and a level of performance deemed sufficient to demonstrate mastery of learning outcomes helps in assessing knowledge and concepts that lead to cognitive, affective, and psychomotor development of students.

Tests are more widely used to evaluate student learning outcomes in terms of the cognitive domain. In the assessment of teaching Sciences, the cognitive aspect is often used as a benchmark for achieving science language learning outcomes. This can be seen in the final assessment of science language learning which only assesses cognitive aspects because the test items used only measure mastery of

knowledge of the material being taught. To evaluate students' science achievement, the teacher usually gives students several questions in a test. The teacher can carry it out after each material chapter is finished or at the end of the semester. The test is called an achievement test. Achievement test is a test that is the focus of measurement is the learning objective. Achievement test is an assignment instrument in education that is very important as a source of information for decision-making. It is one of the most widely used measurement tools to determine student learning outcomes in teaching-learning processes or educational programs. It is important for teachers, schools, and educational institutions to do this to find out how far students have achieved the expected learning goals. Therefore, the researcher concluded that the achievement test was in the form of a planned test to reveal the maximum performance that had been taught. Teachers, schools, or other educational institutions can use achievement test results to make decisions or provide feedback to improve the teaching and learning process. In formal education activities in class, achievement tests can be in the form of daily tests, formative tests, summative tests, and college entrance exams (Suwarto, 2013).

A summative test is an assessment activity that generates scores, which are then used to determine student achievement. This test is carried out if the unit of learning experience or all of the subject matter has been completed. A summative test is used to determine the classification of awards at the end of a course or program (Putri, 2017 & Sugianto, 2017). On the other hand, formative tests are used to track how students are progressing in their studies and provide them with feedback that they can use to improve their performance as teachers and students. Formative tests help students better understand their strengths and limitations and how they can improve in those areas while also allowing teachers to see where their students are having difficulty and take quick action to help them.

A teacher as a test developer must know the basics of preparing a good achievement test to obtain valid and reliable measurement results. Learning, teaching, and content knowledge must

all be in sync for a test score to be valid. When this occurs, the test value is actual. This is supported by Mulianah & Hidayat, 2013; Suwarto, 2016, 2021, 2023 and Cheng, Yang & Du, 2019, to obtain an actual score, practical tests are needed to identify accurately. A good test should consist of good items that meet the criteria of the test and offer actual information with minimum error. High-quality test results are the key that can explain actual learning outcomes. According to Suwarto (2021, 2023), a test is said to be a good test, and must meet the characteristics of a good test. This is; validity test, reliability test, item difficulty, item discrimination and especially for multiple choice tests, have an effective distractor for each item. Analyzing test items is needed to determine the level of validity and reliability of the assessment. As a result, the quality of the test will affect the test results. The quality of each item affects the quality of the test. The teacher should focus on the quality of the item items, so the teacher needs to do item analysis because by analyzing the item items, the teacher can identify the quality of each item, know which item fits the criteria, which item should be deleted, and which item should be deleted. revised.

During the Corona Virus Disease 2019 (Covid-19) pandemic from December 2019 until now, all teaching and learning processes, including exams, are temporarily carried out at home. This needs to be done to minimize mass physical contact to break the chain of spreading the virus. Therefore, through distance learning using cellphones, PC (personal computers), and laptops, evaluations and tests are carried out. A media is considered very effective in preventing the spread of Covid-19 in the educational environment. The teacher gives tests that are sent via cell phones or laptops to students or parents. Then students work on assignments or tests from home. During the pandemic, science achievement tests were carried out by subject teachers independently due to distance limitations, so that good tests made by subject teachers need to be investigated. Based on interviews conducted by researchers, the science achievement test during Covid-19 was conducted by a science teacher.

The test is not piloted; even the science teacher made a test without making a grid in advance according to the syllabus. Therefore, the purpose of this study is to determine the validity, reliability, item difficulty , item discrimination, and the effectiveness of distractors based on classical test theory, as well as to see how the characteristics of tests based on modern test theory. This research is expected to provide input and examples for science teachers, educators, test developers, and other parties who make achievement tests. In addition, this research was conducted to provide a reference for similar research in the future.

According to Suryabrata (2005) and Fernandez (1984), the development of a specificity achievement test has an area, subject test, test objectives, material to be made for the test, type of test, and number of items in the test. Then, they designed a test grid that included specific objectives, specific values, and indicators. In building the test, they print the test items according to the grid that has been made, after that, the test must be validated qualitatively, professional judgment, quantitative validation, theoretical validation, material, construction, language validation, and content validity. Then, they revised the test according to the reviewers' input, and after that, all the good test items were assembled into a test. After completing a test, it must be tested on a group of students. To analyze, there is a classical test theory: item difficulty, item discrimination, distractor function, reliability, and content validity. After that, the test items are selected based on the results of the test analysis (classical test theory: accepted, revised, and rejected or modern test theory: threshold value, accepted or rejected, and suitability of the Rasch model or one-parameter logistic model). Finally, the test items that passed were compiled into a standardized test. Then the tests are printed and distributed to students or in schools.

The characteristics of a good test will be focused on quantitative item analysis. Richard & Sheila. (1999) explained that quantitative item analysis is an item study based on empirical data from the test being tested. There are two kinds of quantitative item analysis, namely analysis based on classical test theory and modern

test theory. Item analysis based on classical test theory is a study of questions through information obtained from student answers to improve the quality of questions using classical test theory. This technique has several advantages, namely cheap, easy, can be implemented quickly, and simple. The characteristics of the test are the item difficulty, the item discrimination, distractors, validity, and reliability (Suwarto, 2021, 2023). Existing research, among others. Huda and Wahyuni's research (2019). Knowing the characteristics of science try-out questions based on Classical Test Theory (CTT) using the Iteman program.

Research by Hamimi, Zamharirah & Rusydy (2020), research to determine the quality level of questions consisting of validity, level of difficulty, reliability, deception, and discriminating power of math questions at SMP Negeri 1 Susoh. The test questions are made directly by the math teacher, who first creates a question grid based on competency standards and basic competencies. The form of test questions given to students is in the form of multiple choice and essay. However, the researcher only analyzed multiple choice. The test was made by the Mathematics MGMP (Musyawarah Guru Mata Pelajaran). The results of the study show that the questions used are relatively invalid because there are still many questions that have low and very low validity. The solution, the problem is not used. In addition, the questions studied also have a low level of reliability. However, these questions have a relatively good level of difficulty, with test results showing that most of the questions have a moderate level of difficulty. The questions have good discriminating power.

The similarity between Richard & Sheila and Hamimi, Zamharirah & Rusydy's research is that both quantitative analyzes were carried out with the Iteman program. The Iteman program is only able to analyze qualitatively based on classical test theory. Iteman's program is not capable of quantitative analysis based on modern test theory. Has been done by author is a quantitative analysis based on classical test theory and based on modern test theory, using the Quest program.

## Research methods

The research design is quantitative and descriptive. Quantitative research because researchers calculate the characteristics of the test (item difficulty, item discrimination, the functioning of the distractor, test reliability, threshold value, Infit Meansquare, Outfit t, and item fit) using the Quest program. This research is descriptive because the researcher describes the characteristics of the test. The research location is at SMP MTA Gemolong Sragen. The objects of research were science achievement tests during Covid-19, science teachers, school principals, and vice principals. There is a set of science tests consisting of 50 multiple-choice questions. Data were obtained from students' responses to all answer sheets of class VIII students as the population of this study. There are 280 student answer sheets. Answer keys to science questions and a package of science questions were obtained from the science teacher. Researchers have conducted unstructured interviews in the form of open questions as a data collection technique. This is based on the research methods used by researchers, which depend heavily on the understanding of researchers and information data obtained from observations and interviews. The researcher asked permission from the administration and the school principal to conduct research at SMP MTA Gemolong Sragen. Second, the researcher asked the science teacher for class VIII to get information about the school program curriculum, and data for class VIII students, and asked how the science achievement test was made during the Covid-19 pandemic. Data analysis was performed using the Quest program.

## Research Results and Discussion

Designing a science achievement test during Covid-19, no stages. It was made by a science teacher who teaches directly to his students. Based on the researcher's interview with him, he immediately made the test without making a grid. So, he makes it straight about adapting what he teaches in class over some time. He was simply copying and pasting from previous tests that the MGMP,

himself, and other science teachers had made. In addition, he did not attempt to analyze test characteristics such as item difficulty, item discrimination, and the functioning of the distractor. And for the whole test is also not analyzed such as the validity test and reliability test.

***Analysis Results Based on Classical Test Theory***

The lowest item difficulty was 0.225 on item 49 and the highest item difficulty index was 0.739, namely items 1 and 27. Based on the item difficulty, it can be concluded that the most difficult item on the science achievement test made by the science teacher was item 49 while the items the easiest are items 1 and 27. A summary of the difficulty level of items by category in the science achievement test is presented in Table 1.

Table 1. Summary of Item Difficulty (p) from the Science Achievement Test

| Category | Item Number | Total | Percentage |
|---|---|---|---|
| Easy ($0.70 < p \leq 1.00$) | 1,12,27,31,35 | 5 | 10 |
| Moderate ($0.30 \leq p \leq 0.70$) | 2,3,4,5,6,7,8,9,10, 11,13,14,15,16,17,18, 19,20,21,22,23,24,25,26,28,29,30,32,33,34,36,37,38,39,40,41,43,44,46,47,48,50 | 42 | 84 |
| Difficult ($0.00 \leq p < 0.30$) | 42,45,49 | 3 | 6 |
| Total | | 50 | 100 |

The Science test has 5 easy items with a percentage of 10%, 42 medium items with a percentage of 84%, and 3 difficult items with a percentage of 6%. Based on these results, the item difficulty is more dominant on medium items, so the researcher concludes that the item does not have proportional item difficulty, even though the ideal test should consist of 25% easy questions, 50% medium questions, and 25% questions difficult (Kunandar, 2013 & Suwarto, 2021, 2023). Roid & Haladyna (1982) stated that a test that does not have a proportional item difficulty level cannot reveal the actual competence

of students. The test is also more dominant on moderate items, Brown (2004) confirms that items that are well made should not be too easy or difficult, the test must be balanced so that a science teacher can obtain information about students' natural science competencies. In contrast, Haider et al. (2012) argue that the category of moderate items can indicate that students have a good understanding of answering the test because more than half of the students answered the items correctly. The difficulty level of these test items can be compared to other studies that examine the difficulty level of summative test items (Mulianah & Hidayat, 2013; Maharani & Putro, 2020; Saputra, Retnawati & Yusron, 2021), even though the test conditions are not the same. Previous studies have found that the difficulty level of questions has more moderate items than the others.

Table 2. Summary of Item Discrimination ($r_{Pt.Biser}$) Science Achievement Test

| Category | Item Number | Total | Percentage |
|---|---|---|---|
| Bad ($r_{Pt.Biser} \leq 0{,}19$) | 6 | 1 | 2 |
| Sufficient ($0.20 < r_{Pt.Biser} < 0.29$) | 42,49 | 2 | 4 |
| Good ($0.30 < r_{Pt.Biser} < 0.39$) | 1,30,33,34,46,47,50 | 7 | 14 |
| Very Good ($0.40 \leq r_{Pt.Biser}$) | 2,3,4,5,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,31,32,35,36,37,38,40,41,43,44,45,48 | 40 | 80 |
| Total | | 5 0 | 100 |

This shows that the test contains more well-constructed items than poorly constructed items, but there is an imbalance between easy, medium, and difficult items. Items that are difficult and unbalanced are thought to be due to the Covid-19 pandemic which requires students to work at home, so students can ask friends for help, or can browse the internet. All of these can affect the item difficulty index. The lowest item discrimination was 0.13 in item 6 and the highest item discrimination was 0.74 in item 28. The summary of item discrimination by category in the science learning achievement test

conducted by science teachers is presented in Table 2. The item discrimination of this test is Good. Based on the Quest program, it shows that 1 item is bad with a percentage of 2%, 2 items are accepted with a percentage of 4%, 7 items are good with a percentage of 14%, and 40 items are very good with a percentage of 80%. These results indicate that 1 bad item must be dropped and 2 acceptable items must be revised (Dichoso & Joy, 2020). This result is good because 80% of the items are very good and 14% of the items are good (Dichoso & Joy, 2020). This means that most of the questions can be used to measure students' actual science competence. These items can also distinguish high achievers, moderate achievers, and low achievers. This is following Suwarto (2021, 2023) where the greater item discrimination implies that the item is increasingly able to distinguish between low-achieving and high-achieving students. This is to detect individual differences among students. The results of this test can be compared with other studies (Boopathiraj & Chellamani, 2013; Singh et al., 2014; Saputra et al., 2021), although the test conditions are not similar. The researchers found good item discrimination. Meanwhile, different results were found from previous studies such as (Sa'adah, 2017; Toksöz & Ertunç, 2017; Rehman, Aslam & Hassan, 2018; Manalu, 2019; Karim, Sudiro & Sakinah, 2021) which reported that items with poor discriminating power, then the item cannot differentiate between high achieving students and low achieving students.

The distractor is a multiple-choice answer that is wrong. Its function is to make students confused or miscalculate when choosing the correct answer among the alternatives provided. The distractor is said to be effective, if it is selected by more than 5% of the respondents, in a decimal number of 0.050. The distractor is said to be ineffective if it is chosen by less than 5% of the respondents or in a decimal number < 0.050. (Suwarto, 2021, 2023). Based on effective distractors and ineffective distractors the science achievement tests made by the science teacher are as follows. The percentage of ineffective distracters from the science achievement tests was 0.70%.

The percentage of effective distracters on the science achievement tests is 99.30%. This test distractor has 1 ineffective distractor (0.7%) of 150 distractors that must be revised and 149 effective distractors (99.30%) of 150 distractors. The results of the percentage of effective distractors in this study were almost the same as in previous studies, namely Maharani & Putro, 2020. They found 80% of distractors were effective. This result can be explained that item discrimination can affect the deceptive index. Most of the science achievement items can distinguish between high and low achievers which can be assumed that a high item discrimination can lead to an effective deceptive index (Kheyami, Jaradat, Al-Shibani, & Ali, 2018). They also said that the ideal number of distractors was at least 3 items. The results of this study are more effective distractors so that the quality of the items is getting better. The results of the science achievement test research, almost all items have an effective distractor. It is assumed that the science teacher designed the test himself so that the teacher already knows the characteristics of the students.

The reliability of the science achievement test made by the science teacher was 0.960. This shows that the test items are very reliable. A test with a high level of reliability is classified as a good test (Sa'adah, 2017). In addition, good tests can be used for subsequent testing. The results of this study also show the extent to which science achievement test measurements remain consistent after being repeated on subjects and under the same conditions (Rudyatmi & Rusllowati, 2017). This reliable test is almost the same as previous studies (Anggreyani, 2009; Mulianah & Hidayat, 2013; Pascual, 2016; Sugianto, 2017; Manalu, 2019; Saputra et. al., 2021) although the test conditions are not the same. They found a reliable test. The estimated reliability of the test can be trusted because it is far above the reliability coefficient limit of 0.700. Several factors affect the estimation of reliability, including group homogeneity, time allocation, and test duration. In addition, another factor affecting the estimated reliability is the number of items that are classified as difficult (Crocker and Algina, 1986).

The analysis based on the classical test theory above has a weakness, namely the characteristics of the items depend on the group of test takers who are subjected to the items. In classical statistical test theory, questions such as the difficulty index of questions depend on the group of test takers, if the test is done by clever students, the questions are easy (the level of difficulty of the item becomes large) and vice versa, if the test is done by students who are not good at it, the questions become difficult (level of difficulty). the difficulty becomes small). Therefore, the characteristics of the questions are inconsistent or change depending on the ability of the students taking the test. Analysis based on classical test theory has a weakness because the characteristics of the test depend on the high group and the low group. Thus, this shows that when analyzing tests based on classical test theory, the characteristics of the tests are inconsistent or change depending on student achievement (Hambleton, Swaminathan & Rogers, 1991). Therefore, the researcher continues to analyze the characteristics based on modern test theory to analyze the characteristics of the test.

***Analysis Results Based on Modern Test Theory***

Table 3. Category Summary *Threshold* (*b*) the science achievement tests

| Category | Item Number | Total (%) |
|---|---|---|
| Very Difficult ($b > 2$) | - | 0 (0%) |
| Difficult ($1 < b \leq 2$) | 6,21,42,45,48,49 | 6 (12%) |
| Moderate ($-1 \leq b \leq 1$) | 2,3,4,5,7,8,9,10,11,13,14,15,16,17,18, 19,20,22,23,24,25,26,28,29,30, 32,33,34,36,37,38,39,40,41,43,44,46, 47,50 | 39 (78%) |
| Easy ($-1 > b > -2$) | 1,12,27,31,35 | 5 (10%) |
| Very Easy ($b < -2$) | - | 0 (0%) |
| | Total | 50 (100%) |

Test characteristic analysis based on modern test theory uses one-parameter logistics (1PL) because the Quest program can only analyze the one-parameter logistic model (Adams & Khoo, 1996). Based on Table 3, the percentage of Threshold science achievement test = very difficult: difficult: moderate: easy: very easy = 0%:12%:78%:10%:0%.

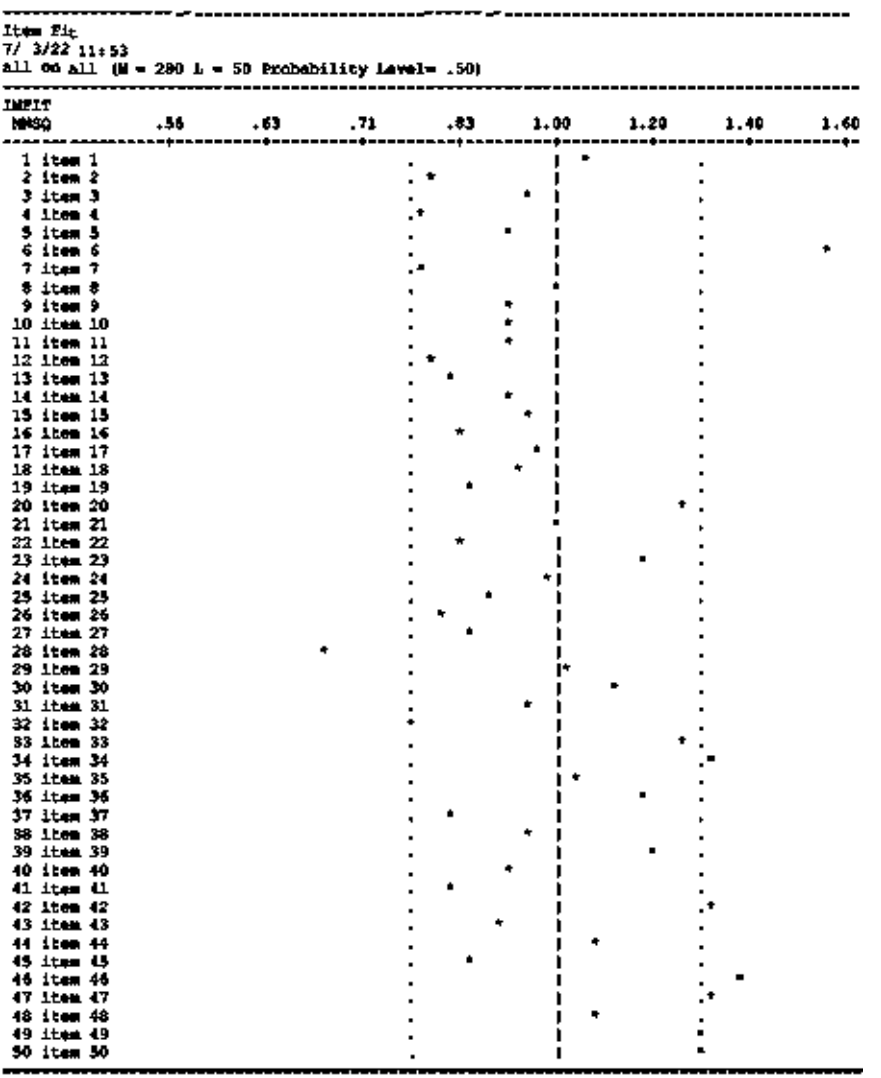


Figure 1. Fit map items for the Science Achievement Test

Based on Figure 1, it can be seen that the 6 items on the Science achievement test are not fit because the asterisk statistics are out of fit which is between the two dotted vertical lines, namely: items 6, 28, 34, 42, 46, and 47, while 44 other items fit (Adams & Khoo, 1996). The percentage of compatibility of the Science test items with the Racsh Model = 44/50x100% = 88%.

Table 4. Analysis of Accepted and Rejected Science Achievement Test Items

| Category (Criteria) | Item Number | Sum (%) |
|---|---|---|
| Accepted (*Outfit t* ≤ 2.00) | 1,2,3,4,5,7,8,9,10,11,12,13,14,16,17 ,18,19,21,22,23,25,26,27,28,29, 30,31,32,33,35,36,37,38,39,40,41,4 3,44,45,48 | 40 (80%) |
| Rejected (*Outfit t* > 2.00) | 6,15,20,24,34,42,46,47,49,50 | 10 (20%) |
| | Total | 50 (100%) |

Based on Table 4, the percentage of science test questions that passed = accepted: rejected = 80%:20%. Meanwhile, if you look at the Item Fit Map for the Science achievement test, you can see Figure 1.

**Conclusions and suggestions**

Characteristics of the science test based on classical test theory: Content validity was not met, test reliability was 0.960, item difficulty category in percentage was easy: moderate: difficult = 10%:84%:6%, item discrimination category in percentage was bad: enough: good: very good = 2%: 4%: 14%: 80%, so the dominant is very good, while the function of the distractor in percentage is ineffective: effective = 0.70%: 99.30%, so the distractor is effective dominant. The characteristics of the Science test are based on modern test theory: the Threshold category of the Science test in percentage terms is very difficult: difficult: moderate: easy: very easy = 0%:12%:78%:10%:0%, so the Science test Threshold is moderate. The percentage of compatibility of the Science test items with the Racsh Model is 88%.

Suggestions that can be given item difficulty levels should be made 25 percent easy, 50 percent moderate, and 25 difficult. Thus, the ability of students who are low, medium, and high can all be measured. Content validity should be fulfilled, so that the Science test has items that can measure what should be measured (all aspects that must be measured are represented in the Science test items). The items that make up the Science test should conform to the Rasch Model.

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# ANALYSIS OF STUDENTS' PERCEPTIONS OF ARTIFICIAL INTELLIGENCE-POWERED CHATAPPLICATIONS IN HIGHER EDUCATION CONTEXT

Mohd Hafiz MD Hanif[1], Singgih Subiyantoro[2*]
[1]Universiti Pendidikan Sultan Idris, Malaysia
[2]Universitas Veteran Bangun Nusantara, Indonesia
Email: singgihsubiyantoro@univetbantara.ac.id
[*]Corresponding Author

*The increasing integration of Artificial Intelligence (AI) technologies in educational settings has raised questions about their impact on students' learning experiences and engagement. The research purpose is to explore how students perceive the use of AI-powered chat applications, identify factors influencing their perceptions, and determine the extent to which they embrace these technologies in their daily academic interactions. A mixed-methods approach was employed, combining surveys and qualitative interviews to gather comprehensive data. The main results indicate that the majority of students exhibit positive attitudes toward AI-powered chat applications. They appreciate the instant support, timely feedback, and round-the-clock accessibility provided by these tools. However, some students expressed concerns about the potential overreliance on AI, the lack of human interaction, and data privacy*

*issues. The qualitative findings also revealed the need for clear communication about the roles of AI-powered chat applications and the importance of maintaining a balance between human and AI interactions. In conclusion, this research highlights the significance of students' perceptions in shaping the successful integration of AI-powered chat applications in higher education. By understanding students' attitudes and concerns, educators and developers can enhance the design and implementation of AI technologies to better cater to students' needs and preferences. This study's academic contribution lies in providing valuable insights into the human-AI interaction in educational settings, fostering discussions about the responsible and ethical use of AI in higher education.*
***Keywords:*** *Artificial Intelligence, AI-Powered Chat Applications, Higher Education, Students'Perceptions, Educational Technology*

## Introduction

Artificial Intelligence (AI) has emerged as a transformative force across various industries, and the realm of education is no exception (Chan, 2023; Cooper, 2023). In recent years, the integration of AI-powered chat applications in higher education has garnered increasing attention as a promising means to enhance the learning experience and support students' academic journey (Nguyen et al., 2023; Wang et al., 2023). These applications, driven by advanced natural language processing and machine learning algorithms, offer the potential to revolutionize the way students interact with educational content, institutional resources, and academic support systems .

AI-powered chat applications are intelligent virtual agents that can engage in real-time conversations with users, providing timely responses, personalized assistance, and relevant information (Crompton & Burke, 2023; Wang et al., 2023). They can take various forms, including chatbots, virtual assistants, and AI-driven tutoring platforms. These applications have the capacity toadapt and improve their responses based on user interactions, leading to increasingly

effective and tailored support for individual students.

In the higher education context, these AI-powered chat applications hold great promise for addressing common challenges faced by students. They can offer 24/7 accessibility to academic resources and guidance, reducing the dependency on human availability (Wang et al., 2023; Zia-ud- din et al., 2023). Moreover, these applications can provide instant feedback on academic queries, enabling students to clarify doubts and reinforce their understanding without delay.

The potential benefits of AI-powered chat applications also extend to promoting inclusivity and accessibility in higher education. Through their adaptive capabilities, they can cater to diverse learning styles and accommodate students with different levels of proficiency, ensuring a more inclusive educational experience. Additionally, these applications have the potential to bridge language barriers and improve access to education for non-native English speakers (Wang et al., 2023).

Despite the potential advantages, several crucial aspects of AI-powered chat applications in the higher education context remain relatively unexplored. First and foremost, the extent to which students embrace and utilize these technologies in their academic journey is not yet fully understood. Understanding students' acceptance and usage patterns is essential for designing effective interventions and ensuring seamless integration (Vera & Palaoag, 2023).

Furthermore, the effects of AI-powered chat applications on student engagement and learning outcomes require deeper investigation. While these applications promise personalized and timely support, it is essential to assess whether they genuinely enhance learning experiences or potentially lead to a dependence on AI-driven assistance, thereby limiting critical thinking and problem-solving skills (Alhumaid et al., 2023; Cooper, 2023).

Data privacy and security concerns also loom large, as AI-powered chat applications gather and process substantial amounts of student data. The implications of data usage and the measures in place to safeguard sensitive information warrant closer scrutiny to instill

trust and confidence in these technologies among students and educators alike.

Moreover, the potential impact of AI-powered chat applications on the dynamics of human interaction within the educational environment remains largely uncharted territory. Questions arise concerning the balance between AI-driven support and the irreplaceable value of face-to-face interactions with educators and peers.

Additionally, AI-powered chat applications may introduce disparities in access to education, particularly for students with limited digital literacy or those from marginalized communities (Krügel et al., 2023). Understanding the potential barriers and challenges that certain groups of students may face will be crucial in designing equitable and inclusive educational experiences.

In recent years, AI-powered chat applications have garnered significant attention for their ability to revolutionize the way students interact with learning materials, access academic support, and engage in collaborative learning experiences (Sorin et al., 2023). However, despite their promise, there exists a notable gap in our understanding of the full extent of their impact and implications in the higher education context.

The first aspect contributing to the gap surrounding AI-powered chat applications lies in the limited knowledge of how students truly perceive and interact with these technologies. While studies have explored student attitudes towards AI and educational technology in general, a comprehensive examination of their specific perceptions towards AI-powered chat applications remains scarce. Understanding these perceptions is crucial as they directly influence the adoption and integration of these applications into the learning process. Without a clear understanding of students' attitudes and preferences, it becomes challenging to design AI-powered chat applications that effectively cater to their needs and expectations.

Secondly, the effectiveness of AI-powered chat applications in

enhancing student engagement and learning outcomes remains a subject of inquiry. While proponents argue that these applications provide personalized and timely support, critics express concern that overreliance on AI-driven assistance may stifle critical thinking and collaborative skills. There is a need for empirical evidence to shed light on the actual impact of AI-powered chat applications on student learning experiences and academic achievements. Understanding the potential benefits and limitations of these applications is essential to harness their advantages while mitigating any adverse effects they may pose on the learning process.

Furthermore, ethical considerations surrounding data privacy and security present a significant gap in the implementation of AI-powered chat applications. These technologies inherently collect and process vast amounts of student data to deliver personalized support. Yet, the extent to which students are aware of the data usage and the measures taken to protect their privacy remains uncertain. It is crucial to address these concerns transparently to foster trust and ensure that the use of AI-powered chat applications aligns with established ethical standards.

Lastly, the impact of AI-powered chat applications on the dynamics of human interaction within educational environments poses another critical knowledge gap. As these technologies become more prevalent, questions arise regarding the potential displacement of human interaction in favor of AI-driven assistance. Understanding how these applications can complement rather than replace human interactions is pivotal in maintaining a balanced and supportive learning environment.

In light of these gaps, this research aims to bridge the existing knowledge divide by conducting an in-depth analysis of students' perceptions with AI-powered chat applications in the higher education context. By examining these key aspects, we seek to contribute valuable insights that will inform educators, policymakers, and developers in effectively integrating AI technologies in education. Ultimately, our endeavor is to foster responsible and ethical use of AI-

powered chat applications, optimizing their potential to enrich the learning experiences of students while addressing their evolving needs and aspirations.

## Methods

### Research Design

The research design for this study is cross-sectional and exploratory in nature. It aims to analyze students' perceptions of artificial intelligence-powered chat applications in the context of higher education at a specific point in time. The cross-sectional design allows for the collection of data from a diverse group of participants, providing insights into a wide range of perspectives and experiences related to the use of AI-powered chat applications.

### Participants

Participants for this study are undergraduate and postgraduate students enrolled in various higher education institutions. A purposive sampling method is employed to select participants who have experience with AI-powered chat applications or have had exposure to these technologies during their academic journey. The inclusion criteria involve students from diverse academic disciplines and varying levels of familiarity with AI-powered chat applications. Participants are recruited from different universities to ensure a representative sample.

### Data Collection

Data collection involves the use of both online surveys and focus group discussions. The online survey is distributed to a larger sample of participants to gather quantitative data and assess general perceptions and attitudes toward AI-powered chat applications. The survey is designed with a combination of Likert-scale questions, multiple-choice items, and open-ended questions. It covers topics such as students' prior experiences with AI-powered chat applications, perceived benefits, concerns, and overall acceptance of these

technologies in their academic lives.

For the qualitative component, focus group discussions are conducted with a subset of participants selected from the survey respondents. Focus groups provide an opportunity to explore in-depth the participants' opinions, experiences, and reactions related to AI-powered chat applications. The focus group discussions are guided by a moderator using a semi-structured interview format, allowing participants to share their perspectives freely while facilitating group interactions and idea exchange.

**Data Analysis**

Quantitative data collected from the online surveys are analyzed using statistical software. Descriptive statistics are computed to summarize the participants' responses and provide an overview of their perceptions of AI-powered chat applications. Qualitative data obtained from the focus group discussions are transcribed verbatim and analyzed thematically. The data is coded to identify recurring themes and patterns related to students' experiences and attitudes toward AI-powered chat applications. The thematic analysis allows for a deeper understanding of the nuanced views and concerns expressed by the participants.

**Results and Disscussion**

The survey data revealed that a significant proportion of the participants (78%) reported having prior exposure to AI-powered chat applications in their academic journey. Among these, 45% had used AI-powered chat applications for academic inquiries and support, while 33% had encountered them in non-academic contexts. The participants expressed several perceived benefits of using AI- powered chat applications in higher education. The most commonly reported advantages were instant access to information (64%), timely feedback on academic queries (54%), and personalized assistance (48%). Additionally, 62% of the respondents acknowledged that AI-powered chat applications enhanced their overall academic experience. Despite

the positive perceptions, the survey also highlighted certain concerns and limitations associated with AI-powered chat applications. The most notable concern was related to data privacy and security (42%), with participants expressing apprehensions about the use and storage of personal information. Furthermore, 38% of the respondents expressed concerns about potential overreliance on AI, which they believed might hinder critical thinking and problem-solving skills. Approximately 56% of the participants perceived that the integration of AI-powered chat applications in higher education did not significantly impact their human interactions with educators and peers. However, 34% reported a slight reduction in face-to-face interactions, primarily due to the convenience of accessing AI- driven support at any time.

The focus group discussions revealed that students highly valued the instant and round-the- clock availability of AI-powered chat applications. They emphasized that timely support through these applications enabled them to clarify doubts and receive academic guidance efficiently.

Participants appreciated the personalized assistance provided by AI-powered chat applications. The ability of these technologies to adapt to individual learning styles and preferences was acknowledged as a valuable feature that catered to diverse student needs Some participants expressed a preference for human interaction in certain situations, especially when seeking emotional support or engaging in complex discussions. They emphasized that while AI-powered chat applications were useful for basic inquiries, human interaction remained irreplaceable in certain contexts. A subset of participants voiced concerns about the lack of transparency regarding data usage by AI-powered chat applications. They felt the need for clear communication and transparent policies regarding data storage and handling to address privacy concerns adequately. Several participants highlighted the importance of responsible and ethical use of AI-powered chat applications in higher education. They urged educators and developers to consider the potential impact on students' well-being

and learning outcomes while integrating these technologies.

Overall, the results of this study indicate that students perceive AI-powered chat applications in higher education as valuable tools for academic support. The applications' instant accessibility and personalized assistance were particularly valued by students. However, concerns related to data privacy, overreliance on AI, and potential impacts on human interaction warrant careful consideration. The findings call for the responsible integration of AI-powered chat applications in higher education, emphasizing transparency, data security, and the preservation of human interactions to optimize their benefits for student learning experiences.

The findings of this study provide valuable insights into students' perceptions of AI-powered chat applications in the higher education context. The high level of familiarity with AI-powered chat applications indicates a growing trend of their integration in educational settings. The perceived benefits, such as instant access to information, timely feedback, and personalized assistance, align with the potential advantages of AI technologies in enhancing the learning experience. However, concerns regarding data privacy and overreliance on AI call for careful attention to ethical considerations in the development and implementation of AI-powered chat applications. To address privacy concerns, institutions must establish transparent data policies, ensuring that students' personal information is securely handled and protected. The balance between AI-driven support and human interaction emerges as a critical aspect to consider in the integration of AI-powered chat applications. While students value the convenience of instant support, they also recognize the irreplaceable value of human interactions, particularly in addressing complex academic and emotional needs. Striking this balance will be pivotal in optimizing the potential of AI technologies while maintaining a supportive and inclusive learning environment.

## Conclusion

In conclusion, this study sheds light on students' perceptions of AI-powered chat applications in higher education, revealing their appreciation of the instant support and personalized assistance these technologies offer. The findings underscore the importance of transparent data policies, responsible integration, and the preservation of human interactions to maximize the benefits of AI- powered chat applications while addressing potential concerns. The study's limitations include the reliance on self-reported data, potential sampling biases, and the focus on a specific point in time. Future research should explore longitudinal perspectives to track students' evolving perceptions over time and investigate the longitudinal effects of AI-powered chat applications on academic achievement and engagement. Based on the analysis of students' perceptions of AI-powered chat applications in the higher education context, the following recommendations are proposed to optimize the integration and use of these technologies:

1. Enhance Data Privacy and Transparency: To address students' concerns about data privacy, educational institutions and developers should prioritize transparency in data collection, storage, and usage. Clear and accessible data policies should be communicated to students, outlining how their personal information is handled and protected. Moreover, implementing robust security measures and complying with relevant data protection regulations will foster trust in the responsible use of AI-powered chat applications.
2. Promote Responsible and Ethical Use of AI: Educators and developers must prioritize the ethical use of AI-powered chat applications in higher education. Responsible AI development includes avoiding biases in algorithms, ensuring fairness in responses, and being sensitive to cultural and social differences. Additionally, continuous monitoring and evaluation of AI applications should be conducted to identify and address any potential adverse effects on students' learning experiences and

mental well-being.

3. Provide Training and Support for Students: Educational institutions should offer training and support to students on the effective use of AI-powered chat applications. Providing guidance on accessing academic resources, leveraging AI-driven feedback, and understanding the limitations of these technologies will empower students to make the most of the available tools. Additionally, workshops and resources on digital literacy and responsible AI usage can help students navigate the AI landscape responsibly.
4. Conduct Longitudinal Studies: To gain deeper insights into the long-term impact of AI-powered chat applications on students' learning experiences and academic achievements, longitudinal studies should be conducted. Tracking students' perceptions and interactions with AI technologies over an extended period will provide valuable data on their evolving needs and preferences, enabling institutions to make informed decisions for continuous improvement.
5. Foster Collaboration between Educators and Developers: Collaboration between educators and AI developers is essential for creating AI-powered chat applications that align with educational goals and student needs. Engaging educators in the design and development process can lead to more contextually relevant and effective applications. Additionally, open channels of communication between developers and educators will facilitate timely updates and improvements based on feedback from the educational community.

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# PLANNING MATHEMATICS LEARNING MEDIA IN FISRT CLASS

Para Mitta Purbosari
Veteran Bangun Nusantara University
paramittapurbosari@gmail.com

*This study aims to determine the planning of instructional media used for mathematics in class I. The method used in this research is descriptive qualitative. The subjects in this study were grade I teachers at Jetis 2 Public Elementary School, Jetis 4 Public Elementary School, and Sukoharjo Christian Elementary School. Data collection techniques used in this study were observations and interviews with first grade teachers from 3 elementary schools selected in this study. The results of this study indicate that there is the same planning for every grade I math teacher in elementary schools. Learning media planning is adjusted to the material. Most of the media used are in the same form, namely picture cards, concrete objects, folded paper.*
***Keywords:****planning, learning media, mathematics*

## Introduction

Learning mathematics is a subject with a high intensity contribution in educating a person and can make that person think critically and take action legically. Learning mathematics at the elementary school level is an interesting study to be researched,

because at this time children are still developing at the level of thinking while mathematics is a deductive science that requires special abilities (Dewi, 2022). The teacher is the most powerful bridge for students to hone the skills they have. When students experience difficulties in learning, especially in arithmetic, it is best to innovate which can be a good bridge for student skill training. Difficulties in learning to count can be referred to as dyscula (Anindya et al, 2022).

In addition, there are other factors that cause children's difficulties in learning to count, namely the monotony of the delivery delivered by the teacher to students. Teachers should adjust the character of the children according to their school level. According to Octavia (2019) elementary school teachers must be able to win over children who still often like to play, and this is one of the solutions for future innovation. Learning media that have the nature of future innovation must be designed neatly and adapted to the goals of mathematics education in class I.

The use of media needs to be designed early before learning activities take place, this aims to align educational goals with learning objectives done. Media become impact main participant educate pay attention or not. Student interest in the learning media used by a teacher is also a special attraction. Instructional media that are designed need to pay attention to technological developments and the availability of facilities owned by elementary schools. Like the three schools, namely Jetis 2 Public Elementary School, Jetis 4 State Elementary School, and Sukoharjo Christian Elementary School, they apply design first before teaching. The design is adjusted to the teacher's ability and innovation in using existing learning media. Teachers in the three schools use media in different materials. The media that is often used is books, but teachers must continue to innovate to see the development of elementary school children, especially grade I, who still like the world of games.

Based on this phenomenon, further research would like to identify the design of mathematics learning media in three elementary schools in Sukoharjo Regency, to find out the design and differences in the media used in the mathematics material used to teach class I.

## Method

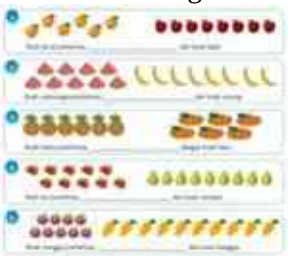
This study used descriptive qualitative method. The subjects in this study were teachers at three schools in Sukoahrjo District, namely Jetis 2 Public Elementary School, Jetis 4 Public Elementary School, and Sukoharjo Christian Elementary School. Data collection was carried out using observation techniques and direct interviews with the elementary school which was the subject of the study, knowing the process of designing mathematics learning media in the elementary school.

## Results and Discussion

Based on the results of research that has been carried out using observation techniques, this study used three schools in Sukoharjo Regency to become research subjects, namely Jetis 2 Public Elementary School, Jetis 4 Public Elementary School, and Sukoharjo Christian Elementary School. With the observation found several equations for the use of designs used in learning mathematics.

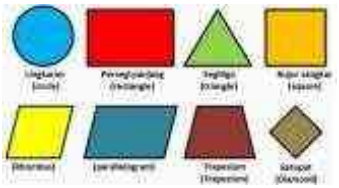
The use of mathematics learning media is adapted to the material to be taught in class I. Based on the research results it is known that the use of learning media in class I SD Krritsen Sukoharjo applies.

**Table 1. Learning Media Design for Sukoharjo Christian Elementary School**

| No | Material | Media |
|---|---|---|
| 1. | Expressing Many Things | Picture cards using ice cream sticks  Procedure : Picture cards are cut out, then popsicle sticks are attached. The teacher gives a picture card that has been given a stick. Then, the child who wants to answer comes forward front and write on the blackboard. |

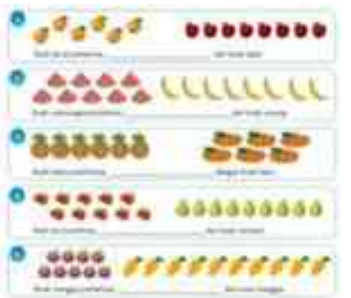
| | | |
|---|---|---|
| 2. | sum | Concrete objects: eraser, pencil, ruler,<br>addition operation number card<br>  <br>Procedure :<br>Children bring concrete objects from home in large quantities (units to dozens). Teacher<br>Give an example of a pair of objects arranged carefully. Children use concrete objects<br>as a visual arithmetic aid. |
| 3. | Subtraction | Concrete objects: eraser, pencil, ruler, number card,<br>addition operation<br>  <br>Procedure :<br>Children bring concrete objects from home in large quantities (units to dozens). Teacher<br>Give an example of a pair of objects arranged carefully. Children use concrete objects<br>as a visual arithmetic aid. |

| | | |
|---|---|---|
| 4. | Addition and Subtraction | Concrete objects: eraser, pencil, ruler, number card, addition operation<br>  <br>Procedure :<br>Children bring concrete objects from home with large numbers (ones to tens) in small groups. The teacher gives an example of a pair of objects are carefully arranged. Child uses concrete objects as visual aids for counting. |
| 5. | CompareSize | Concrete objects: in the form of posters containing pictures such as animals or transportation vehicles.<br>  <br>Procedure :<br>The teacher shows one of two objects. The child is given a picture card and circles the big picture. |

| | | |
|---|---|---|
| 6. | Big Numbers | Number card<br>  <br><br>Procedure :<br>Teacherprovide pieces of paper numbers. Child sort from small to large by sticking on paper. |
| 7. | Get to know the Forms of Wake | Folding paper(origami)<br>  <br>Procedure :<br>The teacher gives a shape pattern on origami paper. The child cuts and pastes it in the notebook and names it after the flat shape. |

The use of learning media in accordance with the table above is used and adapted to the material obtained at that time. Like picture cards used to express many differences used to introduce the concept of addition, subtraction, and number operations and so on. While the application of almost the same design was carried out in Jetis 2 Public Elementary School. Seen in table 2 as follows.

**Table 2. Planning for the Use of Mathematics Learning Media in Jetis Elementary School**

| No | Material | Media |
|---|---|---|
| 1. | Expressing Multiple Things | Picture card  Procedure : Picture card cut out. Teacher give card. Then, son stick in notebooks and answer lots of pictures. |
| 2. | sum | Concrete objects: abacus or counting aids.  Procedure : The teacher will appoint each student to come forward and give an example Addition with units like 5+4. The child will use the Abacus to count one by one to find the end result of the problem. |

| | | |
|---|---|---|
| 3. | Subtraction | Concrete objects: abacus or counting aids.<br>  <br>Procedure :<br>The teacher will appoint each student to come forward and give an example<br>addition with units like 7-3. The child will use the Abacus to count one by one to<br>find the end result of the problem.. |
| 4. | Addition and Subtraction | Concrete objects: abacus or counting aids.<br>  <br>Procedure :<br>The teacher will appoint each student to come forward and give an example<br>Addition with units like 5+4. The child will use the Abacus to count one by one to<br>finding the end result of the problem., matches, as a counting tool. |

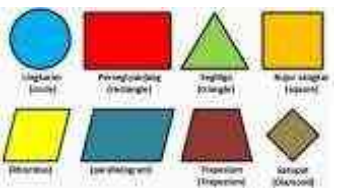
| | | |
|---|---|---|
| 5. | Big Numbers | Number card<br>  <br><br>Procedure :<br>Teacher gives pieces of paper numbers. Children sort from small to large by sticking on paper. |
| 6. | Build Forms | Concrete objects: cones and blocks<br>  <br>Procedure :<br>The teacher shows a combination of several flat shapes in the form of a cone. Child come forward and mention what are the plane shapes that make up the room |

Based on the table above, the media use equation is carried out in the use of picture cards to introduce operations in addition, subtraction, and number operations which will be the next material. The difference in the use of picture cards was carried out at Jetis 4 Public Elementary School, based on the survey they preferred to use pictures with poster media to introduce students to what fruits, vegetables are and how many of each unit. Can be seen in table 3, below.

**Table 3. Design of Mathematics Learning Media at SDN 4 Jetis**

| No | Material | Media |
|---|---|---|
| 1. | Expressing Multiple Things | Posters depicting vegetables or fruits  Procedure : The teacher will point to the vegetables that must be counted. The child will count the number of vegetables in the poster |
| 2. | sum | Concrete objects: marbles, number cards, addition operations  Procedure : Children bring concrete objects from home in large quantities (units to dozens). The teacher gives examples of addition problems. Child use the concrete object as a visual aid for counting. |
| 3. | Subtraction | Concrete objects: marbles, operating number cards increase |

| | | |
|---|---|---|
| | |  <br>Procedure :<br>Children bring concrete objects from home in large quantities (units to dozens). The teacher gives an example problem sum. Child usesthe concrete object as counting visual aids. |
| 4. | Addition and Subtraction | Concrete objects: marbles, operating number cards increase<br>  <br>Procedure :<br>Children bring concrete objects from home in large quantities (units to dozens). The teacher gives an example problem sum. Child usesthe concrete object as counting visual aids. |
| 5. | Big Numbers | Number card<br>  <br>Procedure :<br>Teacher gives pieces of paper numbers. |

| | | |
|---|---|---|
| | | Child<br>sort from small to large by sticking on paper. |
| 6. | Get to know the Forms of Wake | Folding paper(origami)<br>  <br>Procedure :<br>The teacher gives an example of a wake pattern on origami paper. Child<br>form origami paper by folding and cutting parts to match the example the teacher gave. |

Based on the table, this elementary school uses several items such as number cards, posters, folding paper which are related to mathematics learning material. Based on the interview results, the use of mathematics learning media needs to be considered in designing media or when learning has not yet been implemented.

Learning to usesome media known from the design of learning methods. The results of the interviews revealed that the learning method used by elementary school teachers mostly used the exam method, or examples because it was considered clearer and easier for students to understand. Initially, the media was only a book, therefore it needed innovation that could take advantage of the facilities around the school or neighborhood. The media design that has been determined is considered effective and can help students understand mathematics material.

Media learning adapted to the characteristics of class I because it has the character of learning while playing, so that the learning media used must be made real, interesting and made of concrete objects. the media used if the material is related then the teacher does not have to use the same learning media.

However, if the material is different, the teacher uses different learning media. To measure the level of student success, the teacher asks several questions to find out whether students understand the material presented by the teacher or not.

**Conclusion**

Based on the results and discussion above, it can be seen that the design of learning in a school is the most important thing before carrying out learning. Public Elementary Schools 2, 4 Jetis and Sukoharjo Christian Elementary School apply media design that is adapted to teacher innovation, utilization of existing media, and knowing the characteristics of especially for class I. The media used must be designed to provide convenience to students.

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# DEVELOPMENT OF A FERN PLANT (PTERIDOPHYTA) BOOKLET IN THE INDROKILO BOTANICAL GARDEN, BOYOLALI REGENCY AS ENRICHMENT MATERIAL FOR CRYPTOGAMAE TAXONOMY COURSES

Agus Purwanto[1], Ratna Dewi Eskundari[2], Suwarto[3]
University Veteran Bangun Nusantara Sukoharjo
purwantoaguss183@gmail.com

*This study aims to explore ferns in Indrokilo Botanical gardens and to develop and determine the feasibility of a fern booklet as enrichment material for the Taxonomy of Cryptogamae course. This type of research is called research and development, which is divided into four stages: define, design, and develop (4-D). From the results of the exploration of ferns, the researchers managed to find ferns (Pteridophyta) at the Indrokilo Boyolali Botanical Garden and found as many as 31 species from 12 families belonging to 3 classes. The results of the booklet validation as a whole (from the media, materials, and students) on the 48 answered statements were in very good categories (59%), good categories (33%), and 8% sufficient categories so that they were declared feasible to be used as enrichment for the Cryptogamae Taxonomy Course.*
***Keywords:*** *ferns, Indrokilo, booklet*

## INTRODUCTION

Ferns (Pteridophyta) are one of the materials in the Taxonomy of Cryptogamae course, which is a compulsory subject for first-semester students in the Biology Education Study Program. So far, the study of Cryptogamae taxonomies has relied heavily on textbooks and sources from the internet. Generally, the available textbooks are thick, which makes students quickly feel bored while reading them. Besides that, textbooks also contain writing that is usually considered difficult to understand and displays less attractive pictures. Based on this, media is needed that is interesting, easy to understand, and can increase interest and fun for its users.

Booklets are small-sized learning media whose presentation is much shorter than books with one material topic, making it easier for students to take them anywhere. Research on the use of booklets has been carried out before, namely by Sari (2018), who obtained 19 types of nails in the Bukit Cogong Area with a high diversity index, and the resulting booklets are suitable for use with minor revisions. Meanwhile, the results of Pralisaputri et al. (2016) showed that using booklets increased student learning outcomes. Suryani, N., Hairida, H., & Hadi, L. (2019) also reported that the use of booklets can improve student learning outcomes. The same thing was also explained by Muldayanti, N. D., and Kahar, A. P. (2019), who stated that the use of booklet media could improve student learning outcomes. Paramita et al. (2018) obtained booklet media from the results of an inventory of medicinal plants suitable for use as learning media on the benefits of biodiversity as a source of medicine. Rukmana (2018) obtained booklet media based on the results of an inventory of medicinal plants of the Dayak Iban tribe in Mungguk Hamlet, Kapuas Hulu Regency, in the sub-material on the benefits of biodiversity class X, which was declared valid as a learning medium in the sub-material on the benefits of biodiversity with an average validity level of 0.99. Research by Ambarwati, S. A. (2015) reports that the use of booklets is effective in increasing student learning outcomes. Booklet media can also strengthen student character

education (Rehusisma, L. A., Indriwati, S. E., & Suarsini, E., 2017).

Fern (Pteridophyta) are a group of plants that have quite a lot of types. In Indonesia, it is estimated that there are more than 1,300 species of ferns among the 12,000 species worldwide. The distribution of fern species is limited, and some are widespread. About 30% of fern species have a relatively narrow distribution, and there are even some species that can only live in specific places, while less than 10% of fern species have a wide distribution and are cosmopolitan (Sri Rizki Sianturi, A 2020).

The morphological forms of ferns can be divided into two major groups, namely herbaceous ferns and tree ferns, and the ways of life of ferns also vary, such as 1) living on the ground (terrestrial) in open areas, shaded areas, and climbing (climbing ferns); 2) living attached to other plants (epiphytes) in open areas and shaded areas; 3) living or growing on rocks (epilithic); and 4) living in water (aquatic ferns). (Sri Rizki Sianturi, A 2020, Kurniawan, 2009)

Pteridophyta are the simplest bulbous and vascular plants. There is a protective layer of cells (sterile envelope) around the genitals of plant species, which is an internal transport system that lives in moist places. Fibrous roots in the form of rhizomes with root tips protected by calyptra. The root cells of these ferns then form the epidermis, cortex, and central cylindrical layers which contain the xylem and phloem. The stalk of this fern is on the ground, very short, and invisible as it reaches 5 feet high, like a dowel or stake. When young, the leaves curl and ripple. Based on the shape and size of the composition, fern leaves are divided into microphiles and macrophiles. Microfills are small or scaly, do not have stems, do not have veins, and do not show cell differentiation. Chlorophyll is distinguished by large leaves, stems, leafy bones, and differentiated branching cells (Kurniawan, 2009, Tjitrosoepoemo, 2014).

The Indrokilo Botanical Garden is a garden located in the Kemiri Village area, Mojosongo District, Boyolali Regency, which is not far from the Boyolali Regency Government. This tourist park has an area of 8.9 hectares, which was formerly a rice field owned by the

village government. Fern Park is one of the tourist facilities in the Indrokilo Botanical Gardens. This park holds a diverse collection of fern plants (Pterodophyta). For this reason, the research explored ferns in the Indrokilo Botanical Garden to develop and determine the feasibility of a fern booklet as enrichment material for the Taxonomy of Cryptogamae course.

## METHOD

This type of research is research and development using three stages of the 4D development model (define, design, develop, and disseminate), which are not continued until disseminated. This research was conducted from January 2023 to March 2023 at the Indrokilo Boyolali Botanical Garden, and the implementation of the booklet was carried out for students of the Biology Education Program at Veteran Bangun Nusantara University.

The exploration of ferns by exploring the Indrokilo Botanical Gardens is divided into two areas, namely the outdoor and indoor fern garden areas. The results of the exploration of these ferns are used as material for making booklets.

To find out the validity of the booklet that has been developed, a validation questionnaire sheet is used, which will be filled out by material experts, media experts, and biology education students who have taken the Cryptogamae Systematics course. Questionnaire answers consisted of very good, good, fair enough, and not good. Of all the answers, the percentage is calculated, and the highest percentage is the result of its validity.

## RESULT AND DISCUSSION

The results of the exploration of ferns (Pteridophyta) at the Indrokilo Boyolali Botanical Garden found 31 species from 12 families belonging to 3 classes. There is one class of Pteridophyta that is not found, namely the Psilophyta class, which is an ancient fern and has been widely extinct. Most of the ancient fern fossils found lived in the Devonian period, with extinction due to very high tectonic activity

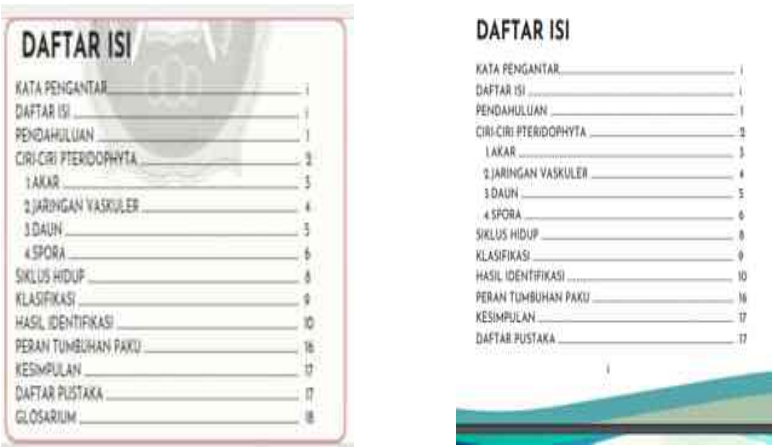
at that time (Yamakazi et al., 2001). Even so, there are still ancient fern species that have survived to this day, such as Psilotum nudum and Psilotum complanatum, which are in the genus Psilotum. Psilotum nudum has existed since 400 million years ago, and its existence is now considered critical. Psilotum nudum has a characteristic form of stem with fork branches; this species is quite tolerant of the environment and can live in tropical and subtropical regions (Nazarian et al., 2010). Observations at the location did not find any psilotum species; this was possible when the collection of specimens by managers from various intended sources did not store psilotum ferns (Budiharta, 2020). So Psilotum is not available, even though the environment is very supportive of the growth of this type of fern.

The ferns found in the Indrokilo Boyolali Botanical Garden consist of 1 species belonging to the Aspleniaceae family, 1 species to the Cibotiaceae family, 2 species to the Cyatheaceae family, 1 species to the Dennstaedtiaceae family, 4 species to the Dryopteridaceae family, 1 species to the Lygodiaceae family, and 1 species to the Marattiaceae family. 1 species belonged to the Ophioglossaceae family, 6 species belonged to the Polypodiaceae family, 7 species belonged to the Pteridaceae family, 3 species belonged to the Thelypteridaceae family, and 1 species belonged to the Woodsiaceae family. Of the 12 families, the most dominant ones are the Pteridaceae family and the Polypodiaceae family. The Pteridaceae family consists of 3 genera, namely: 1) Pteris, including Pteris tripartita, Pteris biaurita, and Pteris vitata; 2) Adiantum, including Adiantum tenerum, Adiantum pedatum, and Adiantum trapizeforme; and 3) the genus Pityogramma. As for the Polypodiaceae family, there are 5 genera with 1 species including Drynaria sparsisora, Microsorum punctatum, Phymatosorus scolopendria, Platycerium bifurcatum, and Pyrrosia longifolia. The number of species in the families Pteridaceae and Polypodiaceae is influenced by environmental conditions and resilience. According to Tryon et al. (1990), Pteris is a cosmopolitan fern that can live in a variety of habitats. The types of this genus can grow in damp places with low to high elevations, both in open and

shaded places. Similar to Pteris, Adiantum also can survive in hot and dry conditions, even though it likes humidity (Lestari, 2011).

Ferns are found scattered throughout the Indrokilo botanical garden as epiphytes attached to various trees and walls and live terrestrially in flat ground, ditches, and pond edges. According to Kinho (2009), the habitat of ferns is epiphytic on substrates such as trees, rock surfaces (epilithic), terrestrial on the ground, and the surface of the water (aquatic fern) with relatively high humidity. Humidity is related to temperature; if the temperature decreases, the air humidity will also decrease. A good percentage of humidity degrees for ferns is in the range of 60–90%, with an ideal temperature of 27-28 C (Janna et al., 2020). Fern in the Indrokilo Botanical Gardens are most commonly found on the inside and around the dome. Taking the theme "East Java Lowland Rainforest Plants " the vegetation is mapped into eight thematic parks, including thematic gardens of medicine, local fruit, bamboo, and ferns. The thematic garden of ferns is named Abiyasa Park, which contains ferns specifically. The arrangement of the collection is very neatly conceptualized; ferns are planted and arranged on the inside and outside of the dome (Budiharta et al., 2020).

The results of the exploration of ferns at the Indrokilo Botanical Gardens were then developed into a booklet as light reading but containing valuable knowledge to support learning biology in general or Systematics of Cryptogamae specifically on ferns. In detail, the results of booklet development include the scope of material, booklet design, presentation of material, and legibility of writing. The coverage of booklet material contains the characteristics of pteridophyta, life cycle, classification, identification, and role of ferns and is supplemented by a glossary. Previously, there was no glossary, but based on suggestions that were considered, this booklet was finally completed with a glossary. According to Dini Safitri (2017), a glossary is used to explain relevant concepts to the field of science being discussed.




(a) (b)

Figure 1: Design Improvement and glossary additions (a: before, b: results repair )

The booklet design is created as attractive as possible, not too formal, and displays lots of original color images. The presentation of the material is delivered in simple language, focusing on images. Then the letter points on the booklet are made clear so that they are easy to read. To make it more interesting, improvements are being made to the cover, where previously the word "booklet" was listed twice and there was no institute from the compiler. Now it has been changed and completed, the word "booklet" is left with one word and it is already equipped with the institute's logo. Besides that, the institute logo is also used as the background for each page. As seen in Figure


(a) (b)

Figure 2: Cover improvement (a: before, b: after )

The "Booklet of Ferns at the Indrokilo Boyolali Botanical Garden" received replies from media professionals, and the results of 11 responses fell into the very good (78%) and good (26%) categories, with no sufficient or insufficient responses. As a result, media professionals can affirm that the pamphlet is excellent.

As illustrated in diagram 2, the results of the responses by material specialists to the "Indrokilo Boyolali Botanical Garden Fern Booklet" from 13 responded statements fell into three categories: very good (60%), good (33%), and 7% sufficient. This implies that the material specialists' pamphlet can also be stated extremely effectively.

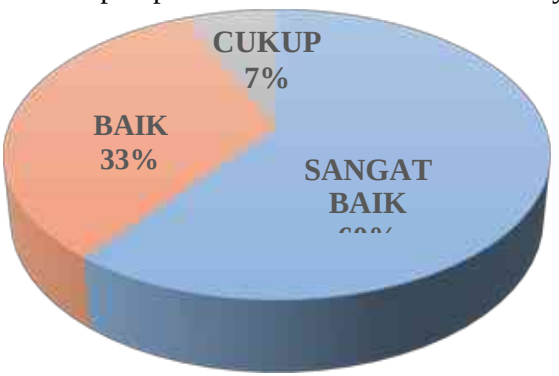



**Figure 4: Material Specialists**

The results of the 24 answered statements in the "Indrokilo Boyolali Botanical Gardens Fern Booklet" from students who were expected to utilize it to support the study of ferns fell into three categories: very good (50%), good (37%), and 13% sufficient, as illustrated in diagram 3. This indicates that the students' booklet was also deemed to be excellent supplemental reading for the study of ferns (Pteridophyta).

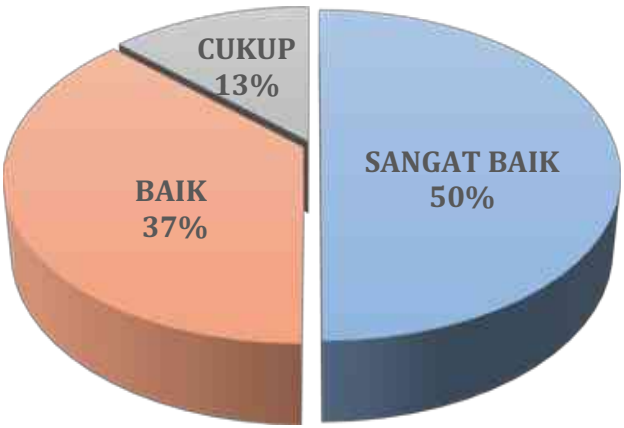



Figure 5: Students Diagram Result

The statements in the "Booklet of Ferns in the Indrokilo Boyolali Botanical Garden" received 48 replies from students, the media, and other sources, and the overall results were very good categories (59%), good categories (33%), and sufficient categories (8%), as shown in diagram 4. This indicates that the book is excellent and acceptable for use as a companion or supplemental resource when studying ferns (Pteridophyta).


Figure 6: Final Result of all replies
(Media, Material specialist & Students)

In some free statements in response to the "Booklet of Ferns at the Indrokilo Boyolali Botanical Gardens," there are no slanted or negative statements. All statements lead to good judgments, for example: good enough, good, very good, very interesting, insightful, easy to understand, creative, and innovative in learning. There is also a statement that asks page 11 in the booklet not to use personal documents, as shown in the following figure:


Figure 7: Boolet page 11

In the booklet *" page 11 in Figure 11: Psiolotum nodum taken from source Gerold D. Car and Figure 12: Psilopsida taken from source*

*Erick Heath " not taken from personal documents because they were not found in the Indrokilo Botanical Gardens. However, to complete the classification, the image is needed.*

Booklets are print media that have many advantages and support the effectiveness of conveying information that is clear, firm, easy to understand, and interesting (Pralisaputri, 2016). The developed booklet media received positive responses from students and teachers (Panjaitan RGP, 2021). Besides being useful in supporting learning activities, booklets can be used as an additional source of information to understand the diversity of ferns found in the Indrokilo Boyolali Botanical Garden area.

## CONCLUSION

In this study, there were two activities, namely the exploration of ferns (Pterophyta) at the Indrokilo Boyolali Botanical Garden and the making of booklets from the results of the exploration to be used as a learning materials supplement of ferns. Based on the results and discussion, it is concluded as follows:

1. From the results of the exploration of ferns (Pteridophyta) at the Indrokilo Boyolali Botanical Garden, there were found 31 species from 12 families belonging to 3 classes.
2. The developed booklet contains an introduction, characteristics of Pteridophyta, life cycle, classification, identification results, the role of ferns, conclusions, a bibliography, and a glossary.
3. Overall responses (from the media, materials, and students) to the "Booklet of Ferns in the Indrokilo Boyolali Botanical Garden" of the 48 statements answered in the very good category (59%), good category (33%), and sufficient category (8%) can be declared feasible to be used as enrichment for the Cryptogamae Taxonomy Course.

Based on the conclusions obtained, it can be suggested as follows:

1. To the Manager of Indrokilo Botanical Gardens to increase the variety of ferns so that educational tourism programs, one of which is ferns as thematic parks, would be more beneficial for education.
2. To students to be able to use the booklet as an enrichment when studying Ferns.

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# ANALYSIS OF STUDENTS' DIFFICULTY IN SOLVING GEOMETRY PROBLEMS BASED ON VAN HIELE'S THINKING STAGES

Anas Urbaningrum[1], Herry Agus Susanto[2], Andhika Ayu Wulandari[3]
University Veteran Bangun Nusantara Sukoharjo
anasurbaningrum500@gmail.com[1], herrysanto62@yahoo.co.id[2],
dhikamath.univet@gmail.com[3]

*The purpose of this study is to analyze students' achievement in solving geometry problems based on Van Hiele's thinking stages and to describe the causes of the difficulties. The research method used a qualitative descriptive approach, with 28 class VIII-E students from SMP Negeri 2 Mojolaban as subjects who were selected based on their attainment of Van Hiele's level of thinking. The data collection techniques in this study included written tests, interviews, and documentation. The data analysis involved data collection, data reduction, data presentation, and conclusion (verification). Data validation was done using the technique of triangulation. The results showed that the students' achievement in class VIII-E of SMP Negeri 2 Mojolaban in solving geometry problems based on Van Hiele's thinking stages had reached stage 2 (informal deduction). As many as 7% of the 28 students were able to reach this stage. About 68% of students were able to reach level 0 (visualization), and around 25% reached level 1 (analysis). However, no students were able to reach level 3 (deduction) or level 4 (rigor) of thinking. The most common difficulty experienced by students was that*

*they did not understand the concept of geometry, especially in quadrilateral material.*
***Keywords:*** *Student difficulty, Symmetry, Van Hiele Theo*

## INTRODUCTION

Hamzah (2014: 57) states that mathematics education is an effort to improve and develop students' reasoning power, develop students' intelligence, and change behavior for the better, and can even create works of mathematical concepts. Mathematics is one of the subjects that must be taught to all students from preschool education to tertiary education. With the help of mathematics, students are expected to be able to think logically, systematically, carefully, effectively, and efficiently. However, most students still think that mathematics is a difficult subject, so many students avoid mathematics (Nursalam, 2016: 2). This is supported by research conducted by Masykur and Fathani, which suggests that the level of mastery of students in mathematics at all levels of education is still around 34%.

One of the important parts of mathematics is geometry. Chairani (2013) states that 'Learning geometry can also increase children's interest in mathematics, improve problem-solving abilities, reasoning, and facilitate various mathematical topics.' According to Budiarto (in Abdussakir, 2013: 439), it is said that 'the purpose of learning geometry is to develop the ability to think logically, develop spatial intuition, internalize knowledge to support other materials, and read and interpret mathematical arguments.'

Learning difficulty is a condition in which a person cannot study well. Difficulties related to the process of learning mathematics in students can be observed in their learning achievement (Angraini, 2019: 7). One of the important approaches to geometry is the Van Hiele approach. Van Hiele's theory is useful in analyzing the learning stages of students. Van de Walle explained that geometry plays an important role in studying other fields of mathematics, such as the concept of fractions related to the arrangement of subsets. Van Hiele's

theory (Zubaidah Amir, 2017: 93) states that there are five levels in understanding geometry in students' thinking. These levels are:

Level 0 (Introduction): At this stage of the introduction, students who are new to geometric shapes can recognize the shape as a whole and define it verbally based on its appearance.

Level 1 (Analysis): At this stage, students already understand the properties of geometric shapes. For example, when given a cube, students can show whether the cube has 6 sides and 12 edges.

Level 2 (Sequencing): At this stage, students already understand the sequence of geometric shapes and can follow the steps in the proof but have not done it themselves. For example, students already know that a parallelogram is a trapezoid, but they cannot explain the relationship between the two.

Level 3 (deduction). At this stage, students understand deduction, meaning they can make deductive decisions or draw conclusions about certain questions.

Level 4 (accuracy) is the final stage in the cognitive development of students' understanding of geometry. At this stage, students already understand the importance of the accuracy of the basic principles that underlie proof.

The reality on the ground shows that most students do not master geometry material. This is by research conducted by Dewi (2017) which revealed that students find it difficult to distinguish between different types of triangles and quadrilaterals, and are even wrong in designing strategies and solving story problems. Following research conducted by Novita et al. (2016), according to the results of interviews with math teachers for class VIII at SMP N 2 Mojolaban Sukoharjo in the even semester of the 2015/2016 academic year, it was shown that the mathematics subject, especially in geometry material, did not achieve student competency according to the KKM, namely 70.

Students who do not reach the KKM can be said to have learning difficulties because the difficulties experienced by students will lead to errors when answering math test questions on geometry.

Therefore, it is necessary to use Van Hiele's thinking stages so that students can progress through stages and no longer experience difficulties in solving geometric problems.

To have a good understanding of geometric topics, children can learn these topics according to their level of difficulty, from the easiest to the most difficult and complex levels. For example, the Van Hiele quadrilateral understanding model. These three elements, if managed in a professional learning process, can improve students' higher thinking abilities. According to Van Hiele, a child who is at a lower level will not be able to understand material at a higher level than that child. Even if it is forced, the child will not understand it, but later it can be learned through rote learning. Van Hiele's learning theory suggests sorting geometry material with a hierarchy from easy to complex. The material is adjusted to the students' thinking stage. The following is an understanding of Van Hiele's level of thinking in quadrilateral material.

Level 0 (visualization): At this stage, students recognize a quadrilateral as a whole based on visual considerations and do not yet know the properties of the quadrilateral. For example, a student already knows a square well if they can show or choose a square from a pile of other geometric objects.

Level 1 (analysis): At this level, students already understand the properties of concepts or quadrilaterals based on informal analysis of parts and attributes. For example, students already know and recognize that the opposite sides of a rectangle are the same length.

Level 2 (informal deduction): At this level, students logically sort quadrilateral properties and can distinguish sets of properties that are necessary and sufficient conditions in determining a concept. So, at this level, students already understand the ordering of geometric shapes, for example, a square is also a rectangle.

Level 3 (deduction), at this level, students' deductive thinking has begun to develop but has not yet developed properly. For example, students must conclude from statements about rhombuses.

Level 4 (rigor), at this level, students can already understand the importance of the accuracy of anything fundamental. Students are required to reason formally.

Based on the explanation above, this study examines students' learning difficulties in solving math problems in the geometry material based on Van Hiele's thinking stages and analyzes the answers to math questions to get the right solution so that students no longer experience difficulties in solving math problems. Therefore, the researcher intends to research to find out students' difficulties in solving math problems in the geometry material for class VIII students of SMP Negeri 2 Mojolaban.

## METHOD

This research method is qualitative descriptive research, in which the data obtained is collected and analyzed descriptively to answer a given problem. This study aims to analyze students' achievements in solving geometry problems based on Van Hiele's stages of thinking and describe the causes of their difficulties. The participants in this study were class VIII E students of SMP Negeri 2 Mojolaban for the 2022/2023 academic year, with a total of 28 students. In this study, the data collection technique used was triangulation techniques with test instruments and interviews. The study began by conducting geometry tests on participants to obtain data on the most dominant difficulties in geometry material. Then the subjects were selected based on purposive sampling.

According to Sugiyono (2015: 53), 'Purposive sampling is a sampling technique for data sources with certain considerations,' so the selected subjects are those that can provide as much information as possible in this study. The subjects of this study were taken from the test results and grouped based on the level of thinking achieved according to Van Hiele. Six students were selected as subjects: two students reached level 0 (visualization), two students reached level 1 (analysis), and two students were at level 2 (informal deduction). Next, interviews will be conducted to gather more in-depth

information about their processes and results in solving geometry problems based on Van Hiele's stages of thinking.

The data analysis technique used in this research is the Miles and Huberman model, which involves four steps: data collection, data reduction, data presentation, and drawing conclusions or verification. In this study, students' difficulties in solving geometry problems were analyzed based on van Hiele's thinking stages, which include difficulties in understanding questions, difficulties in reformulating questions, difficulties in the process of solving problems, and analyzing internal and external factors that cause students' difficulties in solving problems, especially in geometry material.

## RESULT AND DISCUSSION

### RESULT

This research was conducted at SMP Negeri 2 Mojolaban, specifically in class VIII-E. The instruments used in this study were tests and interviews. The test was carried out to obtain data on students' difficulties in solving geometry problems based on Van Hiele's thinking stages. This test, consisting of 5 questions, was created by the researcher. Each of these items measures students' thinking skills in solving geometry problems based on Van Hiele's thinking stages, namely level 0 (visualization) to level 4 (accuracy) on quadrilateral material. Based on the test results obtained by students, it can be seen how much the percentage of students who experience difficulties in solving geometry problems is based on Van Hiele's thinking stages.

Table 1. Percentage of student achievement

| Van Hiele's Thinking Level | Indicator of Achievement | Percentage Difficulty |
|---|---|---|
| Level 0 (Visualization) | Difficulty understanding the concept | 68% |
| Level 1 (Analysis) | Difficulty analyzing traits | 25% |
| Level 2 (Informal Deduction) | Difficulty drawing deductive conclusions | 7% |

| | | |
|---|---|---|
| Level 3 (Formal Deduction) | Difficulty connecting between several plane side shapes or the properties of a geometric shape | 0% |
| Level 4 (Rigor) | Difficulty developing evidence of more than one solution or metho | 0% |

Based on table 1, it can be seen that 68% or 19 students reached level 0, 25% or 7 students reached level 1, while 7% or around 2 students reached level 2. No students were able to reach levels 3 and 4. Therefore, it can be concluded that the level most students reached was level 0 (visualization). This was because students had difficulty understanding concepts in solving geometry problems based on Van Hiele's thinking stages, so they were unable to reach higher levels.

In this study, it was found that students who did not succeed in reaching the previous level would also not be able to reach the next level. For stage 3 (deduction) and stage 4 (rigor), no student can reach these stages. The factors that trigger students' difficulties are that they still do not master geometric concepts, especially quadrilaterals, have not been able to provide deductive conclusions, and lack skills and creativity in geometric concepts to solve mathematical problems related to quadrilateral material.

Regarding the results of the study, it can be seen that the factors that cause students to be unable to reach a higher level of thinking are:

Level 0 (Visualization)

The fact that most of the students' inability to reach the visualization thinking stage is caused by factors: (1) students are wrong in determining geometric concepts, and (2) students are wrong in determining the name of a geometric shape based on its shape and visuals.

Level 1 (Analysis)

The fact that most of the students' inability to reach the analytical thinking stage is caused by factors: (1) students have not been able to understand the properties of plane shapes, and (2) students have difficulty distinguishing the properties of quadrilaterals because of the similarity of the properties between these shapes.

Level 2 (Informal Deduction)

The fact that most students' inability to reach the stage of informal deductive thinking is caused by factors: (1) students still have difficulty understanding the relationships between shapes and elements in geometry, and (2) students are unable to make conclusions from statements about the relationships between geometric shapes.

## DISCUSSION

Based on the results of the observations made, it can be analyzed where the students' difficulties lie in solving geometry problems based on Van Hiele's thinking stages. Following this, students' answers will be presented, with each question representing a different Van Hiele stage.

Question: Which shape below is a quadrilateral? Explain!

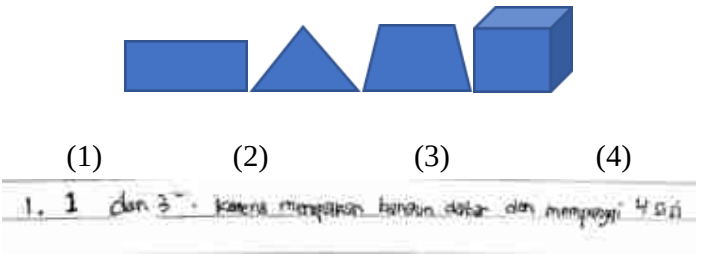


Figure 1. Example of student answers to question number 1

As for efforts to deepen the question of student difficulties, interviews were conducted with these subjects and a summary of the interviews can be seen in Table 2.

Table 2. Summary of Interview Results

| Topic Question | Summary Student Answers |
|---|---|
| Can distinguish shapes based on visuals | Based on the answers from the subject, it can be concluded that the subject has no difficulty in determining the shapes based on the visuals. The subject added that for him the problem was still to be done |
| Difficulty understanding geometric concepts, distinguishing geometric shapes and plane shapes | Based on the subject's answers, it can be concluded that the subject still has difficulty understanding the concept that geometric shapes and plane shapes are different. |

At stage 0 (visualization), the score obtained by students is quite high, namely 68% or around 19 students. That is, at this stage, students' geometry abilities are high enough so that many can answer the test questions correctly. However, there are still students who answer incorrectly, as shown in Figure 1. The shape (4) should not be included in the quadrilateral. Student errors can be caused because students still have difficulty understanding concepts related to quadrilaterals, including flat shapes. That's why in question number 1, the subject also wrote that the picture (4) includes a quadrilateral. This is in line with the research conducted by (Yudianto et al., 2021) which states that students only recognize geometric shapes based on their overall characteristics and visual appearance.

**Question**: The following are the properties of quadrilaterals
Opposite sides are equal and parallel.
All angles are equal, i.e. 90°.
The diagonals are the same length.
The diagonals intersect and bisect each other equally

Based on the above properties of the quadrilateral in question is...

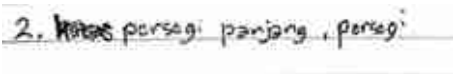


Figure 2. Example of student answers to question number 2

As for efforts to deepen the question of student difficulties, interviews were conducted with these subjects and a summary of the interviews can be seen in Table 3.

Table 3. Summary of Interview Results

| Topic Question | Summary Student Answers |
|---|---|
| Can find the properties of a geometric shape | Based on the answers from the subject it can be concluded that the student subject can find the properties of a flat shape, so students can answer the questions |
| Difficulty in determining geometric shapes based on analysis of known properties | Based on the subject's answers, it can be concluded that the subject still has difficulties in identifying and analyzing the properties of geometric shapes. |

In stage 1 (analysis), only 25% of the 28 students answered correctly. Most students make mistakes and have difficulty answering questions, as shown in Figure 2, where students write down 2 shapes of the specified shape properties. But from the questions, it is clear that what is requested is only 1 shape. Kusnadi & Nana (2018) stated that it was very difficult for students to understand geometry lessons, where it was difficult to distinguish flat figures such as rectangles from squares, trapezoids from parallelograms, and isosceles triangles from equilateral triangles. On the other hand, there are still students who state that a rectangle is an equilateral quadrilateral or isosceles quadrilateral (Khoiri, 2014). This shows that students still have difficulties in analyzing the properties of quadrilaterals, and many

students are not careful in identifying the properties of geometric shapes.

Question: Is a square a rectangle? Explain!

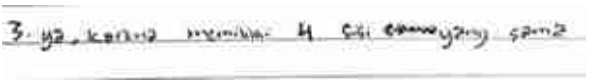

Figure 3. Example of student answers to question number 3

As for efforts to deepen the question of student difficulties, interviews were conducted with these subjects and a summary of the interviews can be seen in Table 4.

Table 4. Summary of Interview Results

| Topic Question | Summary Student Answers |
|---|---|
| Can understand the intent of the questions and understand the material. | Based on the answers from the subject, it can be concluded that the subject does not know the intent of the questions. Then the subject also did not understand what a quadrilateral grouping was. |
| Students have difficulty connecting between several flat side shapes and their properties. | Based on the subject's answers, it can be concluded that the subject still has difficulty understanding the statement sentences of the questions. Students also have difficulty connecting between several flat side shapes and their properties. |

In stage 2 (informal deduction), only 7% of students answered correctly, which indicates their understanding of the relationship between shapes. Figure 3 shows that the answers given by students are still unclear. According to Khoiri (2014), students at this level are already able to recognize that the lengths of the two diagonals of a rectangle are the same, but they cannot explain why. This aligns with Sutarto's opinion (2013, 31) which reveals that students at level 2 (informal deduction) are starting to draw deductive conclusions but only at an early stage, indicating their limited development. This demonstrates that students face difficulties in solving problems and

connecting flat shapes based on their properties, as well as in thinking formally.

Based on the analysis of the results and discussion above, students who reached the most thinking stages were on question number 1 or level 0 (visualization), with an indicator of difficulty, namely difficulty understanding concepts in geometry, especially quadrilateral material. About 68% of the students successfully reach this stage. One of the things that causes students to experience difficulties in solving geometry problems based on Van Hiele's stages of thinking is the lack of understanding of the concept and not being careful in understanding the problem. Based on the analysis of the students' answers in solving the questions, the difficulties experienced by students, in general, were a lack of understanding of the concept and intent of the questions. There are several reasons students have difficulty solving geometry problems, namely many students are not careful in understanding the questions, students have difficulty distinguishing between geometric shapes and plane shapes, and the learning environment is less conducive.

## CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the achievement of class VIII E students of SMP Negeri 2 Mojolaban in solving geometry problems based on Van Hiele's thinking stages has reached stage 2 (informal deduction). A total of 7% of the 28 students were able to reach this stage. Approximately 68% of students were able to reach level 0 (visualization), and students who reached level 1 (analysis) were around 25%. However, there are no students who can reach level 3 (deduction) and level 4 (rigor) of thinking. This is due to five factors: (1) Students do not understand the concept of geometry, especially in quadrilateral material. (2) Many students are not careful in identifying the properties of geometric shapes. (3) Students have difficulty connecting several flat side shapes and their properties. (4) Students have difficulty understanding the statement sentences in the questions.

(5) Difficulty in reasoning formally.

It can be a source of information for other researchers in developing or researching students' difficulties in solving other geometry problems, especially quadrilaterals based on Van Hiele's thinking stages. Efforts that can be made by the teacher to overcome student learning difficulties are to use mathematics teaching aids when learning geometry so that students better understand and can apply them directly. Provide regular practice questions for geometry, especially on quadrilateral material that is still considered difficult. Conduct remedial sessions for students who are still experiencing difficulties and conduct interviews with students about the difficulties they are experiencing. Students are expected to be thorough in solving questions, while also honing their thinking skills to be creative problem solvers. In understanding the concept, students should comprehend it rather than just memorize it.

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# WEB-BASED LEARNING MEDIA (Case Study: History Subject in Class XI Social Studies Department at SMA Negeri 1 Jepon)

Diyah Ruswanti[1], Sarno[2], Dahlan Susilo[3]
University Sahid Surakarta
dyahruswanti@usahidsolo.ac.id[1], sarnouss3@gmail.com[2],
dahlan.susilo@usahidsolo.ac.id[3]

*Online learning, also known as e-learning, is a highly effective and efficient alternative method of delivering teaching materials to students. The Online Learning Application for SMA N 1 Jepon is an innovative solution for Teaching and Learning Activities, especially in the wake of the Covid-19 pandemic. This e-learning web application addresses two critical issues: monotonous classroom learning patterns and the need for repetitive study of history lessons. By using a web-based application program, the material can be uploaded onto web pages, allowing students to access it anytime and from anywhere. The goal is to improve students' qualifications and understanding of history lessons. Using online learning media supports the Teaching and Learning Activities (TLA) process. This study aims to create and develop an e-learning application for class XI history subjects of SMAN 1 Jepon. The research method used is the Research and Development approach, documentation method, and software development method. The Moodle LMS application is used as the web-based learning media*

*application for History class XI material, and the black box testing method is used for testing. The history learning application has three users: administrator, teacher, and student. The online learning media allows various teaching and learning activities, including logins, attendance, uploading materials and questions for teachers, quizzes, and downloading materials for students. The software testing, conducted using the questionnaire method, showed that the web-based learning media received a satisfaction level of 78.94% from 34 respondents, which is considered "feasible".*
***Keywords:*** *e-learning, History subject, Learning Application, Learning Media, SMAN 1 Jepon*

## INTRODUCTION

The advancement of technology has led to the use of web-based information technology, where all information in the system can be accessed through the internet. This development is especially important in the field of education, particularly in Upper Middle schools, where knowledge is constantly increasing. To improve the quality of education, schools must enhance their services and the quality of their human resources (Kustandi & Sutjipto, 2011; Retnoningsih et al., 2015; Rusman & dkk, 2012; Widiyaningsih et al., 2013). One crucial aspect of a good school is having a reliable information system (Arsyad, 2020). However, some schools still lack in this area, such as SMA Negeri 1 Jepon, a public school at Tempellemahbang Village, Jepon District, Blora Regency, Central Java.

SMA Negeri 1 Jepon has 21 classrooms for MIPA and Social Sciences majors, but the learning system is still primarily offline, which limits the use of online resources for students. This is mainly due to the lack of facilities and infrastructure in schools, as well as the limited knowledge of teachers and employees in utilizing web-based learning media (Arsyad, 2020; Asyhar, 2019; Retnoningsih et al., 2015; Sriyadi, 2017; Widiyaningsih et al., 2013). Additionally, web-based learning media is still relatively new in Indonesia, and teachers

are still unfamiliar with it. This greatly affects students who are more dominant in learning by rote method than in calculation material, particularly those in IPS majors (Harismawan, 2020).

To address these issues and facilitate learning activities, a web-based learning media is proposed for class XI Social Sciences Department in History Subject at SMA Negeri 1 Jepon. This innovation is expected to help students develop themselves and prepare for class XII, especially during the COVID-19 pandemic, where online learning has become necessary. This research is titled " Web-Based Learning Media, case Study Class XI Social Stuident at SMA Negeri 1 Jepon."

Scope of the problem

This research focuses on the use of information technology in web-based learning media for social studies students in class XI at SMA Negeri 1 Jepon, specifically in the subject of history. The system has three types of users: admin, teacher, and student. The admin has full access rights to maintain the data, while teachers can use web-based media for teaching and learning activities. Students are expected to actively participate in using the learning media. The system is web-based and created using Moodle, but security web servers are not discussed in the programming.

The main objective of this project is to design and implement an e-Learning application for the history subject at SMA N 1 Jepon. The benefits expected from this research include the opportunity for researchers to apply their knowledge, convenience for teachers and students in teaching and learning activities, and the addition of reading material to the library collection at Sahid Surakarta University.

## METHOD

To understand the problem at hand, various research methods were employed in the creation of this research. The following methods were used:

1. Data Collection Method (Abubakar, 2021):
    a. Interview: Direct interviews were conducted with the head and history subject teacher at SMAN 1 Jepon to gather data on the Implementation of Teaching and Learning Activities (KBM) in class in history subjects.
    b. Documentation: This method involves studying documented data such as books, scientific journals, documents, diaries, etc.
    c. Questionnaire: A set of questions or written statements were given to the respondents to answer. The types of questions in the questionnaire are divided into two, namely: open and closed.
2. Development Method (Anggraeni & Irviani, 2017):

    The study used the ADDIE model, which includes Assessment/Analysis, Design, Development, Implementation, and Evaluation, for the development of web-based learning media. The trial phase was carried out by alpha testing and beta testing.

## RESULT AND DISCUSSION

### RESULT

After conducting an analysis, it has been found that the Learning Activity System Teaching (KBM) being used at SMA Negeri 1 Jepon is functioning relatively well, but there are some issues. The teaching and learning process still relies heavily on note-taking, with teachers having to write on the blackboard and explain concepts, leading to students having to record continuously. This results in a lot of time being wasted and some students not receiving adequate attention.

The Covid-19 pandemic has also impacted education worldwide, especially in the realm of teaching and learning activities. Education institutions have had to shift to online teaching and learning activities. Therefore, it is necessary to improve this system to make it more reliable and functional to provide information to the curriculum as fully as possible (Kustandi & Sutjipto, 2011).

To address the current curriculum's deficiencies and needs, the system will require new programs that can enhance teacher performance, provide more enthusiasm for students in learning, and increase time efficiency. The system should also provide accurate and up-to-date information, making the curriculum more relevant (Rusman & Dkk, 2012). Moreover, the information obtained should be fast and follow the needs.

## DISCUSSION

System Requirements Analysis is a process that aims to determine the appropriate technology to be used, as well as the necessary hardware and software required for the system. It also involves identifying the users who will be utilizing the system. To develop web-based learning media, the following hardware will be used: a laptop with Intel Celeron CPU 1037U Processor specifications, 1GB of RAM, VGA Intel GMA 512 GB, monitors/LCDs, and a mouse. The software required includes Windows 10 Operating System, Moodle version 404, Xampp web server, and Google internet apps, among others. In creating a new system, the first step is to analyze the current learning system being used at SMAN 1 Jepon, including its problems, to have a clear understanding of the existing issues.

Use Case Diagrams to show the interaction between actors and the system, and describe the expected functionality of the system. The e-learning system can also be described in the Use Case Diagram, as shown in Figure 1, which represents the Use Case System Diagram currently being used.

The existing use case diagram outlines the following components:

a. A single system that encompasses all educational activities.
b. Two actors are responsible for performing these activities - teachers and students.
c. Eleven use cases are typically executed by these actors, such as reporting absences, distributing course materials, assigning tasks, managing student absences, receiving submitted work, completing assignments, and recording grades.

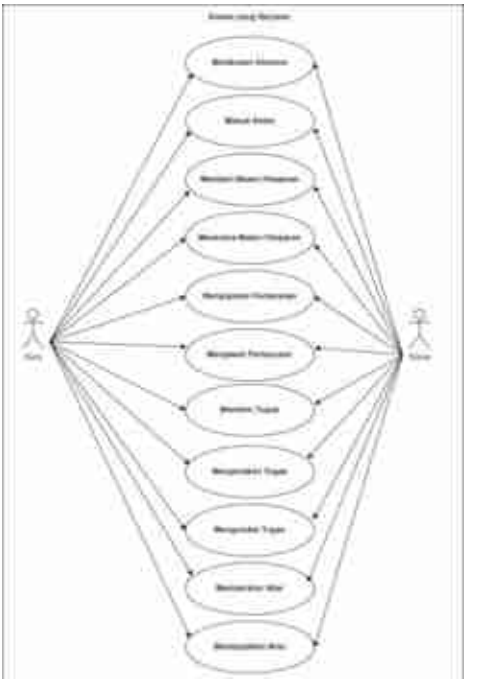


Figure 1. Use Case System Diagram

In this section, we will talk about the interpretation and logical explanation of the findings. We'll also discuss the implications of the findings, with supporting citations. Additionally, we'll touch upon the limitations of the research and the implications related to the findings. Moving on to the conclusion and recommendation section, we'll briefly summarize the objectives and provide recommendations for related parties. Remember, it's all about giving and getting value. Lastly, we'll discuss the final state of the object being terminated.

1. Use Case Diagram

   During the discussion phase, the findings are analyzed both structurally and logically. This analysis includes exploring the implications of the findings, supported by relevant citations, as well as highlighting any limitations of the research and their implications for the findings. Moving on to the conclusion and recommendation section, the proposed system is described using

a use case diagram. This diagram outlines the interactions between the user and the system, detailing the roles and responsibilities of the three actors involved: administrators, teachers, and students. The Learning Management System can also be described in the Use Case Diagram, as shown in Figure 2.

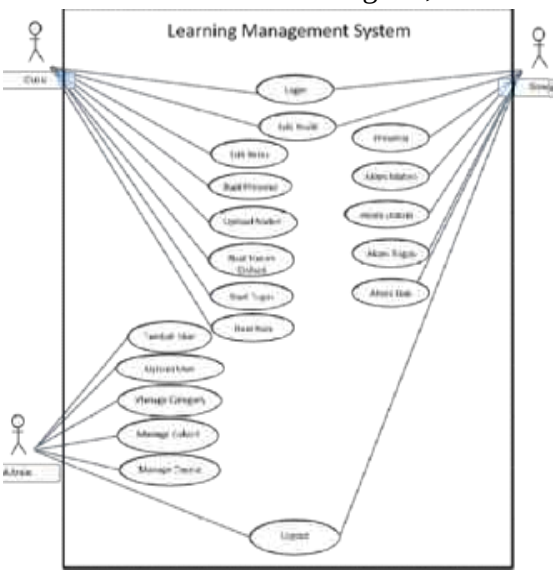



Figure 2. Learning Management System

2. Use Case Admin

   As an administrator, this user has access rights that allow them to log in, set themes, add plugins (or modules), upload user manuals, manage user accounts, organize categories, oversee courses (or classes), manage cohorts, and logout. The administrator roles can also be described in the Use Case Diagram, as shown in Figure 3.


Figure 3. Usecase Diagram of Administrator roles

3. Use Case Diagram Guru

As an actor, the teacher has the privilege of logging in, editing profiles, creating activity and resource modules, and logging out with access rights. The teacher roles can also be described in the Use Case Diagram, as shown in Figure 4.

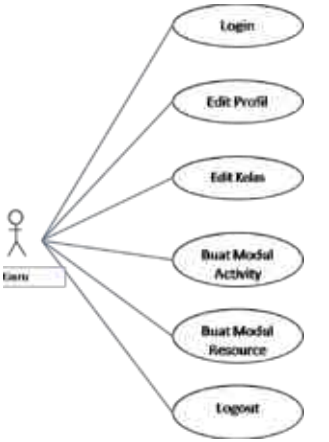



Figure 4. Usecase Diagram of Teacher (Guru) roles

4. Use Case Diagram Siswa

   As actors, students have access to various features on the platform, including the ability to log in, edit their profiles, access attendance records, participate in discussions, access course materials, complete tasks and quizzes, and log out when finished. The student roles can also be described in the Use Case Diagram, as shown in Figure 5.

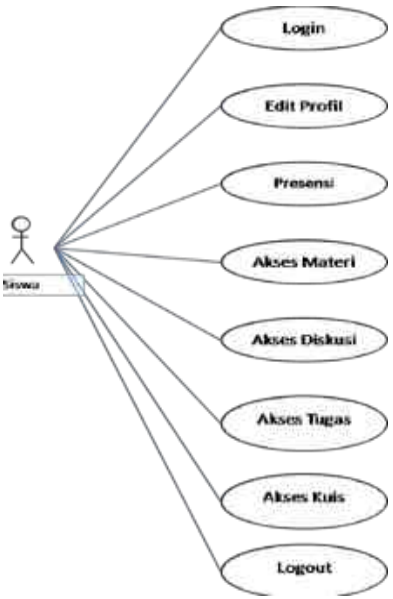
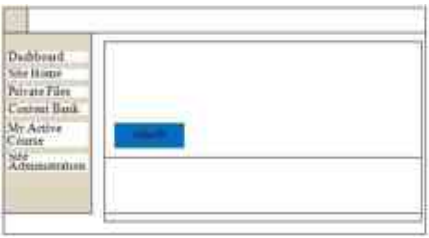



Figure 5. Usecase Diagram of Student (Siswa) roles

5. Page Display Design (Development)

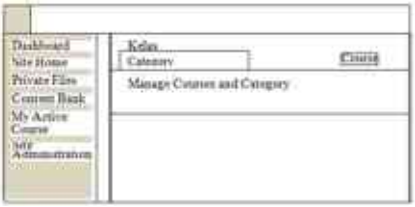
   At this stage, the design of learning web creation will begin which consists of several steps which will be explained in the following explanation. This system had 5 page designs there were Dashboard display design, Site Home display design, Dashboard display design, Site administrator display design, Manage Category and Course display design, and Upload User display design (Figure 6).




Dashboard display design


Site Home display design


Site Administrator display design




Manage Category and Course display design


Upload User display design

Figure 6. Page display design

6. Implementasi
   a. Login page

      To access the Main Menu, you need to log in using your user ID and password. If the login details are correct, you will be directed to the main menu page. However, if the login details are incorrect, the main menu page will remain inaccessible. Login page as shown in Figure 7.


Figure 7. Login page

b. Homepage

The homepage serves as the primary page or landing page for users who are logged in. It is the first page they see upon logging in. Homepage as shown in Figure 8.

Figure 8. Homepage

c. Attendance page

The attendance page holds records of the attendance of all members involved in teaching and learning activities. This page can be accessed and managed by teachers or administrators. Attendance page as shown in Figure 9.


Figure 9. Homepage

d. Assignment page

This page provides details about assignments crafted by teachers for students. Students can complete these assignments in two ways: by typing their responses online or by submitting files. The assignment page is shown in Figure 10.

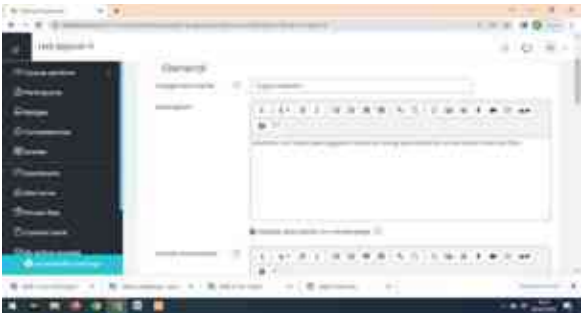


Figure 10. Assignment page

e. Material page

This page showcases historical material curated by the teacher, which forms the primary content of this learning resource. The content aligns with the relevant curriculum. The material page menu is shown in Figure 11.

a) and material page content as shown in Figure 11. b).

a) Material page menu b) Material page content

Figure 11. Material pages

f. Score page

This page displays the grades of grade 11 students in history, which resulted from their learning activities using a web-based learning media called Moodle. A score of students is shown in Figure 12.

Figure 12. List of score page

7. System Testing

To evaluate the suitability of our learning media, we conducted trials using data from material experts and students. We used a testing questionnaire to assess the feasibility of our learning media (Amelia & Pradesan, 2019; Magal & Sitokdana, 2021; Puling & Sitokdana, 2020). The assessment instrument was adapted from a needs analysis and testing indicators for visual communication and an example evaluation instrument for online teaching materials (Kustandi & Sutjipto, 2011).

a. Material Expert Validation Data

We had material experts Waka Curriculum Linarto, S.Kom and Walil Abdul Aziz, S.Pd., a History subject teacher of Class XI Social Sciences Department at SMAN 1 Jepon, validate the learning media from the aspects of learning design, language, and communication. The experts used a Likert scale ranging from 1 to 5 to rate the media. A score of 5 meant "Strongly Agree," 4 meant "Agree," 3 meant "Doubtful," 2 meant "Disagree," and 1 meant "Strongly Disagree."

b. Test Data on Students

We tested the learning media's usability by having students use it and provide feedback through a questionnaire. We used the Computer Usability Satisfaction Questionnaire developed by IBM, with some modifications to suit the media tested. The test was conducted on Wednesday, December 16, 2022, in the Class XI IPS Department at Jepon State High School.

c. Data Analysis

We analyzed the data obtained from material experts and students. The experts have thoroughly assessed the learning media's design, using a Likert scale ranging from 1 to 5 to rate the module (Amelia & Pradesan, 2019; Hapsari & Priyadi, 2017). The assessment results show that the Learning Design aspect has a feasibility percentage score of 95%, the Material Content aspect has a score of 85%, and the Language and Communication aspect has a score of 71.67%. The average percentage of eligibility is 83.89%, which places our web-based learning media in the "Very Eligible" eligibility category, according to Table 1.

Tabel 1. Analysis of Material Expert Test Results

| Number | Assessment Aspect | Number of Scores | Expert Score | Expected Score | Eligibility Percentage |
|---|---|---|---|---|---|
| 1 | Learning design | 6 | 57 | 60 | 95,00% |
| 2 | Material | 8 | 68 | 80 | 85,00% |
| 3 | Language and Communication | 6 | 43 | 60 | 71,67% |
| | Total | 20 | 168 | 200 | |
| | Average | 6,67 | 56,00 | 66,67 | 83,89% |

This study follows the Multimedia-based development procedure Instructional Design, which has been adjusted to produce a learning media product. The stages that must be passed to produce this learning media product include Assessment/Analysis, Design, Development, Implementation, and Evaluation (ADIE). The development of learning media begins with an assessment/analysis to determine the state of learning in schools and what is needed in the school media development process, including material, technology (hardware & software), and task analysis needed to develop appropriate learning media.

After collecting the assessment/analysis, the design process is initiated. At this stage, the researcher designs the components that will be found in learning media, including the selection of specific material, selection of the media approach used, and menu design. There are six main menus in this learning media, including Home, Registration/login, Material, Download, Forums, and Value.

Based on the design, the development process is carried out into a storyboard in the form of a rough layout of learning media, which is then manifested in the form of a real website/site. The next step is implementation, which involves making the online learning media available for direct use by the user.

The material expert validation stage involved the Curriculum Deputy Head and the eye teacher of the History lesson in Class XI Social Sciences Department at SMA Negeri 1 Jepon. The experts

tested the quality of learning media from the aspects of learning design, content, and language and communication. In the learning design aspect, a score of 57 out of 60 was obtained, which is included in the category "decent/Good" and has a percentage of 95%. On the aspect of the content of the material, a score of 68 out of 80 was obtained, which is included in the "very decent" category and has a percentage of 85%. On the aspect of language and communication, a score of 43 out of 60 was obtained, which is included in the category "deserve" and has a percentage of 71.67%. The overall result of each of these aspects is a score of 168 out of 200, which is included in the "very decent" category with a percentage of 83.89%.

The trial phase of learning media on students (beta testing) involved 34 students of class XI IPS Department SMA Negeri 1 Jepon. This stage is done to determine the feasibility of learning media before it is used in learning. In this trial, students filled out an instrument in the form of a filled questionnaire consisting of 19 statements from the Computer Usability Satisfaction Questionnaires (Lewis, 1993) which examines the usability aspect. The results of this trial obtained a score of 2400 out of 3040, which is included in the "Good" category with a percentage of 78.94%.

Based on the feasibility test of learning media consisting of test evaluations feasibility, the results of expert validation and testing by students, we can conclude that the Learning Media with History material for Class XI SMA that has been developed is suitable for use as learning media for schools, especially class XI Social Sciences Department at SMA Negeri 1 Jepon.

## CONCLUSION

The web-based learning media design for history material at SMA N 1 Jepon class XI uses Moodle LMS, an open-source software application that consists of three users: administrator, teachers, and students.

Online learning media allows for various teaching and learning activities, such as logging in, attending, uploading material

and questions for teachers, working on quizzes, and downloading material for students. It is expected to support the teaching and learning activities for class XI Social Sciences Department in history subject at SMAN 1 Jepon.

Product testing using the right of inquiry method (questionnaire) was conducted on 32 students. The results indicate that the web-based learning media performs well with a satisfaction level of 78.94% falling under the "Good" category.

Suggestions for future research and development include: Teachers can use this web-based learning media as an alternative student learning media to overcome difficulties in delivering a lot of material with limited time, allowing students to learn independently. Students can take advantage of this web-based learning media to study historical material independently. School management can optimize internet-connected computer facilities and infrastructure to utilize web-based learning media for social studies majors in class XI history subjects efficiently. Other researchers can develop web-based learning media using other web builder facilities such as Moodle, Drupal, etc. Additionally, they can improve existing products by addressing deficiencies.

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# ANALYSIS OF PERFORMANCE CAPABILITY LEARNING PRACTICE ON PROSPECTIVE STUDENTS OF ELEMENTARY SCHOOL TEACHERS BASED ON ANDRAGOGY PERSPECTIVE

Fatahillah[1], Afri Mardicko[2]
University Muhammadiyah Pringsewu
fatahillahpgsd@umpri.ac.id[1], afrimardicko@umpri.ac.id[2]

*Teaching ability is the main skill that must be provided to Prospective Teacher Students of the PGSD Study Program which is carried out with various efforts, one of which is by using Teaching Practice in Elementary Civics Learning Courses, but this effort is not an easy thing, so through this research will be discussed: 1) How to reconstruct the steps to develop the Teaching Performance Ability of Prospective Elementary School Teacher Students in Civics Learning Courses in Elementary Schools; 2) What is the view of the Andragogical Concept regarding the Performance of Work Ability of Prospective Elementary School Teacher Students in Civics Learning Courses in Elementary Schools.*
***Keywords:*** *Learning Practice, Prospective Student Of Elementary School Teacher, Andragogi Perspective.*

## INTRODUCTION

Based on the Higher Education Database, the number of Study Programs in the field of Education and Teacher Training throughout Indonesia reached 6,127,000 with a total of 1,371,105 students (https://pddikti.kemdikbud.go.id/ accessed 23 June 2022). It is hoped that several Educational Personnel Education Institutions (LPTK) will contribute to the provision of Teacher Educators who have the capacity and capabilities needed to carry out teaching and learning activities at all levels of education, especially at the elementary school level. Based on the Higher Education Database, the number of Study Programs in the field of Education and Teacher Training throughout Indonesia reached 6,127,000 with a total of 1,371,105 students (https://pddikti.kemdikbud.go.id/ accessed 23 June 2022). It is hoped that several Educational Personnel Education Institutions (LPTK) will contribute to the provision of Teacher Educators who have the capacity and capabilities needed to carry out teaching and learning activities at all levels of education, especially the elementary school level.

The ability to teach for a Prospective Educator, namely Teacher Training and Education Students, is the main skill that must be possessed, and students of the Elementary School Teacher Education Study Program are no exception. Therefore, cultivating the ability to develop teaching skills for students is the main mission of Higher Education at Education Personnel Education Institutions. And it is a business that is not easy to implement.

As a teacher, teachers must be able to; 1) prepare a Learning Program; 2) prepare various things related to learning; 3) Prepare effective teaching aids for teaching; 4) plan and prepare appropriate evaluation tools; 5) Prepare things related to lessons which are part of the school program; and 6) managing classroom settings so that they are conducive to teaching; (Kunandar, 2009).

Based on the directives from the Directorate General of Higher Education, Ministry of Education and Culture of the Republic of Indonesia (Junaidi, 2020) it is recommended that the Graduate

Learning Outcomes (CPL) include the skills needed in the Industrial 4.0 era, namely: a) Data Literacy, namely the ability to read, analyze, using digital-based data and information; b) Technological Literacy as the ability to understand how contemporary technology-based machines work and apply technology; c) Human literacy about human values; d) Skills needed in the 21st century that foster level-level thinking abilities (HOTS) which include the ability to communicate (communication), collaborate (Collaboration), think critically (critical thinking), use systematic logic like a computer (Computational Logic), Have a sense of compassion (Compassion), and Citizenship Responsibility (Civics Responsibility).

In line with what was directed above by the ministry, Retnawati et al. (Retnawati et al., 2018) suggested that teachers should be provided with skills regarding Pedagogics or teaching skills, especially in the concept of Higher Level thinking (HOTS).

Royani (2015) citing the Intracurricular activities of Integrated Teaching Professional Practices (PPKT) at the Faculty of Tarbiyah and Teacher Training (FITK) UIN Syarif Hidayatullah Jakarta stated that honing pedagogical or teaching skills needs to be implemented so that student-teacher candidates can adapt well in the educational environment where he will work in the future. Likewise, suggestions in research by Daeng et al. (2021) suggests that prospective teacher students must master Teaching Theory so that they can manage the classroom well in the future, and students must always improve their pedagogical competence.

Related to the description of readiness in teaching for students, Sukmawati (Sukmawati, 2019) describes that what is meant by Pedagogic or teaching abilities includes: 1) the ability to guide students; 2) Class Management Ability; 3) Mastery of Media and Technology; 4) Ability to make teaching tools based on curriculum development principles; 5) Have a positive perception of students; and 6) Ability to prepare assessment instruments.

As for The description of how readiness to teach is depicted differently in each study, such as Munir's research (2022) which concluded that students from educational institutions in Lombok became professional MI/SD teachers in terms of knowledge, practice, and attitude and were ready to become professional teachers. Meanwhile, in Hafinda (Hafinda, 2016), in general, the teaching ability of prospective Madrasah Ibtidaiyah teacher students in the Madrasah Ibtidaiyah Teacher Education Study Program STAIN Teungku Dirundeng Meulaboh in terms of Technological Pedagogical and Content Knowledge (TPACK) in MI/SD Mathematics Learning courses is in the low category.

Equipping students with teaching skills will of course be obtained through the implementation of learning courses related to the content of pedagogic or learning sciences, where courses based on the Higher Education Curriculum Development Guidelines (Junaidi, 2020) are directed to the selection of study material in the form of one or more branches of knowledge that always updated according to the development of science and technology and the direction of the development of the knowledge studied in the study program.

For the Elementary School Teacher Education Study Program, Muhammadiyah Pringsewu University, Lampung, regarding courses that provide practical teaching and learning abilities, they are carried out through the Skills Science Course Group (MKK), Work Skills Course (MKB) and Work Behavior Course (MKB). This course group consists of several courses that provide theoretical and practical knowledge to students when they will carry out teaching and learning activities in the future. One of these courses is Citizenship Education (PKn) Learning in Elementary Schools.

Learning Citizenship Education (PKn) in elementary schools is a course that provides content. Providing the ability to carry out teaching is a Citizenship Education Learning Course.

Citizenship Education (PKn) is one of the scientific contents that must be mastered by Educators in elementary schools, in addition to Social Sciences (IPS), Natural Sciences (IPA), Indonesian

Language, Physical Health and Recreation Education (Penjaskesrek), and Cultural Arts in based on the 2013 curriculum, the material content is used as the subject of thematic learning.

Civics in elementary schools is an effort made by the government through the education sector to instill multidimensional national values by instilling knowledge about the concepts of nationality, social politics, and democracy to become good citizens (Parawangsa et al., 2021). The theoretical and practical aim of Civics learning in elementary school is to form citizens who understand Pancasila and the 1945 Constitution so that they become intelligent and skilled Indonesian citizens.

Referring to the objectives of Civics in Elementary School Learning, the provision of Civics teaching skills for prospective Elementary School Teacher Students must be carefully considered, where Civics in Elementary School is presented in an integrated, participatory, scientifically based manner; the curriculum is based on the core values of the Indonesian nation; learning is done interactively; students are encouraged to find divergent answers; and the assessment is multidimensional and the level of difficulty is relatively high (Rachman et al., 2021).

So in this case the Primary School Teacher Education Study Program (PGSD) Muhammadiyah University of Pringsewu Lampung in Learning PKN Learning Courses tries to train teaching practices to grow learning abilities through steps in carrying out activities to demonstrate performance skills by applying various models, methods and strategies teaching that has been studied in the classroom, with elementary school students in real terms in the field.

However, so far the provision of Teaching Skills in Higher Education has been carried out conventionally and is based on the concept of Pedagogical Science, even though as is known the age of students is more or less in the age range of 18-30 years with the majority being 18-25 years, which is based on their psychological and biological development. Students are classified as Adolescents and Adults who are considered intellectually and academically capable of

carrying out their functions as social beings in society.

Therefore, it is a big mistake in the world of higher education to use learning strategies using theories rooted in pedagogy, because as is known pedagogy is a science that teaches children so that they grow up. So it is necessary to pay attention to whether it is appropriate to use it if it is not in proportion to their level of psychological and psychological development.

Based on the research background that has been presented above, there are several research questions, namely: 1) How to reconstruct the steps for developing Teaching Performance Capabilities in Prospective Elementary School Teacher Students in Civics Learning Courses in Elementary Schools; 2) What is the view of the Andragogical Concept regarding Performance Performance of Prospective Elementary School Teachers in Civics Learning Courses in Elementary Schools?

## METHOD

The research was carried out using a qualitative approach with the traditional case study method, which seeks to examine a particular phenomenon or event in one place and over a certain period. In this case, we will discuss the learning activities in the Citizenship Education (PKn) Learning Course for Primary Schools, Faculty of Teacher Training and Education, Muhammadiyah University, Pringsewu, even semester of the 2021-2022 Academic Year which will take place from February to June 2022 and specifically performance activities will be held in May 2022 which will be held in State Schools around Pesawaran, Pringsewu and Tanggamus Regencies. By object and subject, the object under study is the Ability to Teach Prospective Elementary School Teachers. and the subject is PGSD Study Program Students at Muhammadiyah University of Pringsewu.

Data collection was carried out through direct observation techniques using a structured observation format, then unstructured interviews were carried out, and written document studies related to

learning performance practices were carried out by students. After the data is collected, the analysis technique uses two techniques, namely:1) Analisis Descriptive is done to provide an illustration of the Practice of Implementing Civics Learning based on the Lecturer's emic perspective; 2) Domain analysis, namely grouping data into themes and codes so that it is easy to construct. The assessment stages in conducting research will go through the following steps:

1) Describe the construction of the implementation of the steps for performance activities for PGSD students at Muhammadiyah Pringsewu University, Lampung, teaching practice in civics learning lectures in elementary schools.
2) Presenting the Views of Andragogy Studies regarding the Practice of Civics Learning Performance in the UMPRI PGSD Study Program.
3) Comparing findings in the field regarding Civics Learning Performance Practices in the UMPRI PGSD Study Program with the theoretical basis of andragogy

## RESULT AND DISCUSSION

### A. Reconstruction of Steps for Developing the Ability to Demonstrate Teaching Workability in Prospective Elementary School Teacher Students

Perkuliahan Mata Kuliah Pembelajaran Pendidikan Kewarganegaraan (PKn) Sekolah Dasar yang dilaksanakan pada semester genap tahun akademik 2021-2022 di Program Studi Pendidikan Guru Sekolah Dasar (PGSD) Universitas Muhammadiyah Pringsewu Lampung disajikan dalam Bobot 4 (empat) SKS yang dilakukan melalui beberapa tahapan yakni: 1) Apersepsi; 2) Internalisasi Kontent Materi KeIlmuan Pembelajaran PKn SD; 3) Unjuk Kemampuan Pengamatan dan Analisis Video Praktik Pembelajaran; 4) Unjuk Kemampuan Perekayasaan Pembelajaran PKn SD; dan 5) Unjuk Kemampuan Praktik Pengajaran dalam Pembelajaran PKn SD.

Mata Kuliah Pembelajaran PKn SD diikuti sebanyak 3 (tiga) Rombongan Belajar sebanyak 172 Orang Mahasiswa sehingga dibagi kelas A, B, dan C. Adapun rekonstruksi pelaksanaannya sebagai berikut:

1. Apperception.

   Before carrying out further teaching and learning activities, the lecturer first provides an overview of the stages of implementing lecture activities and provides motivation, advice, and suggestions to students to carry out lectures seriously and stimulate them to be able to focus on learning.

   An overview of the stages of implementing lecture activities is conveyed through the presentation of the lecture contract and delivery of the syllabus, which also contains student lecture activity sheets, lecture material modules, and literature references used by students.

   Because it is still in the Condition of Enforcing Community Activity Restrictions (PPKM), apperception activities are carried out online using the Google Classroom application for the Learning Management System and Google Meet for face-to-face platforms. In addition to explaining how the implementation of learning is carried out, the lecturer also at the Apperception stage explains how to carry out computer application-based distance learning using both Android devices and PC devices. And don't forget to explain the steps for conducting student-centered learning.

2. Material Internalization.

   The Material Internalization Stage is the core activity in implementing learning in Civics Learning lectures at the PGSD Study Program, Muhammadiyah University of Pringsewu Lampung which is carried out online through the use of the Google Classroom platform and YouTube Social Media. The learning methods used are lectures, online discussions, inquiry learning, and case studies. The implementation steps are as follows:

1) Before carrying out the lecture, the lecturer prepares a lecture in the form of a video regarding the subject matter that is studied in the Elementary Civics Learning Course, which consists of:
    a. a. The Meaning and Nature of Learning in Citizenship Education in Elementary Schools.
    b. Educators and Educators Educators in Civics Learning in Elementary Schools.
    c. Understanding Students at the Basic Education Level as Subjects and Objects of Civics Learning in Elementary Schools.
    d. Learning Planning in Elementary Civics.
    e. The concept of Civics Learning as Legal Education.
    f. The concept of Civics Learning as Values and Character Education.
    g. The concept of Civics learning as political and democratic education.
    h. Model. Civics Learning Strategies and Methods in Elementary Schools.
    i. Civics Learning Media in Elementary Schools.
    j. Evaluation of Civics Learning in Elementary Schools.

The video is downloaded on YouTube Social Media and the link is then distributed to students

1) On the Lecture Schedule that has been determined, the Lecturer opens the lecture and invites Students to click on the Google Meet link that is distributed in Google Classroom.
2) Lecturers meet face-to-face through the Google Meet platform and then provide explanations and instructions regarding learning activities that must be carried out.
3) Lecturers invite students to click on the Youtube video link which is shared in Google Classroom to watch the material presented in it.

4) After watching, students are welcome to ask questions via the Google Classroom Forum or the Comments Column on YouTube. Make a resume and make assignments to be submitted in Google Classroom on the day the face-to-face meeting takes place.Unjuk Kemampuan Pengamatan dan Analisis Video Praktik Pembelajaran.

After carrying out 10 meetings interspersed with 2 quizzes, the steps for conducting learning are carried out using the Inquiry Learning Method and case studies, the steps are as follows:

1) Lecturers give instructions to students to download the SD Civics Learning Practice Video on Youtube Social Media.
2) After the video has been downloaded, you are welcome to observe and analyze how the implementation of Civics Learning Practices in Elementary School is carried out through the Learning Video Observation Form Instrument prepared by the Lecturer. The observed are 1) Preliminary Activities in Learning, namely Apperception and Motivation, Submission of Competence and Learning Activity Plans; 2) Core Activities consisting of Implementing educational Learning Strategies, Involving Students in Learning, Using Learning Resources/Media in Learning, Using Language in Learning; 3) Closing Activities.
3) Then the results of the analysis of the Learning Video observations are presented in front of the class. The results of the Demonstration of Ability to Analyze Video Practice Learning through presentations presented in front of the class are assessed by the lecturer.
4) The results of the implementation of the Observation and Analysis of Learning Video can be seen in the table below.

**Table 1. Observation Results Demonstrating Ability to Observe and Analyze Learning Videos**

| Things Observed | Observation result | Findings |
|---|---|---|
| **Preliminary activities** | | |
| a. Apperception and Motivation | • Almost all students find that the teacher carries out apperception and motivation in implementing learning in the form of activities: a) Greeting and giving greetings; b) Asking about the lesson taught yesterday; c) motivating to learn; d) providing an explanation of the benefits of studying the subject matter that will be discussed.<br>• Students provide Apperception and Motivation activities to be more creative and innovative | 1. Students have been able to identify what is meant by apperception and motivation as the first step in implementing learning.<br>2. Students have been able to suggest that in the activity of giving apperception and more motivation |
| b. Submission of Competency and Learning Activity Plans. | Most students are still unable to find a concrete picture of the steps for delivering competence to elementary school students | |
| **Core activities** | | |
| a. Implementation of Educative Learning Strategies. | Things found in the Learning Video regarding the Implementation of this Strategy include: a) carrying out learning by the competencies to be achieved; b) carrying out | Students through observed videos have been able to determine which learning strategies are educational and which are not, based on indicators that have been |

| Things Observed | Observation result | Findings |
|---|---|---|
| | learning coherently; c) mastering the class; d) carry out learning that can foster active participation in asking questions; e) carry out learning that can foster active participation in expressing opinions; f) carry out learning that develops the skills of students; g) Implementing learning contextually; h) carry out learning that fosters a positive attitude. | determined in learning theories. |
| b. Involvement of Learners in Learning. | Students see that several Learning Videos have shown efforts to involve students to be more active in carrying out teaching activities. Activities in the form of 1) Ask questions; 2) Responding positively to students; 3) Give appreciation to students; 4) Explain well if there are wrong answers or responses from students; and 5) Cultivate cheerfulness that shows a sense of enthusiasm. | Students have been able to distinguish whether students have been involved or not in learning. |
| c. Utilization of Learning Resources/Media in Learning. | The relevant findings regarding the use of learning resources/media in learning show that: 1) the speakers in the video are less varied in the use of learning resources | Students have independently analyzed what is included as Learning Resources and Learning Media. |

| Things Observed | Observation result | Findings |
|---|---|---|
| | because they only use the lecture method; 2) Even though it is less varied, the presenters always try to make learning resources and learning media involve students. | |
| d. Use of Language in Learning. | Use of Language in Learning The presenters can use spoken language clearly, but written language is still less used | • Students have been able to explain the importance of using spoken and written language.<br>• Students have been able to explain whether the language used by the presenter is according to the General Guidelines for Indonesian Spelling (PUEBI). |
| **Closing Activities.** | In the closing activity, students found: 1) The presenter did not facilitate summarizing the material after learning; 2) The presenter reflected through oral questions; and 3) Many did not do an Evaluation. | Students have been able to analyze how and what to do in Closing activities in learning. |

5) After carrying out the results of the demonstration of the ability to analyze learning practice videos, the lecturer is then assigned to model the learning carried out.

3. Demonstrate Civics Learning Engineering Capabilities

Before carrying out Teaching Performance Performance activities, students are directed to prepare various preparations for various matters related to teaching at school. These various things are Learning Resources, Learning Media, Learning Models, Learning Facilities, and Infrastructure as well as Media Tools that will be used to make learning videos. The steps for developing Engineering Civics Learning carried out by students are as follows:

1) Analyze needs in implementing Learning Practices.
2) Prepare Licensing Administration Documents to carry out activities.
3) Prepare Learning Resources that will be used in practice.
4) Prepare media equipment that will be used in learning.
5) Compile and Prepare Learning Implementation Plans.
6) Prepare everything related to making Learning Videos.

4. Unjuk Kemampuan Praktik Pengajaran dalam Pembelajaran PKn SD.

After preparing various preparations to carry out teaching and learning activities, students then go to the teaching and learning practice location, namely the elementary school where the permits are prepared. The illustration of the implementation of the Demonstration of Teaching Practice can be seen in the table below.

**Table 1 Observation Results of Demonstration of Teaching Practice.**

| Things Observed | Observation result | Findings |
|---|---|---|
| **Preliminary activities** | | |
| a. Apperception and Motivation | Apperception and Motivational Activities that are visible are:<br>a. Invite children to pray loudly.<br>b. Invite students to shout encouraging slogans. | ▪ Students for the first time experience the experience of managing classroom situations in real terms. |

| Things Observed | Observation result | Findings |
|---|---|---|
| | c. Invite students to sing happily. | ▪ Students look interactive in giving apperception and motivation.<br>▪ Students have tried to be interactive with students, but are still not able to mingle with students, but not all students do so, some students seem to be able to mingle. |
| b. Submission of Competency and Learning Activity Plans. | It can be seen that students explain what they will learn today. | ▪ Students have not been able to explain what they will learn in the language understood by students at the elementary school level.<br>▪ Not all students understand what will be learned so they experience difficulties regarding what will be taught. |
| **Core activities** | | |
| a. Implementation of Educative Learning Strategies. | Visible Students in teaching using the Strategy:<br>a. Lecture.<br>Explain orally about the material to be explained | ▪ Students tend to use the lecture method at the beginning of core activities to explain the rules |

| Things Observed | Observation result | Findings |
|---|---|---|
| | or discussed.<br>b. Game.<br>Invite students to play while learning through one game. | for implementing teaching and learning activities.<br>▪ Many students when using the Lecture Method to explain subject matter seem to lack knowledge of scientific material, but some have mastered the material.<br>▪ Students seem more comfortable using game strategies in carrying out learning because they prioritize fun improvisation to convey material compared to having to memorize content. |
| Involvement of Learners in Learning. | When stimulating students, students use these steps:<br>1. Give feedback questions verbally.<br>2. Promising and Giving gifts to stimulate Response.<br>3. Try to speak according to what students | ▪ Students already understand that students must be able to be actively involved when carrying out learning.<br>▪ Students have made maximum efforts to stimulate student activity. |

| Things Observed | Observation result | Findings |
|---|---|---|
| | understand when communicating and interacting. | |
| Utilization of Learning Resources/Media in Learning. | In connection with the use of learning resources/media used in the form of:<br>a. Media in the form of 2D images. The media used are images and symbols such as the Pancasila Principles symbol.<br>b. Media in the form of 3D Mockups. Media is widely used to help students carry out learning in the form of games.<br>c. Student Worksheets (LKPD). Students need LKPD to help students practice answering questions. | ▪ Students in creating media appear to be able to adapt to existing materials and can overcome difficulties in engineering and design. |
| Use of Language in Learning. | In the use of language when communicating, students use Indonesian when carrying out teaching, which is sometimes interspersed with the local regional language. | ▪ Students still seem too stiff and lack improvisation in their language, so students at elementary school age are sometimes not able to understand it.<br>▪ Even though more |

| Things Observed | Observation result | Findings |
|---|---|---|
| | | languages are used, they pay less attention to language rules and ethics, students have tried to improve this and avoid using bad words. |
| **Closing Activities.** | Activities that are seen to be carried out to close the Teaching and Learning Activities are in the form of:<br>a. Closing the Study with prayer.<br>b. Invite students to shout yells.<br>c. Sorry and Excuse Me. | ▪ Students seem to be in a rush to finish lessons so many activities on the agenda are missed.<br>▪ Students do not review the learning activities that have been carried out. |

Based on the description described in the table above, the Reconstruction of the Implementation of Demonstration of Teaching Practices in Elementary Civics Learning found findings in the form of;Masih telihat kegagapan Mahasiswa dalam melaksanakan Unjuk Kemampuan Praktik Pengajaran pada Siswa Sekolah Dasar?

1. Lack of mastery of the concept of material content so that the provision of material by students as teachers is still limited to knowledge and has not yet achieved learning to internalize attitudes.
2. It is felt that students still lack innovation in improvising when teaching because they still have difficulty identifying needs in teaching and learning activities.

3. Difficulty using the right language in the implementation of learning, resulting in miscommunication between Educators and Students.

## B. View of the Pedagogical Concept of Performance Performance in Elementary School Teacher Prospective Students in Civics Learning Courses in Elementary Schools.

Andragogi merupakan pendekatan dalam Ilmu Pendidikan yang dipopulerkan oleh Malcolm Knowles (Yusri, 2017) yang dimaknai sebagai Seni dan atau Ilmu yang dipergunakan untuk membantu orang Dewasa Belajar. Merujuk pada teori yang dikemukakan Knowles menurut Karwati (2016) Orang Dewasa dalam belajar itu banyak belajar dengan menggunakan pengalamannya dan belajar sesuai dengan kebutuhannya.

The Andragogy approach has several basic assumptions (Yusri, 2017), namely: 1) Adults can direct themselves, including in learning (Self Directedness); 2) Adults must have life experiences that can be used as lessons in their lives; 3) Learn according to their knowledge needs; 4) Adults prefer problem-oriented and performance-oriented learning.

From these basic assumptions then derived the Principles that form the basis of the learning strategy, that Andragogy has Principles: (Sudjana, 2007), namely; 1) Adults have a self-concept, Adult learners are motivated by their desires, so they can direct themselves about what they want to learn; 2) Adults have accumulated experience, so that adult learners often use their experiences as material for knowledge; 3) Adults have learning readiness. Adult learning readiness will be in harmony with the roles that are displayed both in society and in daily tasks; 4) Adults want to be able to immediately take advantage of learning outcomes, therefore Adult Learners simply choose existing knowledge with the relevance of learning objectives; 5) Adults have learning abilities, so adult learners like practical things; 6) Adult Learners always want to be appreciated and respected.

Adulthood is a period in human life that is considered the peak of cognitive, affective, and psychomotor maturity as a result of education that has formed mentally and biologically where body sizes have reached maximum strength (Rahmat, 2018). Referring to this, students are humans aged 18 - 30 years, who are in the developmental phase both biologically and psychologically and are in the Early Adulthood period which is described as a period of adjustment to new life patterns and new hopes.

So for this reason, when we review the learning that occurs in higher education, of course, it is best to use the principles of andragogy as a basis for analyzing how to provide teaching skills to prospective elementary school teacher students carried out by lecturers. Based on this argument, after we describe how learning is carried out, we then pay attention to the pedagogical view regarding Learning Practices in Higher Education. The following is a description of the analysis.

1. Stages of implementing Apperception and Motivation in Preliminary Learning activities.

   At this stage the lecturer tries to provide some stimulation to improve students' mood through several steps, namely: 1) Reading the Qur'an when giving face to face; 2) Explaining what will be studied; 3) asking whether they are ready or not to learn; and 4) Provide an explanation of what is to be achieved in learning.

   Thus, if we examine it based on the perspective of Andragogy Principles, it can be seen that the implementation of the first stage in the Student Teaching Ability Performance activity has implemented the following principles: 1) Directing Students to build Self-Concept and 2) Directing Students to prepare carefully for each activity that will take place. done.

2. Implement Material Internalization.

   Looking at the steps that the Lecturer has implemented in providing pedagogical material, it can be seen that: 1) The Lecturer has implemented the Principles of Self-Concept Formation; 2) Lecturers have allowed students to gather

experience in learning something through giving lectures on the YouTube platform; 3) Lecturers have provided practical learning facilities for the YouTube application and Google Classroom Learning Management Service (LMS).

3. Melaksanakan Analisis Video Praktik Pembelajaran.
   Ketika melakukan Praktik Analisis Video Pembelajarann yang disiarkan di YouTube Mahasiswa telah berlatih untuk belajar mengumpulkan pengalaman sebagai bahan pengetahuan dan dilatihkan untuk memilih pengetahuan yang relevan dengan apa yang ingin ia pelajari.
4. Implementation of Civics Learning Engineering Capabilities.
   When carrying out Civics learning engineering, students carry out learning activities independently and lecturers only act as resource persons and facilitators to develop various products or things related to learning based on the perspective of Andragogy Principles so that this activity can provide: 1) Motivation that directs students to learn something; 2) Knowledge materials according to what is needed; 3) Learning products needed for learning.
5. Implementation of Demonstration of Teaching Practice Skills in Elementary Civics Learning.
   The pinnacle of activities in Civics learning is Teaching Practice in which in this case Students will: 1) Help Students as Learners to think in a realistic context; 2) Help to actively search for additional information to increase knowledge based on real experience; 3) Train to think and process which refers to the Environment, Needs and Experience; 4) Have the opportunity to practice and learn the expected results; 5) Provides an overview of the Learning Process in real-time.

Thus, Andragogically, the Implementation of Teaching Ability Performance among Prospective Elementary School Teacher Students in Elementary Civics Learning Lectures can be said to be;

1. Implementation of Teaching and Learning Activities Learning Civics in Elementary School has been able to direct students to be motivated in learning.
2. The implementation of Teaching and Learning Activities for Elementary Civics Learning has shown that the materials are appropriate to the needs of Learners.
3. The implementation of Teaching and Learning Activities for Elementary Civics Learning has shown that there is a reciprocal learning process so that activity is not only seen by the lecturers but also by students, namely student-teacher candidates.
4. Implementation of Teaching and Learning Activities for Elementary Civics Learning has made Lecturers Facilitators who get feedback from Students as Learners.
5. Implementation of Teaching and Learning Activities for Elementary Civics Learning has stimulated Students as Participants to be active in Learning.
6. Implementation of Teaching and Learning Activities for Elementary Civics Learning has endeavored to continuously train students to review their teaching abilities.

## CONCLUSION

The implementation of Teaching Skill Performance for Primary School Teacher Prospective Students in Elementary Civics Learning Lectures in the Basic Education Study Program (PGSD) can be concluded through a qualitative study as follows:

1. Steps to Develop Teaching Performance Capabilities in Elementary Civics Learning Courses are carried out through the Stages of Apperception, Internalization of Material, Video Analysis of Learning Practices, Engineering of Learning Steps, and Performance of Teaching Skills, which are found in the form of 1) Student stuttering in carrying out teaching activities; 2) Lack of Concept Mastery; 3) Less Innovative in Improvisation in

Teaching; and 4) Language difficulties communicatively between Educators and Students.

2. Implementation of Teaching Skills Performance for Elementary School Teacher Candidates in Elementary School Civics Learning Lectures according to the Andragogy Science View can be said to provide Learning Motivation, Material that suits their needs, Active Learning, Feedback, and Review in learning.

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# THE USE OF ABC SONG FOR IMPROVING STUDENTS'MASTERY IN LISTENING COMPREHENSION

Irawan Catur Atmojo[1], Zhilal Al Islah[2], Antonia Vincent Rosali[3], Lutfhi Sugiyanto[4], Hafidh Ihza Pramudya[5], Luluk Khoirurohmah[6], Arin Arianti[7]
University Veteran Bangun Nusantara Sukoharjo

*Teaching ability is the main skill that must be provided to Prospective Teacher Students of the PGSD Study Program which is carried out with various efforts, one of which is by using Teaching Practice in Elementary Civics Learning Courses, but this effort is not an easy thing, so through this research will be discussed: 1) How to reconstruct the steps to develop the Teaching Performance Ability of Prospective Elementary School Teacher Students in Civics Learning Courses in Elementary Schools; 2) What is the view of the Andragogical Concept regarding the Performance of Work Ability of Prospective Elementary School Teacher Students in Civics Learning Courses in Elementary Schools.*

***Keywords:*** *Learning Practice, Prospective Student Of Elementary School Teacher, Andragogi Perspective.*

## INTRODUCTION

Listening is one of English's basic skills. Listening is where a listener listens to what a speaker is saying and the. the listener would try to understand and interpret the given information from the speaker. Listening gives information to people so that they can develop the necessary information to comprehend and use a language. In learning English, it is necessary to know that there are four skills to be mastered which cover reading, listening, speaking, and writing. There are important factors in the process of English teaching and learning. In this section, the writers do not discuss language skills but the writers limit to discuss listening especially on listening comprehension.

Listening comprehension is one of the language skills that is very important for students to follow lessons well. However, in reality, many students have difficulty understanding information conveyed orally, and many students do not understand how to write the words spoken by native speakers. Moreover, some students do not understand the meaning of the words spoken by other people. Improving students' mastery of listening comprehension is a challenge for educators. Therefore, creative and effective learning approaches are needed to help improve students' listening comprehension skills.

The use of the ABC song can improve the student's interest in learning listening because the students can learn listening in a different way than usual. If previously students only listened to a native speaker in learning listening then it makes the students confused and not understand what the speaker said. In this study, students do not feel bored and confused while learning listening because it is different, the English words are spoken using rhythm and accompanied by music, so the students feel happier and easier to understand.

Based on the problem above, one of the reasons is many students lack interest in learning listening comprehension, this because students are feel bored and confused while learning listening. So, the writers try to give solutions for the students to improve their listening comprehension by using the ABC song.

This study aims to examine the improving of using ABC songs in improving students' mastery in listening comprehension. The ABC song was chosen because of its simple lyrics and memorable rhythm, so it is expected to help students focus more and improve their memory in understanding oral information.

## METHOD

This study used an experimental method with a single group control pretest-posttest design. The experimental group received an intervention using ABC songs as a tool for listening comprehension, while the control group was not given any special intervention.

The participants of this study were grade 3 students at an elementary school in an urban area. The total number of participants was 40 students, of which 20 students were in the experimental group and 20 students in the control group.

A listening comprehension test was developed to measure students' comprehension ability before and after the intervention. The test consisted of several questions covering different levels of difficulty.

Before the intervention, both groups were tested using a listening comprehension test as a pretest. After that, the experimental group listened to the ABC song several times in a predetermined week, while the control group continued learning as usual. After the intervention was completed, both groups were tested again using the listening comprehension test as a posttest.

## RESULT AND DISCUSSION

### RESULT

The results of the study were analyzed using statistical tests, namely the t-test to assess significant differences between pretest and posttest scores in both groups.

The results of the analysis showed that there was a significant increase in students' mastery of listening comprehension in the experimental group who received the intervention with ABC songs. The experimental group's posttest scores were statistically higher than

their pretest scores ($p < 0.05$). Meanwhile, the control group who did not get the intervention showed little or no change in their listening comprehension scores.

In the learning process, the use of ABC songs was used as "ice-breaking" and to get the student's attention. Besides this song helps the students memorize the Alphabets spelling easily. The study with the use of song as a teaching medium is very interesting because the lyrics and the rhyme were easy to understand and memorize for students, especially young learners. So the teachers used the ABC song to improve the students' vocabulary and it can improve students' listening comprehension.

Teaching the learning process with the use of ABC song media has some advantages and disadvantages. The advantages of the use of ABC songs are the following: 1) ABC Song could become a media introduction of new languages, especially the alphabet, 2) The use of ABC Song can improve students' listening comprehension, and 3) ABC Song can strengthen memory of students. But the disadvantages are the following: 1) Their differences in characteristics among young learners, because not all children can receive what will delivered by their teacher, 2) It can disturb adjacent lessons.

**Discussion**

The use of the ABC song as an aid in listening comprehension proved effective in improving students' mastery. The ABC song helps improve students' concentration and helps them focus more on the information conveyed in the context of the song. In addition, the repetitive lyrics and rhythms in the song help improve students' memory, making it easier for them to recall the information.

## CONCLUSION

The use of ABC songs can be an effective approach to improving students' mastery of listening comprehension. It can help students focus more, improve memory, and ultimately help them be more successful in understanding orally delivered information.

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# ANALYSIS OF STUDENT'S MISCONCEPTIONS IN SOLVING QUADRATIC FUNCTION QUESTIONS BASED ON IMPULSIVE REFLECTIVE COGNITIVE STYLES

Isna Nuraini Lathifah Hanum[1], Herry Agus Susanto[2],
Annisa Prima Exacta[3]
University Veteran Bangun Nusantara Sukoharjo
isnanuraini106@gmail.com[1], herrysanto_62@yahoo.co.id[2],
annisa.p.exacta@gmail.com[3]

*The purpose of this study is to describe student misconceptions in solving mathematical problems, the subject of quadratic functions in terms of the reflective and impulsive cognitive styles of grade X students of DKV SMK PGRI Sukoharjo. This study used qualitative descriptive methods with data collection techniques in the form of MFFT (Matching Familiar Figures Test) tests to group students' cognitive styles, quadratic function question tests equipped with CRI (Certainly of Response Index), interviews, and documentation. The validity of the data used in this study is a triangulation technique. Based on data from written tests and interviews that have been tested for validity, it shows that students with reflective cognitive styles are identified as experiencing misconceptions of translation, strategy, systematic, sign, and count. Students with impulsive cognitive styles were identified as experiencing all types of misconceptions: translation, concept,*

*strategy, systematic, sign, and counting misconceptions. The results of this study also showed the type of misconception that is most prevalent in subjects both reflective and impulsive, namely counting misconceptions. The main causes of misconceptions experienced by students are a lack of understanding of the concept of the material and inaccuracy of students in reading questions and writing down solving steps.*
***Keywords:*** *Misconceptions, Cognitive styles, MFFT test, CRI, Mathematics*

## INTRODUCTION

Hamzah (2014: 57) stated that mathematics education is an effort to develop students' reasoning power, develop students' intelligence, and change behavior for the better, and can even create works of mathematical concepts. Utami (2020) stated that mathematics is always considered difficult by students because of the object of abstract mathematics, Mathematics uses many formulas so students' assumptions of mathematics lessons are difficult and complicated subjects to apply and understand. Based on the results of the Program for International Student Assessment (PISA) study also show that the quality of education in Indonesia is relatively low. In 2015 the mathematics ability of Indonesian students was ranked 45 out of 50 countries with a score of 397 still below the international average of 500 (Masjaya & Wardono, 2018). In 2018 the average score in the mathematics category fell again with a score of 379 and Indonesia was ranked 73 out of 79 countries (Tohir, 2019). According to the report of the education assessment center, the results of the National Examination at the vocational level in 2019 the lowest score for mathematics was 0.25 with an average mathematics test score of 35,25.

Mathematics is a science that has an object of study in the form of facts, concepts, procedures, and abstract principles. According to Susanto (2015: 9) the object of study of mathematics learning is in the form of facts, concepts, principles, and skills. Every

concept and structure is arranged systematically, that is, it always develops from the simplest concepts and structures to complex or complex concepts and structures. Radiusman (2020) states that a proper understanding of concepts will help students understand advanced lessons. If students do not master the previous preconceptions, it can cause misconceptions in the next material.

Rahmawati et al. (2021) stated that there are 6 types of student misconceptions in doing math problems, namely: (1) Misconceptions of translation, which are misunderstandings of converting information into mathematical expressions or errors in converting mathematical problems into appropriate sentences, (2) Misconceptions of signs, namely errors in writing signs, symbols, operations, or notations. (3) Misconception of concept, is a mistake in applying and relating one concept to another concept or an error in making statements that are not by scientific concepts. (4) Misconception of strategy, is a mistake that occurs if students choose the wrong path that leads to a dead end which eventually makes them have difficulty in solving problems. (5) Systematic misconception, is an error regarding the selection of resolution steps. (6) Calculation misconceptions, i.e. counting errors in mathematical operations.

Student misconceptions are closely related to the cognitive style of the students themselves. Misconception can be said to be a conception or cognitive structure that is firmly attached to students that deviates from the conception put forward by experts. Exacta (2015) states that a misconception is a conception that is not by scientific knowledge or understanding received by scientists in a field that can only be accepted in certain circumstances is not applied to others and cannot be generalized. Rahmatina, Sumarmo & Johar (2014) said that cognitive style refers to a person's ability to receive, process, and respond to information received. Based on the grouping of cognitive styles, three cognitive styles have to do with the teaching and learning process, namely: (1) Field dependence and independence cognitive styles, (2) Reflective and impulsive cognitive styles, (3) Perceptive/receptive and systematic/intuitive cognitive styles. In this

study, the student misconceptions that will be described will be focused on students with reflective and impulsive cognitive styles. Reflective and impulsive cognitive styles are types of cognitive styles based on conceptual tempo (speed in thinking). Impulsive students are students who quickly respond to situations, but the responses given are often wrong. While reflective students consider many alternatives before responding so that the response given is most likely correct.

Based on the results of the researcher's interview with one of the mathematics teachers who taught in class X DKV SMK PGRI Sukoharjo, it was stated that student learning outcomes that were still low in quadratic function material were caused by students having difficulties in understanding concepts. Lasmi (2017) said the quadratic function material is a prerequisite material in studying other mathematical materials, such as derivative materials, integrals, linear programs, and geometry. In connection with the never conducted similar study at SMK PGRI Sukoharjo, for this reason, researchers want to examine students' misconceptions in solving quadratic function problems based on reflective and impulsive cognitive styles. This study aims to describe misconceptions that occur in students with reflective and impulsive cognitive styles in solving quadratic function problems in class X Visual Communication Design (DKV) SMK PGRI Sukoharjo.

## METHOD

This research is descriptive research with a qualitative approach. Ibrahim (2018: 59) descriptive research is research intended to describe, describe, or explain the state of the object under study as it is, according to the situation and conditions when the research is carried out. The results of this study are presented in the form of a research report. The research was conducted in class X Visual Communication Design (DKV) of SMK PGRI Sukoharjo. The research was conducted in the even semester of the 2022/2023 academic year. The subjects of this study were all students of grade X DKV SMK PGRI Sukoharjo with a total of 20 students.

The data collection technique in this study is with a cognitive style test instrument, namely MFFT (Matching Familiar Figure Test) used to group students based on reflective and impulsive cognitive styles. Furthermore, students are given written questions to identify student misconceptions in solving mathematical problems related to quadratic function material accompanied by Certainly of Response Index (CRI) criteria. Questions related to the subject of quadratic functions accompanied by the Certainly of Response Index (CRI) used in this study amounted to 3 questions. Test result data is used to distinguish between students who master concepts, answer correctly by guessing, and lack knowledge, and students who experience misconceptions in solving questions related to the subject of quadratic functions. To find out in depth the misconceptions of students in solving math problems, interviews were conducted. Fadhallah (2021: 2) an interview is a communication of two people to exchange information and ideas through questions and answers to collect data. Interviews were used in this study to learn in-depth about the misconceptions of students in solving math problems. The documentation method is a method used to collect the required data and to find out the authenticity of the data. The data is in the form of student data, transcripts of interviews with students, transcripts of MFFT tests, and transcripts of written tests.

This study uses data validity with the triangulation technique method. Sugiyono (2019: 369) Triangulation techniques to test data credibility are carried out by checking data to the same source with different techniques. Triangulation techniques are carried out to compare test results and interview results to find out the characteristics of student misconceptions. The data analysis technique in this study uses the Miles and Huberman model, which is carried out through three stages which include data reduction, data presentation, and conclusions.

## RESULT AND DISCUSSION

In this study, the selection of subjects was chosen from grade X students of Visual Communication Design (DKV) SMK PGRI Sukoharjo who were cognitively reflective and impulsive. To classify students with reflective and impulsive cognitive styles using the MFFT (Matching Familiar Figure Test) instrument developed by Warli.

Measurement of reflective and impulsive cognitive styles was carried out on each student of grade X DKV SMK PGRI Sukoharjo. The things recorded in this measurement are the time the student first answered (t) and the frequency of answering until they got the correct answer (f). Then the record of median time and median frequency of answering is used to limit the determination of students who have impulsive or reflective characteristics, then With the median data of time (t) and frequency (f), a line is drawn parallel to the axes t and f so that it will form four groups of students, who are impulsive, slow-not careful, reflective, and fast careful. Here are the results of measuring students' cognitive styles.

From the results of the MFFT test that students have done, a group of students with a reflective cognitive style that uses time (t) which is more than or equal to 34.074 ($t \geq 34.074$) and the frequency of answering correctly (f) less than or equal to 1.55 ($f \leq 1.55$). The group of students with impulsive cognitive styles was students who completed the test with a time (t) less than 34.074 or ($t < 34,074$) and the frequency of correct answering (f) is more than 1,55 or ($f > 1,55$). Based on the results of cognitive style measurement, the results of grouping cognitive styles of grade X DKV students of SMK PGRI Sukoharjo against the MFFT (Matching Familiar Figure Test) test were obtained in the following table.

eflective and impulsive characteristics is greater at 90% compared to students who have fast-careful and slow-not-careful characteristics at 10%. This result is by several previous studies, namely, Anifa Nurul's (2016) research the proportion of reflective and impulsive children was 78.125% greater than students with fast-

careful or slow-not-careful characteristics.

Based on the results of the answers to the quadratic function test of students with reflective and impulsive cognitive styles, students with reflective cognitive styles experienced misconceptions as many as 4 out of 11 students, or 36.36%. For students with impulsive cognitive styles, there are 5 out of 7, or 71.4% of students who experience misconceptions. It is undeniable that students with reflective cognitive styles can also experience misconceptions. This result is data on student misconceptions with reflective and impulsive cognitive styles obtained from quadratic function question tests equipped with CRI (Certainly of Response Index) to determine student misconceptions. The selection of subjects for interviews is by the misconceptions experienced by students on the question numbers and the subjects taken can represent all subjects included in the research process. So in the selected subject, there are 5 students with details of 2 reflective students and 3 impulsive students.

## DISCUSSION

### Analysis of Student Misconceptions Reflective Cognitive Style

a. SKR1 Subject

1) Question number 1

**Figure 1.** SKR1 Subject Test Results Question Number 1

Based on the test results of SKR1 subjects in question number 1 in figure 1, SKR1 subjects chose wrong answers with a confidence level of d (sure of correct) or a

score of 3 on CRI (CRI > 2.5) so that students were said to have misconceptions. The subject of SKR1 suffers from translation misconceptions because it does not write down all that is known and asked on the question. At the end of the completion step, determining the maximum high value of the subject SKR1 gives two different results so it is said that the subject has a calculation misconception. Systematic misconceptions also occur in question number 1 where students can find alternative ways to determine their grades but subjects are unable to complete them.

Based on the interview with subject SKR1 in question number 1, the subject experienced translation misconceptions because they did not write it in the asked section and considered that some information in the question did not need to be written on the answer sheet. And the subject said he did not know the formula by heart so took the alternative by transcribing the result of the answer h(t)max to the equation h(t) but could not solve it because it felt complicated and too long.

2) Question number 2

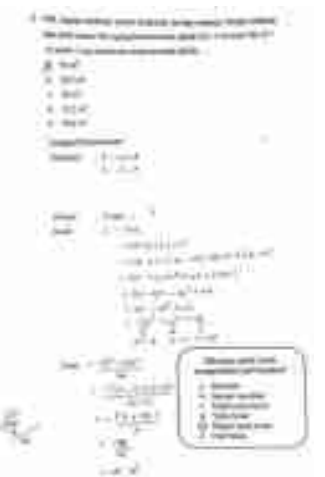

**Figure 2.** SKR1 Subject Test Results Question Number 2

Based on the test results of SKR1 subjects in question number 2 in figure 2, SKR1 subjects chose wrong answers with confidence level e (almost certainly correct) or score 4 on CRI (CRI > 2.5) so students are said to have misconceptions. For question number 2, subject SKR1 experienced a calculation misconception because, at the end of the calculation, there was a calculation error so the answer to question number 2 was wrong. Based on the results of interviews with SKR1 subjects in question number 2, SKR1 subjects experienced calculation misconceptions due to misunderstandings in calculating divisions at the end that should be (-196)/(-8)=24.5 but SKR1 wrote 24 because it assumed that the quotient of 36 divided by 8 was 4.

Triangulation of SKR1 test answer results and subject interviews can be seen in table 4 below:

**Table 4.** Triangulation of SKR1 Test Answer Results and Subject Interview Question number

Analysis of Student Misconceptions Test Results Interview Results

1. a. SKR1 subjects experience translation misconceptions where the subject does not write down what is known and asked completely.
   b. SKR1 subjects experience calculation misconceptions due to incorrect calculation results.
   c. SKR1 subjects experience a systematic misconception where the subject is unable to complete the completion step to the end.
2. Calculation misconceptions occur in SKR1 subjects because errors in calculations determine the final result
   a. SKR1 subjects are not careful in writing down what is known and asked and assume that the information on the questions does not need to be written.
   b. The subject of SKR1 is confused in the calculation of division.
   c. The subject of SKR1 forgets the formula and feels that the chosen alternative path is more complicated and lengthy and thus unable to complete.

The subject experienced a misunderstanding in the results of the division calculation Based on the triangulation of data in table 4, it was concluded that there was a match between the test results and the interview results of SKR1 subjects.

b. SKR2 Subject

1) Question number 2

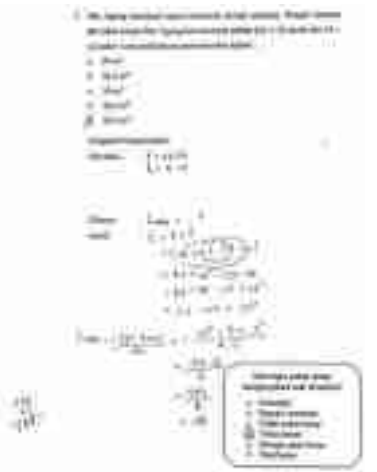

**Figure 3.** SKR2 Subject Test Results Question Number 2

As seen in Figure 3, the answer choice given by subject SKR2 is wrong and subject SKR2 gives a confidence level of d (surely correct) or a score of 3 on the CRI. SKR2 subjects experience sign misconceptions because they cannot affirm symbols of mathematical operations. The calculation misconception made by the subject of SKR2 is a calculation error that causes an incorrect final result. Based on interviews with SKR2 subjects, sign misconceptions occur due to not being careful in using parentheses in mathematical operations. Calculation misconceptions experienced by SKR2 subjects because the subjects were not careful in calculations and errors in determining the data substituted for variables.

2) Question number 3

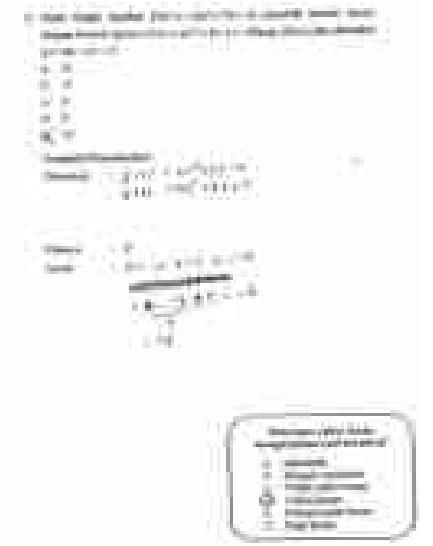

**Figure 4.** SKR2 Subject Test Results Question Number 3

In figure 4, it can be seen that the answer choice given by subject SKR2 is wrong, and subject SKR2 gives a confidence level of d (sure is correct) or has a score of 3 on CRI. Translation misconceptions occur in question number 3 where the subject does not write down the complete question information. A sign misconception occurs when the subject does not affirm the operating symbol. Based on the results of interviews with SKR2 subjects, the translation misconception carried out on question number 3 subjects did not write the p equation as known in the problem. SKR2 subjects do not use parentheses to emphasize the multiplication operation between negative and positive numbers, causing errors in the calculation of the final result.

Triangulation of SKR2 test answer results and subject interviews can be seen in table 5 below:

**Table 5.** Triangulation of SKR2 Test Answer Results and Subject Interviews Question number

Analysis of Student Misconceptions

Test Results Interview Results

2 a. SKR2 subjects experience sign misconceptions where the The subject is unable to affirm symbols of mathematical operations.

b. SKR2 subjects experience calculation misconceptions because they are not precise in determining the data substituted into variables.

3 a. SKR2 subjects experience sign misconceptions where the The subject is unable to affirm symbols of mathematical operations.

a. SKR2 subjects are not meticulous in using mathematical operation signs.

b. Misconception of the subject determines the data to be substituted to variables and is not careful in the calculation step.

c. SKR2 subjects are not meticulous in using signs of mathematical operations.

d. The subject deliberately did not write down the

b. SKR2 subjects experience translation misconceptions where the subject does not write complete information about the questions. equation p in the known part.

Based on the triangulation of data in table 5, it was concluded that there was a match between the test results and the interview results of SKR2 subjects. **Misconception Analysis of Students with Impulsive Cognitive Styles** a. SKI1 Subject

1) Question number 3.

**Figure 5**. SKI1 Subject Test Results Question Number 3

The subject of SKI1 experienced a misconception in question number 3 seen from the high level of confidence of the answer, namely d (sure of correct) or score 3 on the CRI and the answer chosen was wrong. Based on the results of the answer analysis, the subject SKI1 experienced a misconception in question number 3 and was identified as having a calculation misconception due to an error in translating data for substitution. Based on the results of interviews with SKI1 subjects, subjects were not careful in determining the values of a, b, and c to be substituted into the p equation so the final results obtained were wrong.

Triangulation of test answer results and SKI1 subject interviews can be seen in the following table 6:

**Table 6**. Triangulation of Test Answer Results and SKRI1 Subject Interview Question number

| Analysis of Student Misconceptions | |
|---|---|
| Test Results | Interview Results |
| 3 | The subject of SKI1 experienced a calculation misconception where the subject experienced an error in translating data for substitution. |

Subjects are not meticulous in translating data to substitute into equations.

Based on the triangulation of data in table 6, it was concluded that there was a match between the test results and the interview results on the SKI1 subject. SKI2 Subject

1) Question number 1

**Figure 6.** SKI2 Subject Test Results Question Number 1

The subject of SKI2 experienced a misconception in question number 1, it can be seen that there is picture 6 where the confidence level of the answer is high, namely d (sure it is correct) or score 3 on the CRI, but the answer chosen is wrong. In question number 1, the subject of SKI2 experienced a misconception of the sign because the subject was wrong in the use of the symbol h(t) and a misconception of the strategy carried out by the subject of SKI2, namely an error in the use of the formula. Based on interviews with SKI2 subjects, sign misconceptions occur because the subjects do not understand the problem well. Misconceptions of strategies that the subject experiences because they feel right in the use of formulas.

2) Question number 2

**Figure 7.** SKI2 Subject Test Results Question Number 2

Based on figure 7, the subject of SKI2 experienced a misconception in question number 2 as seen from the high level of confidence of the answer, namely d (sure of correct) or score 3 on the CRI but the answer chosen was wrong. In question number 2, the misconception of the concept that occurs in SKI2 is that students are not able to connect the concepts of the material that should be used. Misconceptions of concepts experienced by SKI2 subjects cause subjects to experience misconceptions of strategies where the use of inappropriate formulas to solve problems. Based on the results of the interview, the subject SKI2 experienced a misconception of the concept because it assumes that the area of a rectangle is equal to the maximum area of a rectangle so that the formula for finding the maximum area is the formula of length multiplied by the width so that the subject also experiences a misconception of strategy. Triangulation of test answer results and interviews of SKI1 subjects can be seen in table 7 below:

**Table 7.** Triangulation of Test Answer Results and SKI Subject

InterviewQuestion number

Analysis of Student Misconceptions

Test Results Interview Results

1 a. The subject of SKI2 experiences a sign misconception where the subject is wrong in the use of symbols.

b. SKR2 subjects experience misconceptions of strategies where subjects misuse formulas

2 a. The subject of SKI2 experiences a misconception of the concept which is unable to determine the exact concept of matter.

b. The subject of SKI2 experiences misconceptions of strategies due to the use of incorrect formulas

a. The subject of SKR2 does not understand the problem well so it is wrong in the use of symbols.

b. The subject of SKI2 felt right in the use of formulas to solve the problem

a. The subject SKI2 assumes that the area of a rectangle is equal to the maximum area of a rectangle.

b. The subject of SKI2 misunderstood the maximum area formula.Based on the triangulation of data in table 6, it was concluded that there was a match between the test results and the interview results of SKI1 subjects.

c. SKI3 Subject

1) Question number 1

**Figure 8.** SKI3 Subject Test Results Question Number 1

Based on the results of the SKI3 subject test in question number 1, the SKI3 subject is said to have a misconception because the subject gave a confidence level of d (sure right) or a score of 3 on the CRI. SKI3 subjects experience a calculation misconception where the subject makes a mistake in calculating the final result. The subject of SKI3 experienced systematic misconceptions due to errors in the resolution steps. Based on the results of interviews with SKI3 subjects in question number 1, SKI3 subjects rushed to write down the steps to find h(t)max and calculation misconceptions occurred because they were not careful in calculating division.

2) Question number 2

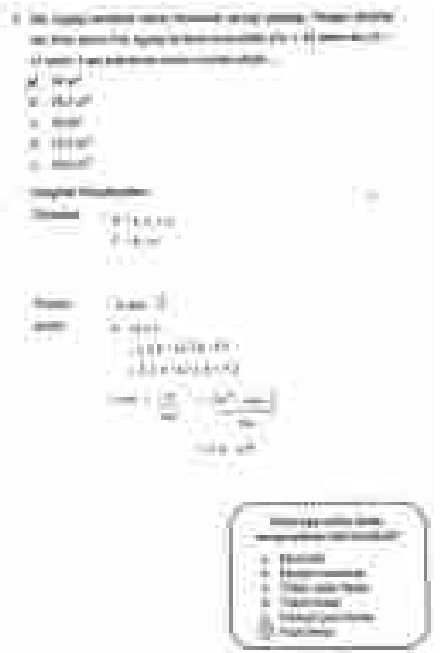

**Figure 9.** SKI3 Subject Test Results Question Number 2

Based on the test results of the SKI3 subject in question number 2 in figure 9, the SKI3 subject is said to have a misconception because it gave a wrong answer with a confidence level of f (definitely correct) or a score of 5 on the CRI. In question number 2, the subject of SKI3 experienced a systematic misconception where the subject immediately gave the final answer. Based on the results of interviews with SKI3 subjects, systematic misconceptions made by subjects in question number 2 due to a lack of understanding in solving two-factor multiplications in quadratic functions. So SKI3 has not been able to decide on the correct settlement steps. The subject of SKI3 explained that he answered question number 2 using his logic but not written on the answer sheet, namely by substituting an arbitrary x value, but the answer given was also incorrect.

3) Question number 3

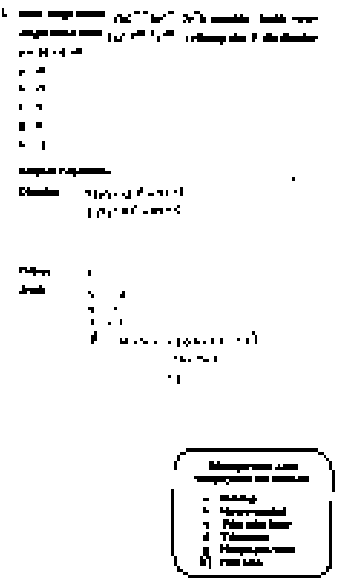

**Figure 10.** SKI3 Subject Test Results Question Number 3

Based on the test results of the SKI3 subject in question number 3 in figure 10, the SKI3 subject is said to have a misconception because it gave a wrong answer with a confidence level of f (definitely correct) or a score of 5 on the CRI. The subject of SKI3 experienced a translation misconception where the subject did not write down the information in the question completely. In the problem, it is known as p=2a-b-c but the subject SKI3 writes p=2a+b-c. This error causes the subject to also experience a misconception of the strategy where the subject uses the wrong solution formula. Based on the results of interviews with SKI3 subjects in question number 3, SKI3 subjects were not careful in writing down what was known and asked on the questions. The subject misunderstood the problem so in the solving step, it was wrong to write the formula used. The triangulation of test answer results and interviews of SKI1 subjects can be seen in the following table 8:

**Table 8.** Triangulation of Test Answer Results and SKI3 Subject InterviewAnalysis of Student Misconceptions

| Test Results Interview Results |
|---|
| 1 a. SKI3 subjects experience calculation misconceptions where the subject is wrong in determining the calculation results and causes the final results given to be wrong. |
| b.`The subject of SKI3 experienced systematic misconceptions due to errors in the resolution steps. |
| 2. The subject of SKI3 experienced a systematic misconception where the subject immediately gave the final result of the |
| a. The subject of SKI3 is less careful in the calculation of division. |
| b. subject SKI3 in a hurry to write down the completion steps to find h(t)max lack of understanding in solving two-factor multiplication of quadratic functions |
| answer |
| 3 a. The subject experiences translation misconceptions because they do not write down the information in the question completely. |
| b. The subject of SKI3 experiences a misconception of strategy where the subject |
| uses the wrong formula. |
| a. The subject of SKI3 is not careful in writing down what is known and asked on the question. |
| b. Misunderstanding of the subject SKI3 in understanding the problem so that it is wrong to write the right formula. |

Based on the triangulation of data in table 8, it was concluded that there was a match between the test results and the interview results on the subject SKI3.

From exposure to all misconceptions experienced by subjects with reflective and impulsive cognitive styles on quadratic function problems, students with reflective cognitive styles experience 4 types

of misconceptions including translation misconceptions because the subject does not write down what is known and ask about the problem completely, calculation misconceptions because the subject has miscalculated, systematic misconceptions because the subject is unable to complete the completion step, and sign misconceptions whereby the subject does not affirm the symbols of mathematical operations.

In subjects with impulsive cognitive styles, subjects experience all types of misconceptions including translation misconceptions due to students' misunderstandings in reading the questions and not writing information on the questions completely, concept misconceptions because the subject is unable to use material concepts appropriately, systematic misconceptions because the subject rushes in writing answers so that they experience errors in solving steps, strategy misconceptions occur because The use of wrong formulas, calculation misconceptions due to errors in translating data for substitution and errors in calculations determine the final result, and sign misconceptions due to errors in understanding the problem. In line with Azmi's research, et. all (2022) said that students' difficulties in solving equation and caudate function problems are that students are unable to apply concepts to solve quadratic function problems. Sinaga (2022) said that students with impulsive cognitive styles are students who can respond quickly but the first response given is often wrong. In addition, children with impulsive cognitive styles will make decisions quickly without thinking about them deeply.

## CONCLUSION

Based on the presentation of research results that have been adjusted to the objectives and formulation of the determined problem, misconceptions experienced by students with impulsive reflective cognitive style class X DKV SMK PGRI Sukoharjo are as follows: Misconceptions that occur in reflective cognitive style students include translation misconceptions, sign misconceptions, systematic misconceptions, and counting

misconceptions. Misconceptions that occur in cognitively impulsive style students occur in all types of misconceptions including translation misconceptions, concept misconceptions, strategy misconceptions, systematic misconceptions, sign misconceptions, and counting misconceptions. The results of this study also showed the type of misconception that is most prevalent in both reflective and impulsive subjects, namely counting misconceptions. The main causes of misconceptions experienced by students are a lack of understanding of the concept of the material and inaccuracy of students in reading questions and writing down solving steps.

Based on research that has been conducted on the analysis of student misconceptions in terms of reflective and impulsive cognitive styles in solving math problems in class X Visual Communication Design (DKV) SMK PGRI Sukoharjo, the suggestions that researchers can give are: (1) To teachers in the learning process, teachers should pay attention and improve students' ability to understand mathematical concepts based on the cognitive styles of students. (2) Other researchers can conduct further research by developing research results by paying attention to every indicator of misconceptions from students in the style of cognitive reflection and impulsive more deeply. In addition, in identifying misconceptions, students can use other types of misconceptions, such as classificational misconceptions, correlational misconceptions, and theoretical misconceptions.

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# THE DEVELOPMENT OF MATHEMATICS MODULE BASED ON ETHNOMATHEMATICS (JALAWASTU CULTURE)

Meli Triani[1], Eka Farida Fasha[2], Sofri Rizka Amalia[3], Anwar Ardani[4]
University Peradaban Bumiayu
melitriani03@gmail.com[1], efaridafasha@gmail.com[2],
sofri.rizkia@gmail.com[3], anwarardani3@gmail.com[4]

*Books are teaching materials that are often used in learning. Existing mathematics books still need to be developed to improve their existence. In addition, students' understanding of culture, especially local culture, is still low. It can be seen from the use of books which have an important role in the development of knowledge and the lack of students' understanding of the local culture of their region. This study aims to describe the procedures for developing mathematics books based on ethnomathematics (Jalawastu Culture) as a new model for learning with interesting concepts and to find out whether the books developed meet valid and practical criteria. The development model used is the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation).*

***Keywords:*** *Development, Ethnomatemtics-Based Mathematics Book (Jalawastu Culture)*

## INTRODUCTION

Indonesia is a unitary state that has a diversity of cultures spread over various islands from Sabang in the west to Merauke in the east, from Miangas in the north to Rote in the south. Indonesia is said to be a multicultural country because the many tribes, languages, religions, cultures, customs, and ceremonies that are still carried out by Indonesian people in certain areas have become a way of life that cannot be underestimated. For the Indonesian people, the cultural aspect is one of the strengths of the nation which has a wealth of diverse values, including local wisdom and traditions that exist in each region.

The existence of national culture and regional local wisdom needs to be developed and preserved to be able to stand firmly side by side with the globalization era which has brought external influences to all aspects of national life. Culture can be one of the aspects affected by globalization because culture is dynamic and can change according to the times (Larasati, 2018: 118). Teenagers and students have great potential affected by globalization, so there needs to be an effort to foster a sense of nationalism so that the younger generation can love and preserve their culture. The period of development of the nation's young generation that needs direction and more optimal character education is junior high school (SMP) students, this is because education and learning level in Junior High School emphasize laying the foundation in preparing generations to become human beings who can face an increasingly tough era. In the development stage, junior high school students are in a period of very rapid development from all aspects, namely the development of cognitive, psychomotor, and affective aspects (Siti Nurbaedah, 2017).

There are also cultural developments side by side with the development of education, so a unifier between the two is needed so that it can be studied by students who indirectly play a role not only as students but also as generations of the nation. An interesting culture-based education is urgently needed for students can be interested in learning as well as getting to know the nation's culture, especially

local wisdom in the area. So that The application of learning in schools can also collaborate with culture so that students can become the successors of a nation that is rich in knowledge and loves culture. This is in line with Zamroni (2016: 87) who argues for the importance of schools having a culture or culture.

One of the lessons in schools that can be collaborated with the nation's culture is learning mathematics. Mathematics is a field of study that is taught in every educational unit. Mathematics is very important to learn because what is learned in mathematics can be useful and can be applied in everyday life in its environment. Besides That, learning mathematics has a close relationship with the context in real life. Mathematics has an important role in everyday life according to (Apertha Putri, Zulkardi, & Yusup, 2018), with the function of mathematics as a means of thinking systematically, logically, and consistently in determining. Anddevelop science and technology to face future challenges in global competition. This is also one of the backgrounds in changing the 2013 curriculum, especially in learning mathematics, Where one must relate it to everyday life or contextual learning in the hope that every student has the skills needed to face this increasingly advanced life.

With culture-based mathematics learning, can be the right strategy to create a learning environment, as well as design experiences Study integrates culture as part of the learning process (Rakhmawati, 2016). The process of practicing mathematical concepts in the learning process with local cultural wisdom is commonly referred to as ethnomathematics. Ethnomathematics is a science or study that is used to understand how mathematics is adapted from a culture. (Richardo, 2016).

As a form of application of local cultural ethnomathematics that is interesting and has unique characteristics namely the culture and customs that exist in the jalawastu cultural village. Jalawastu with its cultural uniqueness makes this village one of the Cultural Villages in Brebes Regency. This is based on cooperation among Jalawastu residents in preserving the culture, traditions, and customs that they

have believed to be passed down from generation to generation. Jalawastu Hamlet was inaugurated as a Cultural Village by the Regent and Minister of Education and Culture of Brebes Regency in 2015.

In the field of learning mathematics in junior high schools, there is several problems were found, such as 1) interest in students' understanding of learning books, one of which is influenced by the appearance and contents of books that are not appropriate for the age group and level of cognitive ability. 2) Mathematics books that are widely used rarely raise the concept of local wisdom and culture. 3) Mathematics books that exist today still need to be developed to improve their existence. Looking at some of the problems in terms of the development of junior high school students related to culture and also existing mathematics learning, it is found a solution for developing ethnomathematics-based mathematics learning (Jalawastu Culture) which is compiled into a book so that it can become a new model in learning with interesting concepts and legibility that can be accepted and easily understood by junior high school students.

In junior high schools, the use of books as learning media is not a new thing anymore, almost all schools use books as learning and teaching media. This shows that books have an important role in the development of knowledge. Books are a source of teaching materials. Knowledge, information, and entertainment can be obtained from books, therefore, books are a mandatory component that must exist in educational institutions, both formal and non-formal educational institutions. According to the Minister of Education and Culture Number 8 of 2016, books are the main source of learning to achieve basic and core competencies and are deemed appropriate by the Ministry of Education and Culture for use in educational units.

Through product development in the form of ethnomathematics-based mathematics books (Jalawastu Culture) in education, especially mathematics education, it is expected that students can master the targeted mathematical abilities without leaving their cultural values, meaning that apart from increasing knowledge and studying mathematics material, students can also preserve culture,

one of which is loved and learns about its culture and is proud of the existing national and regional culture. In this regard, to follow up on the solutions that have been found, and concrete benefits can be obtained, a study about the development of mathematics books associated with the culture of Kampung Jalawastu for junior high school mathematics Learning with the research title namely Development of Ethnomathematics-Based Mathematics Books (Jalawastu Culture).

## METHOD

This study uses the type of research R & D (Research and Development). The product Developed in this study is an ethnomathematics-based mathematics book (Jalawastu Culture) for junior high school students. The book development procedure in this study uses the ADDIE development model which includes five stages consisting of:

### Analysis (Analysis)

This is the stage where the researcher analyzes the need for the development of a mathematics book and analyzes the feasibility and conditions of development. Stages of analysis Which done the author includes three matters that is needs analysis, curriculum analysis, and character analysis of students. In outline the stages of analysis carried out writer are as follows:

Needs Analysis

Needs analysis is carried out by first analyzing the condition of mathematics books as the main information in learning and the availability of mathematics books that support the implementation of a lesson. At this stage, mathematics books will be determined that need to be developed to help students learn. not only learning in the academic field but also learning in cultural aspects and local wisdom. Therefore, math books can adapt to your needs. One of them is an ethnomathematics-based mathematics book with the application of culture in the surrounding environment.

Curriculum Analysis

Curriculum analysis is carried out by taking into account the characteristics of the curriculum being used in a school. This is done so that the development carried out can match the demands of the applicable curriculum. Then the researchers examined Basic Competency (KD) to formulate adjustments to the application of existing culture with indicators of learning achievement.

Student Character Analysis

This analysis was conducted to see students' attitudes towards learning mathematics and culture (especially the Jalawastu culture). This is done so that the development carried out is by the character of the students.

**Design (Design)**

The second stage of the ADDIE model is the design or planning stage. At this stage, an ethnomathematics-based mathematics book (Jalawastu culture) was designed which would be developed according to the results of the previous analysis. Next, the design stage is done by determining the elements needed in the book. Researchers also collect references that will be used in developing material in the book. References in the form of ethnomathematics aspects or elements of the Jalawastu culture are also very much needed by researchers in developing ethnomathematics-based mathematics books.

At this stage, the researcher also compiled additional instruments that would be used to assess the mathematics books being developed. The instrument was prepared by taking into account aspects of book evaluation, namely aspects of format feasibility, readability eligibility, illustration feasibility, and content eligibility. Additional instruments apart from the main instrument, in this case, mathematics books based on ethno-mathematics, are other instruments in the form of book validation sheets and response questionnaires. The book validation sheet is a sheet that contains several aspects of the book's assessment that will be addressed to several validators. The response questionnaire that has been prepared based on research needs will be tested for validity and practicality to obtain a valid and practical assessment instrument.

**Development**

The development stage is the product realization stage. At this stage, the development of the book is carried out by the design stage. After that, the book will be tested for validity and practicality.

Expert Validation

The ethnomathematics-based mathematics book (Jalawastu Culture) that has been produced at the design stage is validated by competent experts to assess and review the book to provide suggestions and input related to the contents of the book which will later be used as a benchmark for revised revisions and improvements to the book. The experts' assessment of the book includes format, readability, illustrations, and contents of the book. Validation was carried out until finally the book was declared feasible to be implemented. At this stage, the researcher also conducted data analysis on the results of the book assessment obtained from the validator.

Book Practicality

The revised ethnomathematics-based math book (Jalawastu Culture) is ready to be tested in schools to see the practicality of math books based on ethnomathematics (Jalawastu Culture). The tryout was carried out by the researchers themselves on the teacher and 5 (five) grade VII junior high school students. It aims to get advice in the field. The trial implementation included filling out a response questionnaire, after the trial was carried out, the data generated was used to revise the ethnomathematics-based mathematics book (Jalawastu Culture).

**Implementation**

Stage fourth is implementation. Implementation is limited to schools designated as research sites. At this stage, the researcher distributed response questionnaires to teachers and students which contained statement items about the use of mathematics books based on ethno-mathematics in learning. This is done to obtain data related to the practical value of using books. In addition, teachers and

students were also asked to provide comments as a reference for the second revision according to the responses of teachers and students. After distributing the questionnaire, the researcher conducted data analysis. The first analysis is an analysis based on the results of the response questionnaire. This analysis was carried out to know the practical value of the developed book. In addition to the practical value, at this stage, an assessment of the effectiveness of the book is also carried out. Effectiveness data was obtained from students' responses to the content and use of books.

**Evaluation**

At this stage, the researcher made the final revision of the ethnomathematics-based mathematics book (Culture Jalawastu) Which was developed based on input obtained from response questionnaires or field notes and validation sheets. It is intended that the books developed are truly appropriate and can be used by a wider range of schools.

## RESULT AND DISCUSSION

### RESULT

The product developed in this study is mathematics teaching materials based on ethnomathematics-based mathematics books (Jalawastu Culture). The book development procedure in this study uses the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). The activities that have been carried out in developing this math book have 5 stages, namely:

1. **Results Analysis (Analysis)**

   The first stage in this research is Analysis, this stage is the stage for analyzing and identifying problems to obtain information related to the book being developed. Information was obtained by conducting interviews and observations of several traditional leaders of the Jalawastu village and several educators. In addition, at this stage, an analysis related to needs analysis, curriculum analysis, and analysis of student characteristics is carried out.

Needs analysis At this stage the researcher conducts a needs analysis to find out information regarding what things can support and what researchers need in the research and development being carried out. In this stage, the researcher also conducted observations and interviews to gather the information needed about the culture of Jalawastu, the state of math books, and matters relating to education in schools.

Curriculum analysis

At this stage, the researcher analyzed the curriculum used at SMP N 4 One-Roof Kenggungan which is located in Jemasih Village, Keuntungan District. This analysis aims to make the basic competencies and achievement of competencies in the book according to the curriculum Which applies. Based on an interview with the school's mathematics teacher on Monday, April 19, 2021, the curriculum used at SMP N 4 One Roof Responsibility is the 2013 curriculum so in preparing the book the researcher used basic competencies and achievement of appropriate competence cultural knowledge of students still needs improvement.

**2. Design Result (Design)**

The second stage of the ADDIE development model is the design or planning stage. At this stage, the researcher begins to design a book that will be developed. There are 4 steps at this design stage, including the preparation of the book framework, collection, and selection of references, initial design, and preparation of book assessment instruments with the 2013 curriculum.

**3. Develop results (development)**

Analysis Character Participant educate Student character analysis activities are focused on class VII. Based on the results of interviews with mathematics teachers, it can be seen that students' knowledge of mathematics in class VII in JUNIOR HIGH SCHOOL Negeri 4 One Roof Liability varies. Some are less knowledgeable, medium, and high. In addition, the majority of students Still do not enough understand local culture and wisdom.

Wrong only one yes That culture Village is Jalawastu Which on located not too far from the village of Jemasih where the SMP was founded. This shows that factors from interest Which different students have towards learning mathematics.

After the book has been compiled and designed, at this stage the researcher conducts a product validation test, which aims to see how far the feasibility of the book that has been designed is carried out. has been designed and compiled and then submitted to the validator to obtain a feasibility assessment, and then the book is revised according to the validator's criticisms and suggestions. Here's how the books look arranged:


Figure 1. Ethnomathematics-Based Mathematics Book (Jalawastu Culture)

The results of the validation of ethnomathematics-based mathematics books (Jalawastu Culture) are as follows:

Product Validation Test Results by Material Experts

Validation by material expert lecturers aims to Forget information, criticism, and suggestions so that the books developed by researchers become quality products through the preparation of good media. Then the results of the data obtained were analyzed and revised the product according to the suggestions. Data regarding the results of the material expert validator's assessment of ethnomathematics-based mathematics books (CultureJalawastu) can be seen in Table 1.

Table 1. Assessment of Material Expert Validators

| Validator | Score average evaluation | Percentage | Category gory |
|---|---|---|---|
| V1 | 4,16 | 83.2% | Valid |
| V2 | 4.48 | 89.6 % | Valid |

Based on the results of the material expert validation, it was found that the validator 1 assessment produced a score percentage of 83.2% and from validator 2 the score percentage was 89.6 %. based on the qualification level of achievement, the results of the validator 1 assessment occupy the achievement level of 80% - 89% in the good category and with the proper description, with revisions according to suggestions. As for the results of the validator 2 assessment, it occupies an achievement level of 89% - 90% in the close to very good category and is feasible with revisions according to suggestions. The close to a very good category is taken because 89.6% is more than the achievement level of 80% - 89% but less than the achievement level of 90% - 100% which is in the very good category with very decent information, does not need to be revised.

So based on the results of the material expert validator's assessment of ethno-mathematical-based mathematics books (Jalawastu Culture) with an average score of 4.32 and a percentage of 86.4% in the valid category, it shows that overall the books compiled are good and it can be concluded that the book is suitable for trial use.

Product Validation Test Results by Media Experts

Product validation by media expert lecturers was carried out before testing the use of media by teachers and students. This media expert validation was carried out to obtain data in the form of validator ratings and responses regarding the feasibility of the product in terms of media aspects. Then the results of the data obtained were analyzed and revised the product according to the suggestions. Data regarding the results of the media expert validator's assessment of ethnomathematics-based math books (Jalawastu Culture) can be seen

in Table 2.

Table 2. Assessment of Media Expert Validators

| validator | Average assessment score | Percentage | Kate gori |
|---|---|---|---|
| V1 | 4,25 | 85 % | Valid |
| V2 | 4,5 | 90% | Valid |

Based on the results of the media expert validation, it was found that the validator 1 assessment, produced a score percentage of 85% and from validator 2 the score percentage was 90%. based on the qualification level of achievement, the results of validator 1's assessment occupy an achievement level of 80% - 89% with a good category and an appropriate description, with revisions according to suggestions. Whereas the results of the validator 2 assessment occupy an achievement level of 90% - 100% which is in the very good category with the description Very feasible and does not need to be revised. So, based on the results of the media expert validator's assessment of Ethno-mathematical-based math books (Jalawastu Culture) with an average of 4.38 and a percentage of 87.5% is in the valid category, indicating that in general the books that have been compiled are very good and it can be concluded that the books are declared good and fit to be used for trials.

## 4. Results of Implementation (Application)

The fourth stage of the ADDIE development model is the implementation stage. After the book Mathematics-basedethnomathematics (Jalawastu Culture) was revised by researchers according to suggestions and input from the validator, the book was declared feasible and valid to be tested. Furthermore, at this stage, the book is applied as follows function in education. In this stage a questionnaire of student and teacher responses who act as learning practitioners is given. This is to find out the feasibility and

usefulness of the compiled book. In addition, the results of distributing the questionnaire are also one of the benchmarks for achieving the practicality of the book. The following are the results of the implementation (implementation) of the practicality test of ethnomathematics-based math books (Jalawastu Culture):

Data on Book Trial Results by Teachers

After doing media validation by material experts and media experts, the product was revised based on comments and suggestions from material experts and media experts. Products in the form of books that have been revised and declared feasible and valid are then tested. Tests on the use of books by teachers were carried out at SMP Negeri 4 One Roof Coverage. The book use test was carried out in a limited trial on Thursday, June 17, 2021. Data regarding the results of assessments and questionnaire responses by teachers towards math books based on ethno-mathematics (Jalawastu Culture) can be seen in Table 3.

Table 3. Results of Assessment and Teacher Response Questionnaire

| **Aspect Evaluation** | **Flat-flat** | **Percenttase** | **Category gory** |
|---|---|---|---|
| Material | 4.0 | 80% | Practical |
| Media | 4.05 | 81 % | Practical |
| Questionnaire Response | 4.05 | 81 % | Practical |

Based on the results of the teacher's assessment as a learning practitioner, it can be concluded that the teacher's assessment of the material aspects produces a score percentage of 80%. the results of this assessment occupy the level of achievement 80% - 89% in the good category and with proper information, with revisions according to suggestions. The teacher's assessment of the media aspect resulted in a score percentage of 81%. the results of this assessment occupy an achievement level of 80% - 89% with a good category and an appropriate description, with revisions according to suggestions. Meanwhile, based on the results obtained from the teacher's response questionnaire sheet, it can be concluded that an average score of 4.05

with a percentage of 81% obtained occupies an achievement level of 80% - 89%, which is in the good category and has a proper description, so it can be concluded that the book that the researcher has compiled feasible and meets practical criteria for use.

Data on Book Trial Results by Students

Tests on the use of books by students were carried out at SMP Negeri 4 One Roof Responsibility class VII. The trial was conducted in a limited manner by randomly selecting 5 class VII students. A limited trial was conducted on Thursday, 17 June 2021. At this stage, students filled out a response questionnaire as data to determine the feasibility and practicality of the book. Mathematics based on ethnomathematics (Culture Jalawastu). The results of the student response questionnaire can be seen in table 4.

Table 4. Student Response Questionnaire Results

| **Student** | **Average** | **Percentage of tase** | **Category gory** |
|---|---|---|---|
| 1 | 4,3 | 86 % | Practical |
| 2 | 4,6 | 92 % | Practical |
| 3 | 4,2 | 84 % | Practical |
| 4 | 4,4 | 80% | Practical |
| 5 | 4.45 | 89 % | Practical |

Based on the results of filling out the student response questionnaire, it shows that of the 5 class VII students of SMP N 4 One Roof of Liability taken as a sample in the research at the book practicality testing stage, it can be concluded that the ethnomathematics-based mathematics book (Jalawastu Culture) developed by researchers is feasible and practical to use as a learning medium.

## 5. Evaluation Results (Evaluation)

The last stage of the ADDIE development model is the evaluation stage. After the ethnomathematics-based mathematics book (Jalawastu Culture) was revised by researchers according to the suggestions and input from the validator and the book was declared feasible both in terms of validity and practicality, then At this evaluation stage it can be stated that research and development of ethnomathematics-based mathematics books (Jalawastu Culture) that have been compiled and designed by researchers can be used as learning media that includes mathematical knowledge based on Jalawastu culture that is unique and interesting to study.

## CONCLUSION

This research develops a mathematics book based on the Jalawastu culture ethnomathematics. The product produced is in the form of an ethnomathematics-based mathematics book (Jalawastu Culture) which is valid and practical both in terms of readability, material aspects, and media aspects so that it can be used for classroom learning. This book can help students to understand the mathematical concepts of comparative material, social arithmetic, quadrilaterals, triangles, and data presentation because it uses the application of jalawastu culture and also the activities of the daily life of society in general. The application of culture that is collaborated with mathematics material, of course, will provide an introduction and understanding to students about the culture that exists in the surrounding environment so that it can have a positive influence on cultivating the character of students who are cultured noble.

There is an ethnomathematics-based mathematics book (Jalawastu Culture) material, sample questions, and practice questions are also provided which are sufficient for understanding concepts regarding mathematics material for grade VII junior high school semester 2.

As for suggestions for using the products developed, the products developed can be used as references and input materials for

teachers in learning mathematics, especially to improve the character of a noble culture. In addition, the development of an ethno-mathematics-based mathematics book (Jalawastu Culture) was only carried out on mathematics material for grade VII junior high school semester 2 so that other researchers are advised to develop an ethno-mathematics-based mathematics book on other materials and levels with the application of other cultures in the surrounding environment.

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# ANALYSIS OF STUDENTS' PERCEPTIONS OF ARTIFICIAL INTELLIGENCE-POWERED CHAT APPLICATIONS IN HIGHER EDUCATION CONTEXT

Mohd Hafiz MD Hanif[1], Singgih Subiyantoro[2]
[1]University Pendidikan Sultan Idris Malaysia
[2]University Veteran Bangun Nusantara Sukoharjo
singgihsubiyantoro@univetbantara.ac.id

*The increasing integration of Artificial Intelligence (AI) technologies in educational settings has raised questions about their impact on students' learning experiences and engagement. The research purpose is to explore how students perceive the use of AI-powered chat applications, identify factors influencing their perceptions, and determine the extent to which they embrace these technologies in their daily academic interactions. A mixed-methods approach was employed, combining surveys and qualitative interviews to gather comprehensive data. The main results indicate that the majority of students exhibit positive attitudes toward AI-powered chat applications. They appreciate the instant support, timely feedback, and round-the-clock accessibility provided by these tools. However, some students expressed concerns about the potential overreliance on AI, the lack of human interaction, and data privacy issues. The qualitative findings also revealed the need for clear*

*communication about the roles of AI-powered chat applications and the importance of maintaining a balance between human and AI interactions. In conclusion, this research highlights the significance of students' perceptions in shaping the successful integration of AI-powered chat applications in higher education. By understanding students' attitudes and concerns, educators and developers can enhance the design and implementation of AI technologies to better cater to students' needs and preferences. This study's academic contribution lies in providing valuable insights into the human-AI interaction in educational settings, fostering discussions about the responsible and ethical use of AI in higher education.*
***Keywords:*** *Artificial Intelligence, AI-Powered Chat Applications, Higher Education, Students' Perceptions, Educational Technology*

## INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force across various industries, and the realm of education is no exception (Chan, 2023; Cooper, 2023). In recent years, the integration of AI-powered chat applications in higher education has garnered increasing attention as a promising means to enhance the learning experience and support students' academic journey (Nguyen et al., 2023; Wang et al., 2023). These applications, driven by advanced natural language processing and machine learning algorithms, offer the potential to revolutionize the way students interact with educational content, institutional resources, and academic support systems.

AI-powered chat applications are intelligent virtual agents that can engage in real-time conversations with users, providing timely responses, personalized assistance, and relevant information (Crompton & Burke, 2023; Wang et al., 2023). They can take various forms, including chatbots, virtual assistants, and AI-driven tutoring platforms. These applications can adapt and improve their responses based on user interactions, leading to increasingly effective and tailored support for individual students.

In the higher education context, these AI-powered chat applications hold great promise for addressing common challenges faced by students. They can offer 24/7 accessibility to academic resources and guidance, reducing the dependency on human availability (Wang et al., 2023; Zia-ud-din et al., 2023). Moreover, these applications can provide instant feedback on academic queries, enabling students to clarify doubts and reinforce their understanding without delay.

The potential benefits of AI-powered chat applications also extend to promoting inclusivity and accessibility in higher education. Through their adaptive capabilities, they can cater to diverse learning styles and accommodate students with different levels of proficiency, ensuring a more inclusive educational experience. Additionally, these applications have the potential to bridge language barriers and improve access to education for non-native English speakers (Wang et al., 2023).

Despite the potential advantages, several crucial aspects of AI-powered chat applications in the higher education context remain relatively unexplored. First and foremost, the extent to which students embrace and utilize these technologies in their academic journey is not yet fully understood. Understanding students' acceptance and usage patterns is essential for designing effective interventions and ensuring seamless integration (Vera & Palaoag, 2023).

Furthermore, the effects of AI-powered chat applications on student engagement and learning outcomes require deeper investigation. While these applications promise personalized and timely support, it is essential to assess whether they genuinely enhance learning experiences or potentially lead to a dependence on AI-driven assistance, thereby limiting critical thinking and problem-solving skills (Alhumaid et al., 2023; Cooper, 2023).

Data privacy and security concerns also loom large, as AI-powered chat applications gather and process substantial amounts of student data. The implications of data usage and the measures in place to safeguard sensitive information warrant closer scrutiny to instill

trust and confidence in these technologies among students and educators alike.

Moreover, the potential impact of AI-powered chat applications on the dynamics of human interaction within the educational environment remains largely uncharted territory. Questions arise concerning the balance between AI-driven support and the irreplaceable value of face-to-face interactions with educators and peers.

Additionally, AI-powered chat applications may introduce disparities in access to education, particularly for students with limited digital literacy or those from marginalized communities (Krügel et al., 2023). Understanding the potential barriers and challenges that certain groups of students may face will be crucial in designing equitable and inclusive educational experiences.

In recent years, AI-powered chat applications have garnered significant attention for their ability to revolutionize the way students interact with learning materials, access academic support, and engage in collaborative learning experiences (Sorin et al., 2023). However, despite their promise, there exists a notable gap in our understanding of the full extent of their impact and implications in the higher education context.

The first aspect contributing to the gap surrounding AI-powered chat applications lies in the limited knowledge of how students truly perceive and interact with these technologies. While studies have explored student attitudes toward AI and educational technology in general, a comprehensive examination of their specific perceptions towards AI-powered chat applications remains scarce. Understanding these perceptions is crucial as they directly influence the adoption and integration of these applications into the learning process. Without a clear understanding of students' attitudes and preferences, it becomes challenging to design AI-powered chat applications that effectively cater to their needs and expectations.

Secondly, the effectiveness of AI-powered chat applications in enhancing student engagement and learning outcomes remains a subject of inquiry. While proponents argue that these applications provide personalized and timely support, critics express concern that overreliance on AI-driven assistance may stifle critical thinking and collaborative skills. There is a need for empirical evidence to shed light on the actual impact of AI-powered chat applications on student learning experiences and academic achievements. Understanding the potential benefits and limitations of these applications is essential to harness their advantages while mitigating any adverse effects they may pose on the learning process.

Furthermore, ethical considerations surrounding data privacy and security present a significant gap in the implementation of AI-powered chat applications. These technologies inherently collect and process vast amounts of student data to deliver personalized support. Yet, the extent to which students are aware of the data usage and the measures taken to protect their privacy remains uncertain. It is crucial to address these concerns transparently to foster trust and ensure that the use of AI-powered chat applications aligns with established ethical standards.

Lastly, the impact of AI-powered chat applications on the dynamics of human interaction within educational environments poses another critical knowledge gap. As these technologies become more prevalent, questions arise regarding the potential displacement of human interaction in favor of AI-driven assistance. Understanding how these applications can complement rather than replace human interactions is pivotal in maintaining a balanced and supportive learning environment.

In light of these gaps, this research aims to bridge the existing knowledge divide by conducting an in-depth analysis of students' perceptions of AI-powered chat applications in the higher education context. By examining these key aspects, we seek to contribute valuable insights that will inform educators, policymakers, and developers in effectively integrating AI technologies into education.

Ultimately, we endeavor to foster responsible and ethical use of AI-powered chat applications, optimizing their potential to enrich the learning experiences of students while addressing their evolving needs and aspirations.

## METHOD

### *Research Design*

The research design for this study is cross-sectional and exploratory. It aims to analyze students' perceptions of artificial intelligence-powered chat applications in the context of higher education at a specific point in time. The cross-sectional design allows for the collection of data from a diverse group of participants, providing insights into a wide range of perspectives and experiences related to the use of AI-powered chat applications.

### *Participants*

Participants for this study are undergraduate and postgraduate students enrolled in various higher education institutions. A purposive sampling method is employed to select participants who have experience with AI-powered chat applications or have had exposure to these technologies during their academic journey. The inclusion criteria involve students from diverse academic disciplines and varying levels of familiarity with AI-powered chat applications. Participants are recruited from different universities to ensure a representative sample.

### *Data Collection*

Data collection involves the use of both online surveys and focus group discussions. The online survey is distributed to a larger sample of participants to gather quantitative data and assess general perceptions and attitudes toward AI-powered chat applications. The survey is designed with a combination of Likert-scale questions, multiple-choice items, and open-ended questions. It covers topics such as students' prior experiences with AI-powered chat applications,

perceived benefits, concerns, and overall acceptance of these technologies in their academic lives.

For the qualitative component, focus group discussions are conducted with a subset of participants selected from the survey respondents. Focus groups provide an opportunity to explore in-depth the participants' opinions, experiences, and reactions related to AI-powered chat applications. The focus group discussions are guided by a moderator using a semi-structured interview format, allowing participants to share their perspectives freely while facilitating group interactions and idea exchange.

***Data Analysis***

Quantitative data collected from the online surveys are analyzed using statistical software. Descriptive statistics are computed to summarize the participants' responses and provide an overview of their perceptions of AI-powered chat applications. Qualitative data obtained from the focus group discussions are transcribed verbatim and analyzed thematically. The data is coded to identify recurring themes and patterns related to students' experiences and attitudes toward AI-powered chat applications. The thematic analysis allows for a deeper understanding of the nuanced views and concerns expressed by the participants.

## RESULT AND DISCUSSION

The survey data revealed that a significant proportion of the participants (78%) reported having prior exposure to AI-powered chat applications in their academic journey. Among these, 45% had used AI-powered chat applications for academic inquiries and support, while 33% had encountered them in non-academic contexts. The participants expressed several perceived benefits of using AI-powered chat applications in higher education. The most commonly reported advantages were instant access to information (64%), timely feedback on academic queries (54%), and personalized assistance (48%). Additionally, 62% of the respondents acknowledged that AI-powered

chat applications enhanced their overall academic experience. Despite the positive perceptions, the survey also highlighted certain concerns and limitations associated with AI-powered chat applications. The most notable concern was related to data privacy and security (42%), with participants expressing apprehensions about the use and storage of personal information. Furthermore, 38% of the respondents expressed concerns about potential overreliance on AI, which they believed might hinder critical thinking and problem-solving skills. Approximately 56% of the participants perceived that the integration of AI-powered chat applications in higher education did not significantly impact their human interactions with educators and peers. However, 34% reported a slight reduction in face-to-face interactions, primarily due to the convenience of accessing AI-driven support at any time.

The focus group discussions revealed that students highly valued the instant and round-the-clock availability of AI-powered chat applications. They emphasized that timely support through these applications enabled them to clarify doubts and receive academic guidance efficiently. Participants appreciated the personalized assistance provided by AI-powered chat applications. The ability of these technologies to adapt to individual learning styles and preferences was acknowledged as a valuable feature that catered to diverse student needs Some participants expressed a preference for human interaction in certain situations, especially when seeking emotional support or engaging in complex discussions. They emphasized that while AI-powered chat applications were useful for basic inquiries, human interaction remained irreplaceable in certain contexts. A subset of participants voiced concerns about the lack of transparency regarding data usage by AI-powered chat applications. They felt the need for clear communication and transparent policies regarding data storage and handling to address privacy concerns adequately. Several participants highlighted the importance of responsible and ethical use of AI-powered chat applications in higher education. They urged educators and developers to consider the

potential impact on students' well-being and learning outcomes while integrating these technologies.

Overall, the results of this study indicate that students perceive AI-powered chat applications in higher education as valuable tools for academic support. The applications' instant accessibility and personalized assistance were particularly valued by students. However, concerns related to data privacy, overreliance on AI, and potential impacts on human interaction warrant careful consideration. The findings call for the responsible integration of AI-powered chat applications in higher education, emphasizing transparency, data security, and the preservation of human interactions to optimize their benefits for student learning experiences.

The findings of this study provide valuable insights into students' perceptions of AI-powered chat applications in the higher education context. The high level of familiarity with AI-powered chat applications indicates a growing trend of their integration in educational settings. The perceived benefits, such as instant access to information, timely feedback, and personalized assistance, align with the potential advantages of AI technologies in enhancing the learning experience. However, concerns regarding data privacy and overreliance on AI call for careful attention to ethical considerations in the development and implementation of AI-powered chat applications. To address privacy concerns, institutions must establish transparent data policies, ensuring that students' personal information is securely handled and protected. The balance between AI-driven support and human interaction emerges as a critical aspect to consider in the integration of AI-powered chat applications. While students value the convenience of instant support, they also recognize the irreplaceable value of human interactions, particularly in addressing complex academic and emotional needs. Striking this balance will be pivotal in optimizing the potential of AI technologies while maintaining a supportive and inclusive learning environment.

## CONCLUSION

In conclusion, this study sheds light on students' perceptions of AI-powered chat applications in higher education, revealing their appreciation of the instant support and personalized assistance these technologies offer. The findings underscore the importance of transparent data policies, responsible integration, and the preservation of human interactions to maximize the benefits of AI-powered chat applications while addressing potential concerns. The study's limitations include the reliance on self-reported data, potential sampling biases, and the focus on a specific point in time. Future research should explore longitudinal perspectives to track students' evolving perceptions over time and investigate the longitudinal effects of AI-powered chat applications on academic achievement and engagement. Based on the analysis of students' perceptions of AI-powered chat applications in the higher education context, the following recommendations are proposed to optimize the integration and use of these technologies:

1. Enhance Data Privacy and Transparency: To address students' concerns about data privacy, educational institutions, and developers should prioritize transparency in data collection, storage, and usage. Clear and accessible data policies should be communicated to students, outlining how their personal information is handled and protected. Moreover, implementing robust security measures and complying with relevant data protection regulations will foster trust in the responsible use of AI-powered chat applications.
2. Promote Responsible and Ethical Use of AI: Educators and developers must prioritize the ethical use of AI-powered chat applications in higher education. Responsible AI development includes avoiding biases in algorithms, ensuring fairness in responses, and being sensitive to cultural and social differences. Additionally, continuous monitoring and evaluation of AI applications should be conducted to identify and address any

potential adverse effects on students' learning experiences and mental well-being.

3. Provide Training and Support for Students: Educational institutions should offer training and support to students on the effective use of AI-powered chat applications. Providing guidance on accessing academic resources, leveraging AI-driven feedback, and understanding the limitations of these technologies will empower students to make the most of the available tools. Additionally, workshops and resources on digital literacy and responsible AI usage can help students navigate the AI landscape responsibly.
4. Conduct Longitudinal Studies: To gain deeper insights into the long-term impact of AI-powered chat applications on students' learning experiences and academic achievements, longitudinal studies should be conducted. Tracking students' perceptions and interactions with AI technologies over an extended period will provide valuable data on their evolving needs and preferences, enabling institutions to make informed decisions for continuous improvement.
5. Foster Collaboration between Educators and Developers: Collaboration between educators and AI developers is essential for creating AI-powered chat applications that align with educational goals and student needs. Engaging educators in the design and development process can lead to more contextually relevant and effective applications. Additionally, open channels of communication between developers and educators will facilitate timely updates and improvements based on feedback from the educational community.

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# ANALYSIS OF CREATIVE THINKING ABILITY WITH THE APPLICATION OF ECOPRINTING IN CULTURAL ARTS AND CRAFT CRAFT SUBJECTS OF CLASS IV STUDENTS AT STATE ELEMENTARY SCHOOL 01 PLOSO JUMAPOLO SUB-DISTRICT, KARANGANYAR DISTRICT, 2022/2023

Puput Amillia[1], Tri Sutrisno[2], Para Mitta Purbosari[3]
University Veteran Bangun Nusantara Sukoharjo
anggitaputri8272@gmail.com[1], trisutrisno@univetbantara.ac.id[2],
paramittapurbosari@gmail.com[3]

*This research is motivated by the ability to think creatively in fourth-grade students at SD Negeri 01 Ploso, Jumapolo District, Karanganyar Regency, which is still not optimal. This can be seen from the learning activities which are still dominant or monopolized by the teacher thus limiting the space for children to be creative and channel their ideas or ideas in developing creativity abilities so that children tend to imitate, lack confidence in their work, and are afraid when doing something new or innovative in creating a work/idea. This study aims to describe the effect of eco-print batik on the ability to think creatively in arts and crafts in elementary schools. The method used is qualitative. The research uses data collection techniques in the form of observation, interviews, and documentation. Based on the results of data analysis, it was concluded that there was an influence from ecoprint batik on students' creative thinking abilities in art learning. Ecoprint batik activities channel all ideas and ideas*

*without limits using various forms of leaves and flowers to produce creative works of artistic value. Making ecoprint batik is one of the attractive safer and environmentally friendly media because the use of synthetic dyes made from chemicals will hurt the environment such as soil, water, and air pollution. This activity is expected to be able to motivate educators to be creative in developing various strategies according to the learning model applied.*
***Keywords:*** *think creatively, eco print*

## INTRODUCTION

Ministry of National Education (2010) says that every creative value is integrated into every learning content taught by students. One of the learning content that is integrated through creativity is Cultural Arts and Crafts (SBdP). Arts and Culture and Crafts (SBdP) has content related to creativity, including dance as a physical exercise, music as a sound exercise, fine arts as an applied exercise, and other skills. Arts learning as stated by Ki Hajar Dewantara (in Susanto Ahmad, 2013: 178) is the most important reason capital to shape students' selves about attitudes and behavior. Overcoming the erosion of character education as one of the strategies for transforming modern education, is the right solution to create a conducive and enjoyable school ecosystem. Enjoyable learning conditions are formed from the pedagogical competence and professional competence of educators, where educators must be able to get to know individual students first so that learning becomes meaningful.

Cultural Arts and Crafts are subjects that provide opportunities for students to be involved in various experiences of appreciation and creativity to produce works in the form of real objects that are beneficial to their lives. In this subject, students interact with objects of craft and technology that are around students, so students indirectly gain creative experience in their lives (Puskur Balitbang, 2007: 2).

Learning Arts and Crafts contributes to students so that they dare to be proud of their own native culture and support them in facing future challenges. This is because competency in this subject is

part of providing students with life skills. Besides that, all cultural arts learning activities are the application of other subjects in producing a work that is formed directly by students so that they can immediately feel the aesthetic experience of working.

Humans have been gifted with abilities. The abilities they have vary. The word able is an adjective that means "Power or being able to do something" while ability means "(1) ability, skill, strength, (2) wealth, (3) absorption". (Department of National Education, Big Indonesian Dictionary, (Jakarta: Balai Pustaka, 2002) pp. 707-708). From this definition, it can be said that ability is being able to do something well. These abilities and skills are needed to find good ideas if someone can be said to have the ability to think. Ability is the power to take action as a result of innate training, the ability shows that an action (performance) can be done now. From the definition of ability above, it can be said that ability is the power to do something that is owned by someone to be shown to others.

According to M. Dimyati in Oding Supriadi, Student Development, (Yogjakarta: PT. Kurnia Kalam Semesta. 2010) p. 114. Thinking is the ability or ability of the soul to connect things that are already known to solve a problem. According to Momon Sudarma's book, Developing Creative Thinking Abilities (Jakarta: PT. Rajagrafindo Persada, 2016) p. 38, thinking is imagination or awareness that is present within a person. John Dewey in Momon Sudarma, Developing Creative Thinking Abilities (Jakarta: PT. Rajagrafindo Persada, 2016) p. 38 says someone who has faith can also be said to be thinking so that he can have an opinion, argue, or act in line with the belief in question. This means that when someone has faith, then that person has also thought about what that belief is. And why does this become a belief because someone has thought about it carefully so that something he believes in is created?

From several expert opinions above, it can be concluded that Thinking ability is the ability, skill, or strength to produce an idea, idea, or opinion that occurs in someone's mind and requires the ability to remember and understand which can be done properly and skillfully

and produces a belief and is used to solve problems.

Children at elementary school age already have the ability or think creatively. Children can usually think of things they have just heard or things they have not seen. This is because their imagination and creativity are developing and they need guidance from others who are more mature. According to Kuper in Samsunuwiyati Mar'at (2006: 175), the notion of creativity is a multiple and multi-dimensional concept, so it is difficult to define operationally. A simple, often widely used definition of creativity is the ability to create something new.

According to Sternberg (2007), a creative definition is someone who can think synthetically, meaning that he can see relationships that others are unable to see, who can analyze his ideas and evaluate the value or quality of his work, can translate theories and things that abstract into practical ideas so that individuals can convince other people about the ideas they will carry out. According to Supriadi in Yeni Rachmawati (2005: 15) states that the notion of creative is a person's ability to give birth to something new, both in the form of ideas and real works that are relatively different from what already exists. Creativity is a high-level thinking ability that implies an escalation in thinking skills, characterized by succession, discontinuity, differentiation, and integration between stages of development.

According to Kuper in Samsunuwiyati Mar'at (2006: 175), the notion of creativity is a multiple and multi-dimensional concept, so it is difficult to define operationally. A simple, widely used definition of creativity is the ability to create something new. The form is human action, through a creative process that takes place in the minds of people or groups of people, creative products are created.

So, based on the definition of the ability to think creatively according to the experts above, it can be concluded that the ability to think creatively is an ability, skill, or power to produce ideas, notions, or opinions or a way to solve original problems that are relatively different from what other people think. thus producing something new

that has never existed before with a process that reflects fluency of thinking, flexibility of thinking, and originality of thinking ideas created by someone well and skillfully. According to Guilford (in Munandar: 2014), the characteristics or 4 traits that characterize the ability to think creatively are fluency, flexibility, and originality.

A product can be considered creative if: 1) the product is new, unique, useful, true, or valuable when viewed from certain needs and 2) is more heuristic, namely showing methods that have never been or rarely done by others before. (Amabile, 1983).

The point is, that the idea or product is new in terms of novelty, unique, and useful in terms of certain needs for the product produced, the word new means that it is original or does not imitate someone else's. What is said doesn't have to be new in its true sense. The resulting product may be a combination of existing things to give birth to something new. then it is heuristic, meaning that the method displayed is still not many people who use it or have never even used it at all.

Ecoprint is a coloring technique that beautifies fabric using natural materials while producing motifs (Herlina et al., 2018; Utaminingsih & Wike, 2019). This technique is a current trend because it is the rising issue regarding environmentally friendly production (Saptutyningsih & Wardani, 2019). This is different from the technique of coloring and printing motifs on fabric which uses artificial materials that can have an accumulative impact on health and the environment with their carcinogenic and dangerous properties. Some examples of artificial materials that are chemically synthesized as derivatives of aromatic hydrocarbons are naphthol, indigo sol, and reason (Atirza & Soewondo, 2018). Natural materials that are often used to produce eco prints include teak leaves (Saraswati & Sulandjari, 2018), sweet potato leaves (Wirawan & Alvin, 2019), and other types of plants that have strong colors (Husna, 2016). A diversity of skills can be obtained by students at school. Various methods can be used to produce ecoprints, one of which is the pounding technique. This method is simple in the ecoprint application

(Arif & Marsudi, 2019).

According to Flint (2008), ecoprint is a process of transferring color and shape directly onto fabric. With eco print, fabric that was originally plain can be given a variety of motifs using plants. This shows that eco-print can attract people's interest in carrying out an activity that is capable of producing something but can also contribute to the environment because products with natural ingredients contain sustainability values or are durable (Elsahida et al., 2019: 6).

Based on initial observations, researchers interviewed class IV teacher Ali Ilyas S.Pd. Researchers found that class IV students' creative thinking abilities, especially in the Arts, Culture, and Crafts subjects, were still relatively low. The teacher said that students have not been able to develop the creative ideas they have in learning arts and culture in particular, so they are still stuck to what the teacher tells them to do without development. Based on the explanation above, the researcher wants this program to be a gradual answer to the needs of elementary school educators, to develop creative values through one of the activities in applying ecoprinting techniques in various media as one of the themes in the Arts, Culture and Crafts subject. Apart from that, this activity can be used as a forum for educators to develop their abilities and competencies in designing Arts, Culture, and Crafts learning activities outside the classroom that support the framework of strengthening the creative values of elementary school students. It is hoped that this activity will be able to arouse the motivation of educators to be creative in developing various strategies according to the learning model being implemented.

Based on the description above, researchers are interested in researching "Analysis of Creative Thinking Ability with the Application of Ecoprinting in Arts, Culture and Crafts Subjects for Class IV Students at State Elementary School 01 Ploso, Jumapolo District, Karanganyar Regency, 2022/2023". Through this eco-print batik activity, students are expected to be able to create an interesting work with various motifs from flowers and leaves. Of course, children are free to choose which flowers and leaves the child wants. Apart

from that, ecoprint batik has never been used so it is an innovative activity in elementary schools using materials that are attractive to students and easy to obtain.

Based on the background stated above, the author can draw the following problems: How are students' abilities to think creatively with the application of eco-printing in the 4th grade Cultural Arts and Crafts subjects at Elementary School 1 Ploso, Jumapolo District, Karanganyar Regency in 2022/2023? What are the obstacles that arise in the implementation of eco-printing in the 4th grade Cultural Arts and Crafts lessons at 1 Ploso Public Elementary School, Jumapolo District, Karanganyar Regency in 2022/2023?

Based on the problems stated above, the objectives of this study are as follows: To describe students' ability to think creatively through the application of eco-printing in the 4th grade Cultural Arts and Crafts subjects at Elementary School 1 Ploso, Jumapolo District, Karanganyar Regency in 2022/2023. As well as analyzing the obstacles that arise in the application of eco-printing in the 4th grade Cultural Arts and Crafts subjects at 1 Ploso Elementary School, Jumapolo District, Karanganyar Regency in 2022/2023.

The benefits of this research can add insight and broader knowledge about education by thinking creatively for elementary school children. Through the application of ecoprinting, it will also add new variations to learning media in Arts, Culture, and Crafts subjects.

## METHOD

This research uses a qualitative descriptive research method, namely by describing a phenomenon that occurs and collecting complete information using research procedures through observation, interviews, and documentation.

The strategy used in this research is a case study. Case studies are a choice of research objects, not a methodological consequence (Stake in Ratna, 2016: 191). With a research strategy in which the researcher carefully investigates an event or activity, and the

researcher collects complete information using various collection procedures based on a specified time.

According to Sugiyono (2016: 225), primary data is a data source that directly provides data to data collectors. Primary data sources were obtained through interviews with research subjects and by observation or direct observation in the field. In this research, the primary data collected in this research is data from observations observing students with creative thinking abilities in eco-printing activities as a medium for knowing students' creative thinking abilities. Results of interviews with grade 4 teachers at Public Elementary School 1 Ploso, Kec. Jumapolo, Kab. Karanganyar about how creative students think in class and outside of class when participating in learning Arts and Crafts. Each question has been made according to indicators of creative thinking. According to Guilford (in Munandar, 2014) as strengthens the results of students' creative thinking abilities.

Secondary data sources in this research come from books, research reports, journals, articles, and several other documents that are relevant to the discussion in this research.

Data analysis in qualitative research was carried out before entering the field, and after in the field. Data analysis is more focused during the process in the field along with data collection. For test data, use the following formula:

$$\text{Percentage of Each Indicator} = \frac{Respondent\ Answering\ Accroding}{Total\ number\ of\ responding} x\ 100\%$$

With this, it is calculated per indicator to get a percentage that shows students' ability to think creatively. Then it is interpreted in the form of a sentence with the following criteria:

Table 1. Criteria for Creative Thinking Ability

| Presents | Category |
|---|---|
| 76% - 100% | Good |
| 56% - 75% | Enough |
| 41% - 55% | Not good |
| 0% - 40% | Not good |

Researchers measure students' creative thinking abilities using creative thinking indicators according to Guilford (in Munandar, 2014).

Table 2. Indicators of Creative Thinking Ability

| No. | Indicator | Deskription |
|---|---|---|
| 1. | Fluency | Sparking lots of ideas, lots of answers, lots of problem-solving, lots of questions smoothly. |
| 2. | Flexibility | Generate varied ideas, answers, or questions. |
| 3. | Elaboration | Able to enrich and develop an idea or product. |
| 4. | Originality | Able to give birth to new and unique expressions. |

The data analysis technique used is based on the opinion of Miles & Huberman in their book Qualitative Data Analysis: A Sourcebook of New Methods, namely flowing analysis, this is because the flowing analysis can be used in case study research ("Guidelines for Writing Theses and Scientific Articles," 2019).

## RESULT AND DISCUSSION

### RESULT

Based on the results of observations, interviews, and documentation conducted with grade IV teachers and 18 grade IV students for approximately 1 week relating to the Analysis of Creative Thinking Ability with the Application of Ecoprinting in the subject of Cultural Arts and Crafts Grade 4 Students at Elementary School 01 Ploso district Jumapolo, Kab. Karanganyar for the 2022/2023 Academic Year, the following data was obtained:

Based on the results of the class IV teacher's interview on June 6, 2023, he revealed that every child has a different and varied tendency to think creatively, obtained from the following interview results: "I see that there is a student's ability to think creatively. The creative level of each student is certainly different, not only seen in the differences between female and male students. For example, in terms

of coloring or choosing colors, each child has a different level of preference. But women indeed tend to be more dominantly creative in terms of arts culture and crafts. You could say it's more colorful and brighter." (Interview with Mr. Ali Ilyas, S.Pd, on June 8 2023).

This is evidenced by the results of student questionnaire sheets on indicators of creative thinking in doing eco-printing assignments, that 15 out of 18 students were able to complete assignments with varying creative levels, on time, innovatively. However, there were 3 out of 18 students who faced various obstacles. Evidenced by the answers to the questionnaires from students after doing ecoprinting practices.

Research data is also supported by creative thinking indicator data according to Guilford (in Munandar, 2014) which researchers managed from the results of filling out or answering questionnaires and from the results of the practice of making eco-print batik for fourth-grade students of Elementary School 01 Ploso, as follows:

Table 3. Data on Creative Thinking Indicators

| No | Indikator Creative Thinking | Rating result | |
|---|---|---|---|
| | | Meet the criteria | Not yet Meet the Criteria |
| 1 | *Fluency* | 18 | 0 |
| 2 | *Flexibility* | 13 | 5 |
| 3 | *Elaboration* | 16 | 2 |
| 4 | *Originality* | 12 | 6 |

From the data table above the researcher can conclude that there are 10 out of 18 students who meet all indicators of creative thinking. Further discussion includes the first, namely fluency or thinking ability, for this stage the researcher described that 18 out of 18 students, or the entire class IV students at State Elementary School 01 Ploso were able to generate ideas and ask many questions fluently to the supervisor, understanding the questions. or material provided by the teacher when explained, and students can answer more than one

answer. Second, flexibility or flexibility of thinking, at this stage 13 out of 18 students were able to produce varied answers and ideas, as seen during the practice of making ecoprints, 13 out of 18 students did not need a long time to think about the kopen they were making, so they were quickly and swiftly able to realize it. ideas you have to put into practice. Third, elaboration, namely the ability to develop ideas and add or detail details of an object, idea, or situation so that it becomes more interesting (Munandar, 2014). From the data above, 13 out of 18 students were able to create new and interesting detailed ideas, so when practicing eco print, students carried out lots of ideas and interesting concepts, the results were beautiful because the concepts were arranged beforehand, and interesting too. The fourth is originality or originality, 12 out of 18 students can or can give birth to something unique and new, making good and unusual combinations, Researchers can conclude this because when collecting data from observation to practice students have increased data expressing statements, the ideas conveyed will be better, new, unique and interesting.

From the questionnaire given to students, the level of fluency in thinking, flexibility, elaboration, and originality has been formed little by little in these students. From the description above, students are quite creative in completing eco-printing work in art and culture subjects, although there are still some students who do not understand the method or how to do it. This shows that students who are creative in completing the task are students who can fulfill indicators of creative thinking in the process of completing the application of eco-printing in learning arts and crafts.

## DISCUSSION

According to Supriadi in Yeni Rachmawati (2005:15), the definition of creativity is a person's ability to give birth to something new, either in the form of an idea or a real work that is relatively different from what already exists. Creativity is a high-level thinking ability that implies an escalation in thinking ability, characterized by

succession, discontinuity, differentiation, and integration between stages of development.

In essence, creative thinking is closely related to the discovery of something new, as stated by Harriman (2017, p. 120) who states that creative thinking is thinking that tries to create new ideas. However, creative thinking also involves a systematic process to achieve novelty.

The ability to think creatively in grade IV students at Public Elementary School 01 Ploso shows a good creative level. When viewed from the indicators of creative thinking, it has sufficient value. Researchers measure students' creative thinking abilities using indicators of creative thinking according to Guilford (in Munandar, 2014). Firstly, from the level of fluency in thinking/fluency, 18 out of 18 or all of the fourth-grade students were mostly able to generate many ideas, and many answers, solve many problems smoothly, and were able to think of more than one answer. At the second level of flexibility, class IV students can produce varied ideas, answers, or questions, and can see different points of view. Look for many alternatives or different directions. The third is the level of elaboration, namely, students can enrich and develop a new idea or product, Students are also able to add or detail the details of an object, idea, or situation so that it becomes more interesting. The last one is the level of originality, students can create new and unique expressions, can think of ways that are not commonly found, and can create combinations.

Because the characteristics of creative thinking are that they must meet the cognitive and affective aspects as expressed by Susanto (2016, p. 102), the characteristics of creative students can be viewed from two aspects, namely the cognitive and effective aspects. The cognitive aspect is related to the ability to think creatively or divergently, which is characterized by the presence of certain skills, such as fluent thinking skills, flexible/flexible thinking, original thinking, detailing skills, and assessment skills. The more creative a person is, the more these characteristics become attached to him. The

affective aspect is that which is more related to a person's attitudes and feelings, which are characterized by various feelings, such as curiosity, imaginative/fantasy, courage to take risks, respect, self-confidence, and openness to new experiences.

The research was supported by the results of a questionnaire given by researchers to 18 fourth-grade students at the Ploso 01 State Elementary School, which all students answered after implementing the eco-printing practice. From the questionnaire, the researcher concluded that the creative level of fourth-grade students at the 01 Ploso State Elementary School could think creatively according to Guilford (in Munandar, 2017) which was sufficient or close to sufficient with indicators of creative thinking through the application of ecoprinting in arts, culture and crafts subjects. However, there are still some students who do not understand the question in question or the concept of ideas that have not yet been developed. However, it can be concluded that the majority are capable and have passed the assessment according to the creative thinking indicators that the researchers took from the creative thinking guidelines according to Guilford (in Munandar, 2017)

According to Uno & Mohamad (2017, pp. 154-156) there are several factors inhibiting creative thinking which include: 1) being lazy to think, act, try and do something; 2) impulsiveness, namely an attitude when someone acts without thinking about the consequences of what they do; 3) underestimate other people's work; 4) easily give up, get bored quickly, can't stand the test; 5) too quickly satisfied; 6) not daring to take risks; 7) and no self-confidence (Uno & Mohamad, 2017, pp. 154-156).

The implementation of the Arts, Culture, and Crafts learning process which is not yet supported by supporting facilities and infrastructure and some teachers who lack teaching materials can be the root of the emergence of barriers or obstacles in students' creative thinking processes.

During the eco-printing work in class IV, several students experienced some minor obstacles or problems in the work. From the

results of interviews with class IV teachers, there were several obstacles faced by students in learning arts and culture and crafts, especially in creative thinking, including not understanding in depth the tasks given, and not being able to create ideas in completing the tasks given. Not knowing the method for completing the assignment at hand, hinders students in collecting or completing assignments, this is by the results of interviews conducted by researchers with class IV teachers.

When practicing applying ecoprint, students experienced the biggest obstacles, namely when choosing the concept of ecoprint batik to be made, such as not being organized in arranging the flowers and leaves they wanted, so there were still many people who asked questions and needed input from their supervisors. Second, when hitting the leaves with a hammer on a cloth that has been coated with plastic, there are holes in them because you hit them too hard, there are also some that don't print, because some of the leaves and flowers don't have the color to come out.

From the statement above, the researcher concluded that some students only understood when the teacher explained the material and questions, but when faced with problems, students had some difficulty solving them.

Many factors also influence students' creative thinking abilities, including different learning styles. Learning style is the easiest way for individuals to absorb, organize, and process information. Because in essence, an appropriate learning style is the key to student success in learning. Therefore, in learning activities, students need to recognize the learning style that suits them so that learning goals can be achieved effectively, especially in the creative thinking process.

De Porter & Hernacki (2009: 110) suggest that a person's learning style is a combination of how he absorbs and then organizes and processes information. Furthermore, Munir (2008: 159) believes that a learning style is a characteristic or method used by someone to obtain or process information or knowledge in a learning process.

Samples (2002: 146) also expressed the same thing that learning style is the way we prefer to process experience and information.

There are several types of learning styles that students have. This is due to the characteristics of students who are different from each other. According to De Potter & Hernacki (2009: 116), learning styles can be classified into three, namely visual learning styles, auditory learning styles, and kinesthetic learning styles.

Learning style is a variable that concerns the way students understand lessons at school. In the school environment, some students prefer their teachers to teach by writing everything on the board, that way they can read and then try to understand it (visual learning style). Some students prefer their teachers to teach by conveying it orally and they listen to understand it (auditory learning style). Meanwhile, some students prefer to form small groups to discuss questions related to the lesson (kinesthetic learning style). (According to De Potter & Hernacki (2009: 116)).

So learning style is the most preferred, most dominant way in the learning process, where students can receive, absorb, organize, and process the information they get.

It can be concluded by researchers that the creative thinking process of students in learning arts and culture and crafts for class IV students at the 01 Ploso state elementary school, has several obstacles or barriers. Moreover, the lack of infrastructure, lack of understanding, or explanation given by teachers to students, increasingly means that students cannot think creatively evenly. Then, with the differences in students' learning styles, teachers often forget that students do not have the same learning styles even though they are at school or even sitting in the same class, a person's ability to absorb and understand lessons is different levels, some are fast, some are medium and fast. also slow. Because they often have to take different ways to understand the same information or lesson. Therefore, the learning style that students have influences the level of students' creative thinking.

## CONCLUSION

Based on the results of research on Creative Thinking Ability with the Application of Ecoprinting in Arts, Culture, and Crafts subjects for grade 4 students at State Elementary School 1 Ploso District. Jumapolo, Kab. Karanganyar Academic Year 2022/2023, can be concluded as follows:

The creative thinking ability of class IV students at State Elementary School 01 Ploso shows a good level of creativity. If we look at the indicators of creative thinking according to Guilford (in Munandar, 2014) that researchers manage, they have sufficient value. From the student creative thinking indicator questionnaire, the researcher concluded that the creative level of fourth-grade students at State Elementary School 01 Ploso had sufficient creative thinking abilities and/or close to sufficient creative thinking indicators through the application of eco-printing in arts and culture and crafts subjects. Although there are still some students who do not understand the question in question. However, it can be concluded that 15 of the 18 fourth-grade students at State Elementary School 01 Ploso were capable and passed the assessment according to the creative thinking indicators according to Guilford (in Munandar, 2014), namely fluency of thinking (fluency) 100%, flexibility of thinking (flexibility) 83%, elaboration 88%, and originality 66%.

Constraints faced by students in the process of creative thinking in learning arts and crafts in grade IV public elementary school 01 Ploso have several obstacles or obstacles. Especially with The lack of infrastructure, lack of understanding, or explanations given by the teacher to students, increasingly makes students unable to think creatively evenly. Then, with the differences in student learning styles, teachers often forget that students do not have the same learning style even though they are in school or even sit in the same class, a person's ability to absorb and understand lessons is definitely at different levels, some are fast, medium and some are also slow.

The solution or effort to overcome these obstacles or obstacles is by way of the teacher appreciating the ideas submitted by students,

the teacher can stimulate student creativity when learning, the teacher must recognize student learning styles that are different from each other, the teacher is more creative in making teaching media, namely by the use of innovative learning models. Teachers are required to be able to improve the quality of learning through learning innovations, such as visual aids, innovative learning models, and effective teaching methods or strategies. The ideal teacher is a teacher who can choose innovative learning models to make students excited about learning. Through the application of innovative learning models or the use of various visual aids, the learning atmosphere will be more student-centered. And the school should complete the facilities and infrastructure to support learning.

Based on the results of this research, the suggestions that researchers can convey are as follows. For Principals, Principals and teachers hold meetings for counseling and direction to teacher educators regarding better methods, concepts, teaching materials, and learning media used in the learning process, especially in improving students' creative thinking abilities, as well as completing facilities and infrastructure that are not yet available. There is.

Teachers are advised to further increase their creativity in teaching, be able to use various models, methods, and learning media that are sufficient to improve students' thinking abilities, and be able to recognize students' learning styles. As well as encouraging teachers to continue to develop and innovate learning that attracts students' interest in learning so that the development of creative thinking abilities continues to increase.

Students are advised to further increase their motivation to study arts and culture and crafts subjects to hone their creative abilities to further advance and develop in the future. Students are also expected to be able to understand their appropriate learning styles in improving their creative thinking abilities.

Parents are advised to always motivate their children by guiding and improving their children's learning, rewarding their children's learning efforts, providing a comfortable and conducive learning

environment, and facilitating it. Parents also need to know each individual's learning style, so they can provide learning assistance that suits their needs.

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# ANALYSIS OF THE ABILITY TO THINK CREATIVELY WITH THE APPLICATION OF ECOPRINTING IN THE SUBJECT OF CULTURAL ARTS AND CRAFTS IN GRADE IV SDN 01 PLOSO, JUMAPOLO, KARANGANYAR IN 2022/2023

Putri Nur Zuhroh
putrinz732@gmail.com

*This study aims to determine the types of student errors in solving statistical problems based on Watson's error categories in class X.2 students at SMA Negeri 1 Polokarto in the 2022/2023 academic year. This research uses a descriptive method with a qualitative approach. As a source of data, students in class X.2 of SMA Negeri 1 Polokarto were given a written test on statistics and an interview. The subjects of this study were 3 students. Data collection was carried out using written tests, interviews, and documentation. Data validity was carried out by data triangulation, namely by comparing the results of written tests and interviews. The data analysis technique used according to Miles and Huberman includes data reduction, data presentation, and conclusion. Based on the results of the study, it was shown that subjects with high initial abilities made 6 errors based on the Watson category, making 2 errors including missing data and skill hierarchy problems, then subjects with initial abilities made 6 errors including inappropriate data, inappropriate procedures, lost data, response level conflict, skill hierarchy problems, and in addition to the seven categories above,*

*while subjects with low initial ability made 8 mistakes including improper procedure, lost data, lost conclusion, response level conflict, and 3 errors other than the seven categories above.*
***Keywords:*** *Error Analysis, Statistics, Watson Category*

## INTRODUCTION

Education plays a very important role in human life to realize changes towards the progress and welfare of a nation so that education cannot be separated from human life and life (Apriliani, 2019: 1). The notion of education is very closely related to the notion of teaching, so it is difficult to separate and distinguish. Education cannot be carried out without teaching, and teaching will be meaningless without being directed to the purpose of education. According to Mubarok &; Zahroh, (2018: 38) learning is essentially a process of interaction that occurs both directly and indirectly, directly carried out through face-to-face and indirectly, namely by using learning media.

Mathematics is an important element in our lives, so learning mathematics is very necessary. Mathematics is one of the most important fields of study taught in schools. According to Hidajat, et al. (2018: 16) mathematics is a science that studies known quantities through a process of calculation and measurement and about organized structures. Given that mathematics has several units that are interconnected, what is important in learning mathematics is a person's ability to solve problems, in this case, mathematics requires reasoning skills to learn it (Fitriani, 2019: 10). The importance of learning mathematics is inseparable from its role in various aspects of life.

Statistics is one of the topics in mathematics learning that must be shared with students in educational units since junior high school / MTs. According to Sudjana (2020), Statistics is a science that studies ways to collect, analyze, present, and interpret data. Statistics is also a science related to decision-making based on data. In this study, the statistics in question lead to statistical problems for high school / vocational students, namely related to frequency distribution tables, histograms, measures of data concentration (mean, median, and

mode), data location sizes (quartiles and deciles), and data distribution measures (range, overlay, intersection).

One theory for analyzing mistakes made by students in solving problems is an analysis using Watson error categories. It is said to be the Watson criterion because the formulator of this criterion is John Watson. John Watson is a pure behaviorist because his study of learning is aligned with other sciences such as physics or biology which are very oriented towards empirical experience alone, namely the extent to which it can be observed and measured. According to Watson (Pramita, 2020: 27) there are 8 categories of errors in doing the problem, which are as follows: (1) Inappropriate data (id), (2) Inappropriate procedure (ip), (3) Missing data (omitted data/od), (4) omitted conclusion (oc), (5) response level conflict (rlc), (6) indirect manipulation (im), (7) skill hierarchy problem (ship), and (8) in addition to the seven criteria above (above other / ao).

Based on the findings of several previous studies that examined students' errors in doing math problems analyzed using the Watson category, it can be seen that doing math problems, especially statistical material, remains a challenge for many students. Based on the findings of research conducted by (Jannah: 2015) show that highly capable subjects commit improper procedure errors and skill hierarchy problems. The capable subject is committing improper procedure errors, missing data errors, manipulation errors, and hierarchy problem errors. Mistakes made by subjects with low ability in solving trigonometric equation problems are another category of errors that are not giving answers, which are caused by the lack of skills possessed by students. Based on a study conducted by (Febriana: 2014) it is known that the most common mistakes made by students are skill hierarchy errors before 35.79% caused by students being wrong in pouring algebra ideas and less careful in calculations, missing conclusion errors by 31.05% caused by students forgetting not to write conclusions, not understanding the questions in the questions, and less careful when reading question commands.

The results of the study above show that there are many variations in the types of mistakes made by students in solving math problems. According to Widiyanti al (2015: 2-3), errors are the main source of finding out students' difficulties in solving math problems, these errors do not occur by chance but mistakes made when using and applying steps to solve math problems. With the Watson category, student errors in solving problems will be easily analyzed. According to Winarsih et al. (2015: 13), each of these error categories has indicators such as table 1.

**Table 1. Error indicators according to Watson**

| Error Type | Error Indicators |
|---|---|
| Incorrect data | • The formula or principle used is incorrect (wrong formula)<br>• Do not use the data it should be<br>• Error entering data into variables. |
| Improper procedure | • Using inappropriate ways to solve problems<br>• Not writing steps that are appropriate to the problem<br>• Not writing down the steps that will be used in solving the problem. |
| Data lost | • Missing one or more data from the learner's response, resulting in incorrect completion. |
| Missing conclusions | • Do not use data that has been obtained to make conclusions from the answer to the problem. |
| Response level conflict | • Lack of response in understanding the meaning of the question. |
| Indirect manipulation | • The right answer is obtained by using simple reasons and not using the right way |
| Skill hierarchy problems | • Making mistakes in expressing algebraic ideas<br>• Making mistakes calculating. |
| In addition to the seven types of errors | • Write answers that do not match what is requested in the question<br>• Rewrite the question<br>• Do not write the answers on the answer sheet |

The subjects in this study were students of grade X.2 SMA Negeri 1 Polokarto, Sukoharjo Regency. Based on the results of observations and interviews with mathematics subject teachers, it is necessary to research to find out the location of student errors in solving statistical problems by using the Watson error category so that later teachers can find out the errors experienced by students in statistical material so that they can achieve the planned learning goals.

Because there has never been a similar study conducted at SMA Negeri 1 Polokarto, for this reason, researchers want to examine the mistakes of students in solving statistical problems using the Watson category. This study aims to find out what mistakes and causative factors students make in solving statistical problems and try to find solutions to overcome errors.

## METHOD

This research is descriptive research with a qualitative approach. According to Arikunto (2013: 3) descriptive research is research intended to investigate circumstances, conditions, or other things (events, situations, and activities) whose results are presented in the form of research reports. The data collection technique in this study is to use a written test in the form of essay test questions consisting of 5 branched questions, then an interview method conducted with representatives of students who have errors in doing questions according to the category of ability to do the test. Learners are shown their test answers and then given several questions related to the test answers that students have done. And also documentation to collect the required data and know the authenticity of the data.

The data validity technique used in this study is triangulation. According to Moleong (2011: 330), triangulation is a technique of checking the validity of data that utilizes something other than the data for checking purposes or as a comparison to the data. Triangulation is a triangulation technique to test the credibility of data done using checking data against the same source with different techniques i.e. tests and interviews. Data analysis from test results is

checked with interviews so that it can be used as a comparison and complement to strengthen the research data. If the data credibility test with these two techniques produces different data, then the researcher conducts further discussions with the data source concerned to ascertain which one is considered correct (Sugiyono, 2016: 274).

In this qualitative research, data was analyzed using the Miles and Huberman model (Muhadjir, 2018: 84) through three stages, namely: (1) Data reduction, (2) Data presentation, and (3) Conclusion drawing/verification. The presentation of data in this study is to present a written data description with tables so that the data is organized, to more easily understand and answer problems. Conclusions are obtained from the results of student work that is the subject of research and student learning style questionnaires.

## RESULT AND DISCUSSION

### RESULT

This research was conducted in the even semester on grade X.2 students at SMA Negeri 1 Polokarto, the research was conducted by testing the description questions about statistical material. The number of students in this study was 33 people and the description questions used in this study amounted to 5 branching questions related to statistical material. The interview technique chosen is a semi-structured interview.

The questions used in the form of basic questions can then be developed based on needs. In this study, researchers took 3 subjects using the purpose sampling technique which was chosen based on several considerations, namely the number of errors made on each question in answering the test, consideration with subject teachers, openness, and fluency in oral communication. The students who meet these criteria will be described in tables 2 and 3:

**Table 2. Number of Student Errors on Written Tests**

| Num | Initials | Gender | Number of Mistakes Made for Number Question | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| 1 | VAS | P | - | - | 1 | 1 | - |
| 2 | DAM | P | - | 3 | 2 | - | 1 |
| 3 | TB | L | - | 4 | 2 | 1 | 1 |

**Table 3. Student Encoding**

| Num | Initials | Test Scores | Information |
|---|---|---|---|
| 1 | VAS | 82 | High initial capability (low error) |
| 2 | DAM | 64 | Medium starting ability (medium error) |
| 3 | TB | 38 | Low initial capability (high error) |

## DISCUSSION

### Subject Error Analysis High Initial Ability Group (Low Error)

**a.)** Subject VAS

1.) Question number 3b

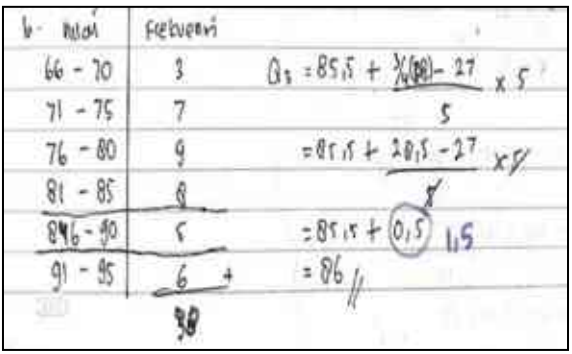


Figure 1. Written Test Answer Subject VAS Question Number 3b

Based on the answer of the VAS subject in question number 3b in figure 1, the VAS subject carried out the category of errors in the skill hierarchy problem because, at

the end of the calculation, there was a calculation error that had an impact on the final result and caused the VAS subject's answer to question number 3b to be wrong.

Based on the results of interviews with VAS subjects in question number 3b, VAS subjects made mistakes in skill hierarchy problems whereas in question number 3 part b VAS subjects made mistakes in calculating deductions at the end of determining the value of the third quartile. That should be 28.5 – 27 = 1.5, but the VAS writes 0.5 so the final result of determining the third quartile is wrong.

2.) Question number 4

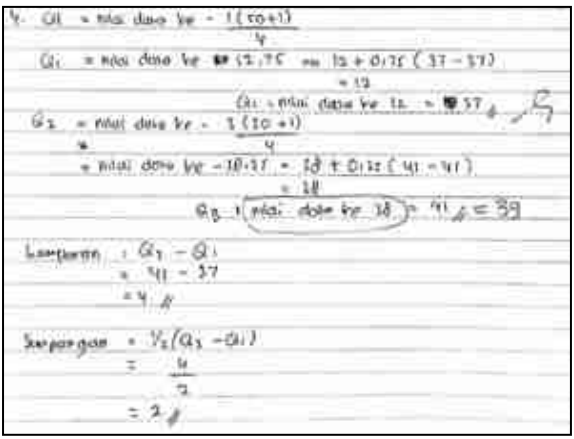

Figure 2. Written Test Answers Subject VAS Question Number 4

Based on the answer of the VAS subject in question number 4 in figure 2, the VAS subject performs a missing data error category because, in the determining part of the third quartile, there is an error in determining the value of the data so it has an impact on determining the value of overlay and deviation and causes the VAS subject's answer to question number 4 to be wrong.

Based on the results of interviews with VAS subjects in question number 4, VAS subjects made missing data errors whereas in question number 4 VAS subjects made mistakes in determining the 38th data value in the third quartile. The supposed value of the 38th data is 39 but the VAS writes 41 causing the results to determine the overlay value and the quartile deviation is wrong.

Triangulation of test answer results and VAS subject interviews can be seen in table 4 below:

**Table 4. Triangulation of Test Answer Results and VAS Subject Interviews**

| Num Question | Learner error analysis | |
|---|---|---|
| | **Test Results** | **Interview Results** |
| 3b | VAS subjects err skill hierarchy problems by incorrectly determining the calculation results and causing incorrect final results. | VAS subjects are not careful in calculating subtraction on the problem so it is categorized as an error in the skill hierarchy problem. |
| 4 | VAS subjects perform categories of missing data errors due to data inaccuracies and lack of accuracy in solving problems. | VAS subjects make mistakes in determining data in the middle of calculations, causing the final answer to be wrong and categorized as missing data errors. |

Based on table 4 above, a match was obtained between the results of the written test and the interview on VAS subjects.

**Subject Error Analysis Medium Initial Ability Group (Medium Error)**

a.) Subject DAM

1.) Questions number 2a and 2b

Figure 3. Written Test Answers DAM Subject Questions Number 2a and 2b

Based on the answers of the DAM subject to question number 2 in figure 3, in question number 2 part a the procedure is incorrect, and the response level conflicts. The DAM subject performs the category of improper procedure errors because the section determining the mean, median, and mode does not use formulas or improper means. For the conflict level response error, the DAM subject immediately wrote the answer without any formula or right way, causing the DAM subject's answer to question number 2a to be wrong. Then for question number 2 part b the subject of DAM performs categories of improper data errors in addition to the seven categories. The cause of incorrect data is because, at the time of determining the mode, the subject uses incorrect data that is substituted into the formula. Meanwhile, in addition to the seven categories above, DAM subjects did not complete the answers as asked in the questions.

Based on the results of interviews with DAM subjects in question number 2a, subjects admitted to making incorrect procedural errors and response level conflicts due to forgetting formulas so they used inappropriate fast methods/procedures and also wrote direct answers without formulas. Then, for question number 2b, DAM subjects admitted that they were confused and did not understand the mean, median, and mode formulas for group data. This causes the subject to choose the wrong interval location so that incorrect data is obtained and also the problem is not solved optimally.

2.) Questions number 3a and 3b

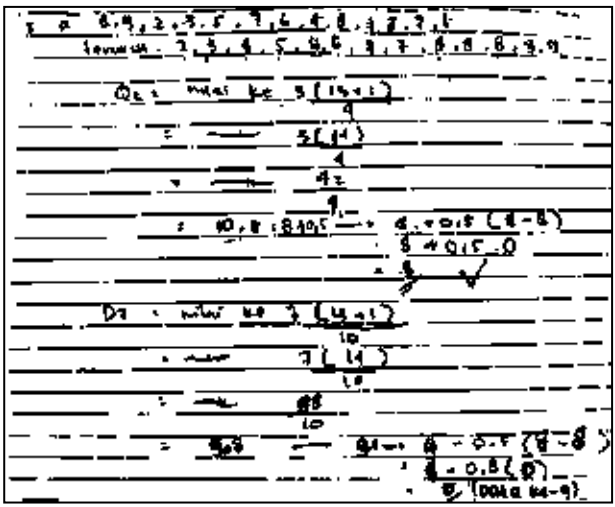

Figure 4. Written Test Answers DAM Subject Question Number 3a

Based on the written test answers of DAM subjects on question number 3 in Figure 4, for question number 3 part DAM subjects perform the category of missing data errors. The DAM subject performs the missing data error category because at the end of the final determining the value of the 9th data on the seventh decile is not spelled out.

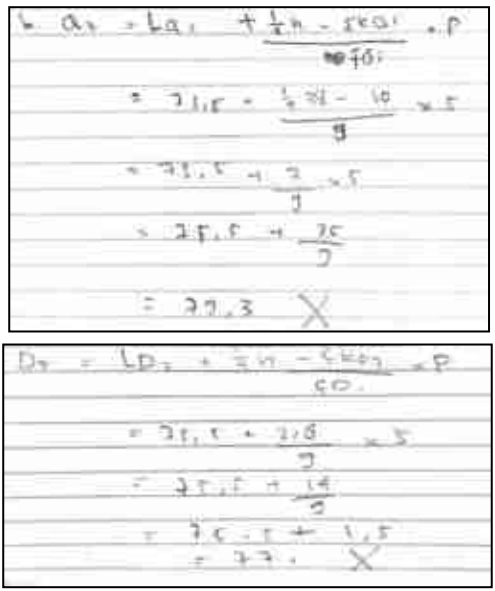

Figure 5. Written Test Answers DAM Subject Question Number 3b

Then for question number 3 part b the DAM subject performs an incorrect data error category in determining the values of the third quartile and the seventh decile. The cause of incorrect data is that the DAM subject made an error in the initial step, namely in determining the location of the class interval.

Based on the results of interviews with DAM subjects in question number 3a, the subjects did not know the location of the error but after being explained by the author the subject finally knew the location of the error, namely in the seventh decile determined the value of the 9th data which was included in the category of missing data errors. Then, for question number 3b, the DAM subject made a mistake in the initial solution, namely in determining the location of the class intervals for the third quartile and the seventh decile. This causes the subject to obtain incorrect data from the specified class thus committing improper data error categories.

3.) Question number 5

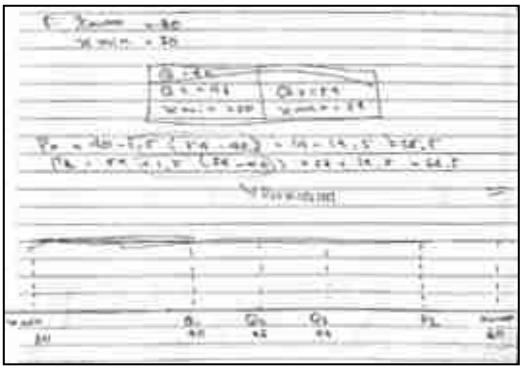

Figure 6. Written Test Answers DAM Subject Question Number 5

Based on the results of the written test of question number 5 of the DAM subject, it is known that the subject committed the category of errors in the skill hierarchy problem. In the calculation process looking for the value of the inner fence and outer fence, the subject made a multiplication calculation error.

From the interview of question number 5 with the DAM subject, the subject's answer was obtained to admit errors in multiplication calculations and also the values of PD and PL that were not included in the box plot drawing. So it is concluded from the results of the interview that question number 5 is included in the category of errors in the skill hierarchy problem.

Triangulation of written test answer results and DAM subject interviews can be seen in table 5 below:

**Table 5. Triangulation of Test Answer Results and DAM Subject Interviews**

| Num Question | Learner error analysis | |
|---|---|---|
| | **Test Results** | **Interview Results** |
| 2a | DAM subjects perform categories of improper procedure errors and response level conflicts. Where the subject does not use the right formula or way and immediately writes the answer without being accompanied by the formula. | The subject admits that not using the right method/procedure is due to forgetting the formula so that it immediately writes the answer without any solution. This falls under the category of improper procedure errors and response level conflicts. |
| 2b | DAM subjects commit improper data error categories in addition to all seven categories. Because the subject does not use the right data to substitute into the formula and also does not complete the answer. | DAM subjects are confused and do not understand the mean, median, and mode formulas for group data. This causes the wrong choice of class interval location and this is included in the category of improper data errors. |
| 3a | DAM subjects commit missing data error categories because the end of the solution shows data inaccuracies and subjects are not careful in solving the problem. | The subject does not understand where the error lies, and after being explained finally understands that the subject is missing one data so that the solution becomes incorrect. This includes missing data errors. |
| 3b | The DAM subject did category incorrect data errors caused by an initial misstep in determining the location of the class. | The subject made an error at the initial completion in locating the class interval causing the subject to obtain data unable to. |
| 5 | DAM subjects are known to perform category errors in skill hierarchy problems because subjects make multiplication calculation errors in solving problems. | DAM subjects are not careful in calculating multiplication in solving so the subject does category error skill hierarchy problems. |

Based on the triangulation of data in table 5, it was concluded that there was a match between the results of the written test and the interview on DAM subjects.

**Subject Error Analysis Low Initial Ability Group (High Error)**

a.) Subject TB

1.) Questions number 2a and 2b

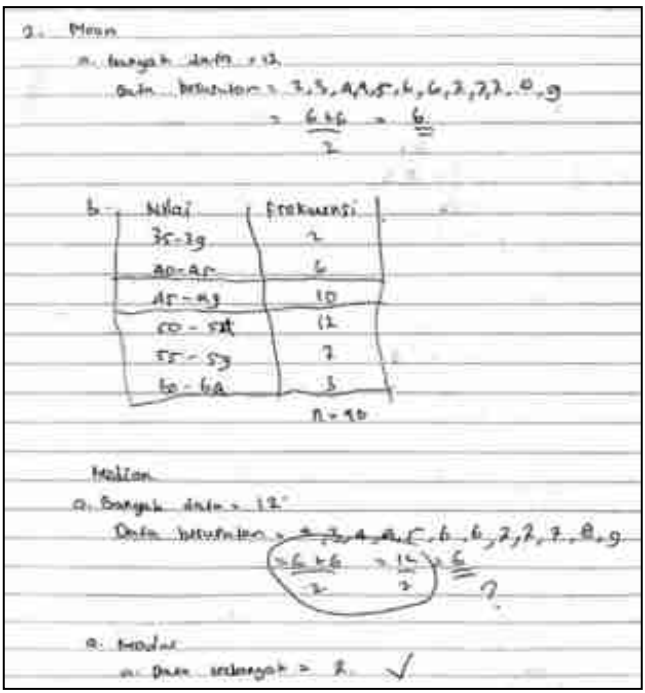


Figure 7. Written Test Answers TB Subject Questions Number 2a and 2b

Based on the results of the written test of TB subject question number 2 in figure 4.7, in question number 2 part a the procedure is incorrect, response level conflicts, and indirect manipulation. TB subjects perform categories of improper procedure errors because the section determining the mean, median, and mode does not use formulas or improper means. Then, for response level conflict errors, TB subjects

immediately wrote down answers without any formula or right way, while for indirect manipulation errors, subjects solved median problems but the method used was illogical or random. This causes the TB subject's answer to question number 2a to be wrong.

Then for question number 2 part b the TB subject committed a category of errors in addition to the seven categories. TB subjects simply rewrite the problem without any solution.

Based on the results of interviews with TB subjects in question number 2a, subjects committed improper procedural errors, response level conflicts, and indirect manipulation. TB said that using fast methods/procedures that are not appropriate and also writing direct answers without accompanying formulas. The subject also solves the main problem in an illogical way or formula. Then, for question number 2b, the TB subject said that the question was only rewritten because of the limited time and that he did not understand the formula to be used. This includes error categories in addition to the seven error categories.

2.) Question number 3b

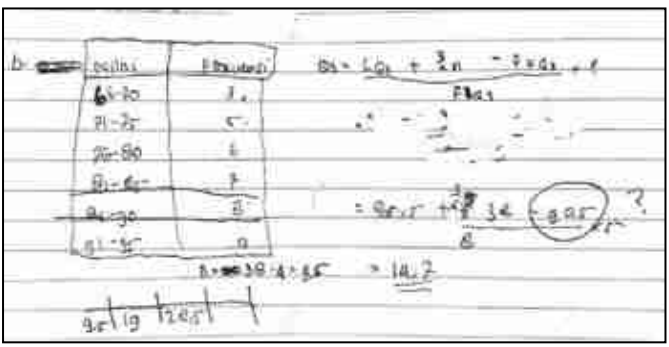

Figure 8. Written Test Answers for TB Subject Question Number 3b

Based on the written test results of TB sale subject number 3b in figure 8. above, it is known that TB subjects commit categories of missing data errors in addition to all seven types of errors. Because, in the completion of the third quartile the subject substitutes the data into the formula there is one data of unknown origin. Then for the completion of the seventh decile, the subject did not work on the problem.

Based on the results of interviews with TB subjects in question number 3b above, it was concluded that the subjects committed 2 types of errors. The first is that the subject loses data at completion to find the value of the third quartile, where FkQ3 from the data is not 90.5 but the sum result of the cumulative frequency before the quartile class which is 3 + 5 + 6 + 7. The second mistake, the subject did not do the problem until it was finished. The question of finding the value of the seventh decile is not worked out.

3.) Question number 4

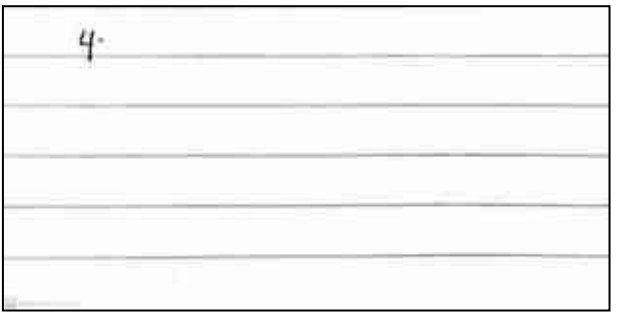


Figure 9. Written Test Answers TB Subject Question Number 4

Based on the results of answer number 4 of the TB subject in figure 9 above, it can be seen that the TB subject did not do the question. It is included in the error category in addition to the seven error categories.

From the results of interviews with TB subject number 4, it was found that the reason the subjects did not do question number 4 was due to time constraints and also did not understand the formula used for the question. So that TB subjects commit error categories in addition to the seven error categories.

4.) Question number 5

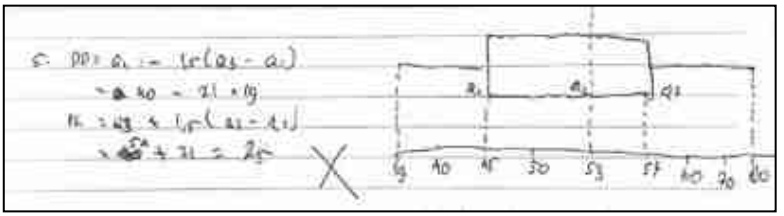

Figure 10. Written Test Answers TB Subject Question Number 5

Based on the results of the written test of TB subject question number 5 above, it was found that the category of inference errors was lost because the subject failed to make conclusions from the solutions that had been done.

Based on the results of interviews with TB subject question number 5, subjects made mistakes in drawing box plots where all known values namely Xmin, Q1, Q2, Q3, Xmax, PD, and PL should be substituted into the picture. Meanwhile, from the interview, the subject admitted that he did not know how to draw a box plot and get answers from friends. It can be concluded that TB subjects commit a type of missing conclusion error.

Triangulation of written test answer results and TB subject interviews can be seen in table 6:

**Table 6. Triangulation of Test Answer Results and TB Subject Interviews**

| Num Question | Learner error analysis | |
|---|---|---|
| | **Test Results** | **Interview Results** |
| 2a | TB subjects perform categories of improper procedure errors, response level conflicts, and indirect manipulations. Because the subject writes the answer without a formula and solves the problem in an illogical way. | TB subjects commit improper procedural errors because they do problems without using the right method/procedure, then response level conflicts because they write direct answers without a way to solve them, and indirect manipulation because of illogical problem-solving. |
| 2b | TB subjects commit categories of errors in addition to the seven categories of errors because the subjects simply rewrite the problem without any solution. | TB subjects rewrote the questions due to time constraints. This includes errors in addition to all seven error categories. |
| 3b | TB subjects commit categories of missing data errors in addition to the seven categories of errors because the subject loses one data in solving the problem and also does not complete the answer. | TB subjects lost one data, namely after the third quartile which included the category of missing data errors, and did not do the seventh decile problem so that it included errors other than the seven categories of errors. |
| 4 | TB subjects did not do question number 4 so they included the category of errors other than the seven types of errors. | The subject committed a category of errors other than the seven types of errors because he did not do question number 4 due to time running out and incomprehension of the formula. |
| 5 | TB subjects perform the category of missing conclusions because the subjects lose | TB subjects claimed that they did not know how to draw box plots and only copied friends' |

| | | |
|---|---|---|
| | conclusions in drawing the box plot. So the answer is considered wrong. | work and experienced a missing conclusion error category because subjects could not conclude the settlement by drawing box plots. |

Based on the triangulation of data in table 6, it was concluded that there was a match between the results of written tests and interviews on TB subjects.

From the exposure of all errors made by students according to their initial abilities, in subjects with high initial ability, errors made based on Watson error categories were 2 errors including skills hierarchy problems (ship) and omitted data (od). The error in the skill hierarchy problem was carried out by the subject of high initial ability because the subject was not careful in calculating the reduction in the problem, According to Ningsih, et al. (2019), the cause of students being wrong in the missing data is because there is one stage that has not been done by students, procedural steps that should exist but do not exist.

In the subject of moderate initial ability, the subject made errors based on Watson error categories as many as 6 categories including the inappropriate data (id) category because the subject made an error in the initial step, namely in determining the location of the class interval for the third quartile and the seventh decile, then incorrect procedure (ip) errors because in the section determining the mean, median and mode did not use formulas or methods that did not precise, response level conflict (RLC) errors because the subject immediately writes the answer without any formula or right way, Data is lost (ommited data / OD) because at the end determining the value of the 9th data in the seventh decile is not described., skills hierarchy problems (SHP) because in the calculation process looking for the value of the inner fence and outer fence the subject makes a multiplication calculation error, and in addition to the seven categories of errors (above other / AO) because the subject does not complete the answer as asked in the question.

The results of this study are in line with Lerner's research (Sari et al., 2018) that participants who make mistakes in solving problems are causative factors are difficulties in learning so that they have the potential to misunderstand symbols, place values, calculations, the use of wrong processes, and illegible writing.

In the subject of low initial ability, the subject made errors based on the Watson error category as many as 9 categories including the category of inappropriate procedure (ip) because in the section determining the mean, median and mode did not use the formula or improper way, response level conflict (rlc) error because the subject immediately wrote the answer without the right formula or method, Data is lost (ommited data / OD) because at the end determining the value of the 9th data in the seventh decile is not described, Indirect manipulation (undirected manipulation) because the subject solves the median problem but the method used is illogical or random, the conclusion is lost (ommited level conflict / RLC) because the subject fails to make conclusions from the solution that has been done, and 3 times in addition to the seven categories of errors (above other / AO) because the subject does not complete the answer as asked in the question, The subject did not do the problem and the question was only rewritten because of limited time and also did not understand the formula to be used.

The results of this study are in line with the research of Nur Aly, et al. (2019), missing conclusion errors made by students, namely not writing conclusions at the end of the answer, even though students have found the final result of the solution.

## CONCLUSION

Based on the results of the research that has been described, the following conclusions were obtained:

Subject Error High Initial Ability in Solving Statistical Problems Based on Watson Error Category, making mistakes based on Watson criteria as many as 2 errors including skills hierarchy problems (ship) and missing data (omitted data/od). Of all the

mistakes made by the subject of high initial ability above, the main factor causing the subject to make 2 mistakes including skills hierarchy problems (ship) and omitted data (od) is the subject with the high initial ability category is less careful in doing calculations and lack of concentration;

Subject Error Initial Ability Is in Solving Statistical Problems Based on Watson Error Category, making mistakes based on Watson criteria as many as 6 categories including inappropriate data (id), inappropriate procedure (IP), response level conflict (rlc), omitted data (OD), skills hierarchy problems (SHP), and in addition to the seven categories of errors (above other/ao) because the subject did not complete the answer as asked in the question. Of all the mistakes made by the subject, the initial ability is above the main factor causing the subject to make 6 mistakes is that students are not careful and rushed in solving problems and still do not understand the solving procedure given by the teacher;

Subject Error Low Initial Ability to Solve Statistical Problems Based on Watson Error Category, making mistakes based on Watson criteria as many as 9 categories including inappropriate procedure (IP) categories, response level conflict (rlc), omitted data (OD), indirect manipulation (undirected manipulation), omitted level conflict (rlc), and 3 times in addition to the seven error categories (above other/ao). Of all the mistakes made by the subject, the initial ability is low above, the main factor causing the subject to make 9 mistakes is that students lack mastery of statistical material and do not understand the method used to solve the problem so the time used is up and does not write the answer.

Solutions that can be sought to minimize student errors based on influencing causal factors are developing interest in learning mathematics to students, increasing practice doing statistical practice problems, and eliminating students' negative mindset towards learning mathematics.

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# THE DEVELOPMENT OF AUDIO MOTION VISUAL LEARNING VIDEO USING INSHOT ON THE MATERIAL OF VIRUS REPLICATION PROCESS IN X GRADE OF SMA N 3 SUKOHARJO

Riska Satya Graha Putrimulya[1], Tri Wiharti[2], Agus Purwanto[3]
riskasatya00@gmail.com

*This study aimed to develop and determine the feasibility of audio motion visual learning video media using Inshot on the virus replication process material that has been made. The results of this development research are expected to provide a solution so that students can more easily understand virus replication material and make learning more enjoyable. This study uses research and development (R&D) methods conducted at SMA N 3 Sukoharjo. The data collection techniques used were interviews and questionnaires consisting of validation questionnaires from media experts and material experts, teacher evaluation questionnaires, small-group trial questionnaires, and large-group trial questionnaires. This research resulted in the development of learning videos that were validated by media experts with a percentage of 92% (excellent), material experts with a percentage of 97% (excellent), teacher response assessments with a percentage of 94% (excellent), and student trials with a percentage of 88% (good) for small group trials and 84% (good) for large group trials. It proves that the learning video product produced is feasible and valid.*

***Keywords:*** *Virus Replication, Inshot, Learning Video*

## INTRODUCTION

Improving learning achievement needs to be supported by good facilities. Facilities in learning facilitate the teaching and learning process. One example of a learning tool that is often developed is learning media. Learning media is a means of communication in various forms, from print, audio, or visual, which includes hard or soft technology and has been designed to follow the material needed. Learning media is an essential tool in learning that aims to channel messages and stimulate students' thoughts, feelings, and willingness in the learning process (Arsyad, 2017). Engaging learning media can motivate and influence the conditions and atmosphere of the learning place so that it can run according to the planned objectives. The learning media in question is learning video-based media.

Meanwhile, according to Sadiman (2010), learning media in the form of videos will further increase the concentration and the memory of students in learning because, according to him, videos can collect information entry in humans by 94% through vision and hearing, this can strengthen students' memories by more than 50% of what they see and also hear from the video displayed.

Based on Nurwinda's (2022) research, the effect of using video media on science learning outcomes in fifth-grade students of SD Negeri 188 Tanrongi, Wajo Regency, shows that learning outcomes in the final test have increased. In the initial test or pretest, the average student scored 64.25. Then, after being given the learning treatment with learning video media, the average student post-test result was 85.00. It indicates an increase in the average value of learning outcomes by 20.75. From this research, it can be used as an illustration that the use of video media is beneficial for students to understand Biology material.

Biology material discusses living things, nature, and its contents and generally requires media that looks real in its delivery so that students can easily understand and capture lessons. Virus material is one of the class X biology materials that need the development of learning media in the form of videos. Viruses are so small that they

can only be seen with an electron microscope. Therefore, virus material, especially in the stages of virus replication, needs a visualization of the process or stages. Based on observations during the Teaching Assistance Practice activities at SMA N 3 Sukoharjo in the biology learning process, the teacher explains the material using learning media in the form of LKS and power points. Teachers tend to use the lecture method and make less use of learning media and existing facilities due to teacher limitations in developing learning media. As for the interview results (the results are in the attachment) with one of the Biology teachers, the learning media that are often used are textbooks and power points and rarely use learning videos. The problem experienced in the current learning process of virus replication is that students have difficulty understanding the stages of virus replication in the form of pictures in the textbook or PowerPoint, so students do not understand the material and quickly feel bored if they only use learning media based on textbooks or power points. In addition, teachers usually have to re-illustrate each process on the blackboard so that students can understand each stage. Meanwhile, some students who sit at the back often complain and cannot grasp the material because the pictures on the blackboard are less clear.

Based on these problems, it is necessary to develop video-based learning media as a support in the learning process to make it more interesting, easy to understand, and time efficient, especially when explaining material about the stages of viral replication. Therefore, the development of Audio Motion Visual learning videos about viral replication material needs to be done and is expected to be a solution so that students can more easily understand viral replication material and learning feels more enjoyable than before.

## METHOD

This study uses the Research and Development (R&D) method. This development research aims to produce a learning product supporting the teaching and learning process. In this study, learning video media was developed on class X virus replication material. This

development research procedure uses the ADDIE research model. ADDIE research stands for Analyze, Design, Development, Implementation, Evaluation. This model was selected because it is easy to understand. Besides that, the ADDIE model is developed systematically and rests on the theoretical basis of the learning design developed. The following are the stages of ADDIE development.:


**Picture 1.** ADDIE Development Stage

The validators in this study consisted of material experts and media experts conducted by experienced lecturers in their fields. The research subjects in this development consisted of a biology teacher who played a role in product assessment and high school class X students, totaling 36 students who played a role in the small group test of 12 students and an extensive group test of 36 students.

The data collection instruments used interviews and questionnaires. The data obtained was then processed in such a way and analyzed using qualitative descriptive techniques and descriptive statistics. To determine the feasibility of the learning video developed using the following provisions:

**Table 1**. Achievement Level Conversion with Liker Scale

| Achievement Level | Qualifications | Description |
|---|---|---|
| 90% - 100% | Excellent | No revision needed |
| 75% - 89% | Good | No revision needed |
| 65% - 74% | Fair | Revision required |
| 55% - 64% | Poor | Revision required |
| 0% - 54% | Extremely Poor | Revision required |

Source: Arikunto (2010)

## RESULT AND DISCUSSION

### RESULT

This research results in the development of audio motion visual learning videos using Inshot on the material of the virus replication process in class X SMA. The learning video developed is based on the ADDIE research model, which consists of analysis, design, development, implementation, and evaluation stages.

The analysis stage obtained initial data related to problems in learning biology and student needs related to learning media.

a. The results of the problem analysis are as follows:
    1) Students need help understanding the material about the virus replication stages that come from worksheets or PowerPoint.
    2) There are differences in learning styles, interests, and ability to absorb material between one student and another.
    3) The lack of learning media makes students bored using media in the form of books, worksheets, or texts.
b. The results of the media development needs analysis are as follows:
    1) Teachers require learning media that are easy to use and practical.
    2) Students require learning media that is easy to understand and enjoyable.

In the planning stage, the researcher planned ideas and ideas, material design, and storyboarding as a reference in the development stage. In the development stage, researchers prepare text, images, animations, and audio to be edited using the short application. The video media program that has been made is then checked and improved to produce a good learning video product. The learning video product will be validated by media experts and material experts so that the validation weight or product feasibility is known.

Table 2. Media Expert Validation Results

| No | Aspects assessed | Score |
|---|---|---|
| Resolution Quality Indicators | | |
| 1. | Quality of animation display | 5 |
| 2. | Quality of the background color with the text color | 5 |
| 3. | Quality of text and image display | 5 |
| 4. | Image layout accuracy | 5 |
| Indicators of Content Representation | | |
| 5. | Appropriateness between material and images | 4 |
| 6. | Appropriateness between audio and image | 4 |
| 7. | Appropriateness of material content to student needs | 4 |
| User-Friendly Indicator (easy to use) | | |
| 8. | Applying standardized language | 5 |
| 9. | Easy-to-use learning media | 5 |
| Message clarity indicators | | |
| 10. | The sentences used in the media are easy to understand | 5 |
| 11. | Clarity of material content contained in the media | 4 |
| 12. | Learning media is effective in attracting students' attention | 4 |
| Total | | 55 |

## DISCUSSION

Based on the assessment by media experts, the resolution quality indicators, which include animation display, background color with text, display of text with images, and image layout, received an excellent assessment. Indicators of content representation consisting of the suitability of material with images, audio with images, and the suitability of material content to the needs of students received a good assessment. The user-friendly indicator, which includes using standard language and learning media is easy to use, received an excellent assessment. The message clarity indicator, which consists of sentences that are easy to understand, gets an excellent rating. In contrast, the

clarity of material content and engaging learning media get an excellent rating.

Suggestions for improvements from media experts related to the learning video media developed are good. However, the material in the video can be added again, and the images on the host cell and virus components can be improved to look better.

The results of the assessment by media experts were then analyzed by the percentage of achievement levels as follows:

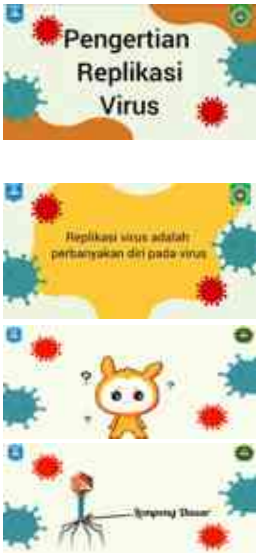
$$Persentase = \frac{\sum(answer\ x\ score\ for\ each\ option)}{\mathrm{N}\ x\ highest\ score}\ x\ 100\%$$

As the score of each choice is 1, the percentage of :

$$Persentase\ = \frac{55}{12\ x\ 5}\ x\ 100\%\ = 92\%$$

The percentage level of achievement is 92% with excellent qualifications, so there is an unnecessary revision. However, improvements must be made according to the media expert's suggestions to produce a better learning video product.

Table 3. Media Expert Revision Results

| No | Feedback | Before Revised | After Revised |
|---|---|---|---|
| 1. | Adding material to the video ( Material about the parts of the virus and how the virus reproduces itself) |   |   |

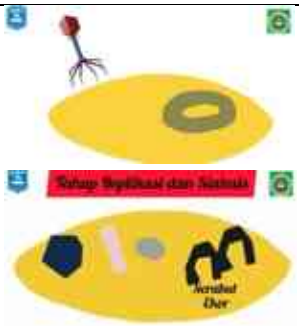
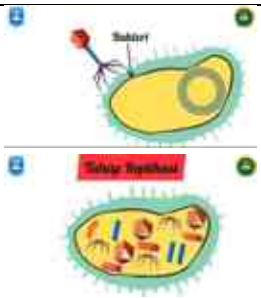
| No | Feedback | Before Revised | After Revised |
|---|---|---|---|
| | | |  |
| 2. | Image improvements on the host cell and virus components |  |  |

Table 4. Material Expert Validation Results

| No | Aspects assessed | Score |
|---|---|---|
| Aspects assessed | | |
| 1. | The appropriateness of the content of the material with the lesson plan | 4 |
| 2. | The appropriateness of material content with learning outcomes | 5 |
| 3. | The appropriateness of material content with learning objectives | 5 |
| Message Clarity Indicator | | |
| 4. | Materials are organized systematically | 5 |
| 5. | Simplified and concretized presentation of the material | 5 |
| 6. | Material descriptions are presented clearly | 5 |
| Total | | 29 |

Based on the assessment by material experts, the content representation indicator consisting of the suitability of the material's content with the teaching module received a good assessment. In contrast, the suitability of the material's content with learning outcomes and objectives received an excellent assessment. Indicators of message clarity, including material arranged systematically, presentation of simple and concrete material, and clear material descriptions, received excellent ratings.

The suggestions for improvement from the material expert related to the content representation indicator are to clarify the insertion process (injection) of viral DNA into the host cell (bacteria) and display bacterial DNA during the synthesis stage. In addition, on the indicator of message clarity, the material expert also gave suggestions to add some further explanations related to the virus cycle at the lysogenic stage.

The results of the assessment by the material experts were then analyzed by the percentage of achievement levels as follows :

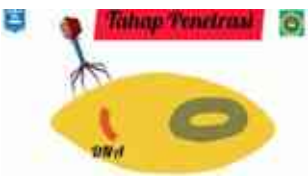
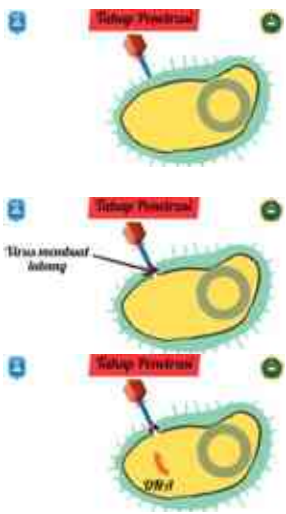
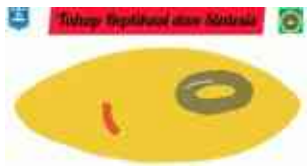
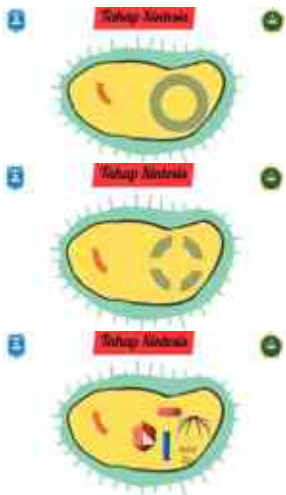
$$Persentase = \frac{\sum(answer\ x\ score\ for\ each\ option)}{\mathrm{N}\ x\ highest\ score}\ x\ 100\%$$

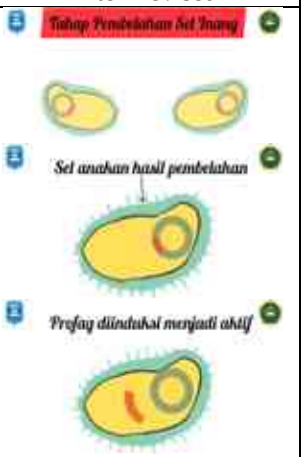
As the score of each choice is 1, the percentage of:

$$Persentase = \frac{29}{6\ x\ 5}\ x\ 100\% = 97\%$$

It is known that the percentage level of achievement is 97% with excellent qualifications, so there is no need for revision. However, improvements must be made according to the material expert's suggestions to produce a better learning video product.

Table 5. Media Expert Revision Results

| No | Feedback | Before Revised | After Revised |
|---|---|---|---|
| 1. | The process of injecting viral DNA into host cells is clarified |   |   |
| 2. | Displayed bacterial DNA during the synthesis stage (added information that the bacterial genetic material is hydrolyzed) |  |  |
| 3. | Added further explanation of the virus cycle in the lysogenic |   |   |

| No | Feedback | Before Revised | After Revised |
|---|---|---|---|
| | stage |  |  |

Based on the validations of media experts and material experts on learning video products, the percentage level of achievement results was 92% in the assessment of media experts and 96% in the assessment of material experts. It can be understood that audio motion visual learning media products on viral replication material are included in excellent qualifications. They are feasible and valid and can be applied to actual conditions or implemented by students and teachers.

In the implementation stage, products that have been developed and made improvements are then applied to actual conditions, namely applied to the learning process in the classroom. In this stage, researchers explain the material of the virus replication process with the help of learning video media; then, an assessment is made by teachers and students regarding the learning video media. The results of small-group and large-group tests of learning video products are included in good qualifications, with an average percentage achievement level of 88% in small-group tests and 84% in large-group tests. At the same time, the results of the biology subject teacher's assessment of learning video products are included in excellent qualifications, with a percentage achievement level of 94%. Based on

the results of trials implemented on students and assessments by teachers, the learning video products made are practical.

Many things make this learning video product feasible and practical, including, according to Akhmad Busyaeri, Tamsik Udin, and A. Zaenuddin, the use of learning videos has several advantages and benefits, including being able to describe an event in a short time, can be repeated to increase clarity, the message conveyed is fast and easy to remember, develops students' thoughts, opinions and imaginations and can clarify abstract things (Busyaeri et al., 2016). According to Agustiningsih's opinion (2015), learning video media is feasible if the media can provide new experiences for students and increase students' interest and absorption of the material presented. According to Putu Darma Wisada's opinion, images can convey many messages and meanings and clarify the material presented (Wisada et al., 2019). In addition, according to Arsyad (2017), learning media can clarify the presentation of messages and information to facilitate the learning process and increase learning motivation.

However, this is also supported by several studies on the use of videos in learning, including research from Ni Luh Putu Purhita Pebriani, on Youtube-assisted Learning Videos to Increase Student Interest in Learning Changes in the Form of Objects, finding that the learning videos with the help of Youtube developed are declared feasible for use in the learning process (Pebriani et al., 2021). Research from Sultia Linika Sari on the Development of Animated Video-Based Learning Media in Smartphones on the Material of the Human Immune System for Grade XI Students found that the video developed was suitable for Grade XI students. In addition, research from Miftahul Khairani on the Meta-Analysis Study of the Effect of Learning Videos on Student Learning Outcomes found that video learning media has a dominant relationship in improving student learning achievement (Khairani et al., 2019).

Furthermore, the audio motion visual learning video product on virus replication material developed has several advantages compared to other learning videos. The advantage of this learning

media product is that it can systematically display each stage of viral replication lyrically and lysogenically using moving images supported by audio and music backgrounds. The images used are designed with a simple appearance and attractive colors so that they feel comfortable, not dull to look at, and have their charm to make learning more fun. In addition, this learning video product also explains each stage clearly. It uses language that is easy to understand, making the content of the material presented can be easily absorbed by students.

## CONCLUSION

Based on the results of research on the development of audio motion visual learning videos on the material of the class X SMA virus replication process using the shot application, the following conclusions can be drawn: At the development stage, the feasibility of learning video media is known, based on the assessment of media experts and material experts in terms of the feasibility of display quality and content representation, the percentage of achievement level is 92% for media expert assessment and 97% for material expert assessment. The percentage of the achievement level is included in the excellent qualification so that the learning video product can be declared valid or feasible. In the implementation stage, it is known that the practicality of learning video media based on small group tests, extensive group tests, and teacher assessments in terms of message clarity and ease of use obtained a percentage level of achievement in small group tests of 88% with good qualifications, extensive group tests obtained a percentage of 84% with good qualifications, and teacher assessments obtained a percentage of 94% with excellent qualifications. Based on the results of the trial and assessment, it can be understood that the learning video product is declared practical and feasible.

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# PEMBELAJARAN BAHASA DAN SASTRA INDONESIA DI ERA SOCIETY 5.0

Siti Suwadah Rimang
Universitas Muhammadiyah Makassar
sitisuwadahrimang@unismuh.ac.id.

Masalah yang dibahas dalam artikel ini adalah pertama bagaimana proses pembelajaran Bahasa dan Sastra Indonesia di era Society 5.0, kedua tantangan pembelajaran Bahasa dan sastra di era 5.0. ketiga bagaimana menyiapkan materi pembelajaran Bahasa dan sastra Indonesia di era 5.0. sementara tujuan yang ingin dicapaia adalah mendeskripsikan proses pembelajaran Bahasa dan Sastra Indonesia di era Society 5.0, kedua menguraikan tantangan pembelajaran Bahasa dan sastra di era 5.0. ketiga mendeskripsikan penyiapkan materi pembelajaran Bahasa dan sastra Indonesia di era 5.0. Pendidikan merupakan sebuah saluran kebijakan dalam mengatasi berbagai masalah dalam proses belajar mengajar. Sementara itu Penelitian ini menggunakan penelitian kepustakaan (riset) literatur. Dalam penelitian kepustakaan ini peneliti menggunakan teknik pengumpulan data seperti membaca dan mencatat serta mengolah bahan penelitian. Kemudian dalam pengumpulan data peneliti melakukan proses peninjauan dan jelajahi beberapa jurnal dan sumber data atau informasi lainnya dianggap relevan dengan penelitian. Hasil penelitian menyimpulkan bahwa (1) Pembelajaran Bahasa Indonesia dapat dilakukan dengan baik, apabila siswa dilengkapi dengan media yang menarik (2) Nampak kreativitas

guru dalam memecahkan persoalan pembelajaran Bahasa Indonesia kurang tepat sasaran; (3) Rendahnya kesiapan guru dalam menyiapkan materi ajar bahasa dan Sastra Indonesia. Pada prinsipnya, masyarakat 5.0 adalah konsep masyarakat yang berpusat pada human-centric dan berbasis teknologi. Penggunaan otomatisasi, digitalisasi, dan sistem kapitalisme yang disengaja mewujudkan efektivitas dan efisiensi industrialisasi berdampak besar pada sumber daya sumber daya manusia sehingga ini menjadi paradigma baru humanistik di era masyarakat 5.0. dengan adanya perubahan ini membuat semua sistem dalam pembelajaran juga berubah. Perubahan yang diharapkan tentu perubahan yang baik dan memberi manfaat.

## Pendahuluan

A. Latar Belakang

Menurut Ni Nyoman Lisna Handayani (2020) bahwa peningkatan Sumber Daya Manusia dalam persaingan di kancah internasional di saat ini ada dua prioritas yakni; pertama, proses penggunaan, pembelajaran dan pencetakan karakter mahasiswa di dalam perguruan tinggi. Kedua, pendidikan Indonesia harus mulai merdeka dalam belajar dan menjadikan guru sebagai penggerak. Dari kedua pernyataan di atas, dapat disimpulkan bahwa dalam menjalankan proses Pendidikan tidak hanya berfokus kepada kecerdasan buatan (artificial intelligence) melalui konektivitas di segala hal, tetapi juga berfokus kepada komponen manusia sebagai motor penggerak pendidikan.

Perbedaan antara masyarakat 4.0 dan masyarakat 5.0, jika masyarakat 4.0 masih baru melihat, mengenali, kemudahan dalam mendapatkan informasi, kemudian masyarakat dalam era 5.0 sudah menggunakan teknologi dalam kehidupan dan teknologi sangat erat dalam kesehariannya. Konsep masyarakat 4.0 berbasis teknologi yang berpusat pada manusia menerima perubahan dan menggunakan teknologi dengan bijak sehingga kehidupan masyarakat yang lebih berarti. Era masyarakat itu sendiri ditandai dengan perkembangan teknologi semakin canggih. Orang tidak hanya tahu dan mengerti

tetapi juga gunakan dalam kehidupan sehari-hari. Salah satu bidang pendidikan yang memasuki era industri adalah belajar dengan menggunakan literasi yang yang menggunakan aplikasi.

Dalam sebuah jurnal yang ditulis oleh Nursyamsiah. 2019. Mengatakan bahwa Perkembangan ilmu pengetahuan semakin meningkat terutama dalam bidang komunikasi. Dari tahun ke tahun masyarakat mengalami perubahan ekonomi, sosial dan komunikasi sesuai dengan perkembangan zaman. Ada perubahan teknologi membuat orang harus mengikuti perubahan, mulai dari komunitas berburu (Masyarakat 1.0), masyarakat agraris (Masyarakat 2.0), masyarakat industry (Masyarakat 3.0), dan masyarakat informasi (Masyarakat 4.0) kepada masyarakat (masyarakat 5.0). Meski baru memasuki era industri 4.0, disadari atau tidak Memasuki era 5.0. Masyarakat 5.0 adalah masyarakat yang mengembangkan pengetahuan pengetahuan seperti perkembangan sosial, komunikasi atau keterampilan membaca dan keterampilan. Apabila diamati sebenarnya masyarakat sudah tahu dan menggunakan teknologi dalam kehidupan sehari-hari, di bidang ekonomi ada penjualan berbasis online jadi orang tidak perlu ikut membawa uang atau repot untuk membawa, barang akan dikirim melalui kurir atau jasa pengiriman barang-barang. Pembayaran tidak harus melalui ATM atau pergi ke bank untuk membayar tapi cukup dengan e-banking. Masyarakat juga sudah terbiasa dengan alat komunikasi berbasis android, dimana semua aplikasi dalam kehidupan sehari-hari yang dibutuhkan ada disana dan siap digunakan. Kalau mau pergi pakai aplikasi Go-Jek atau Go-Car, kalau mau belanja pakai aplikasi mirip belanja online, mau booking tempat tinggal, telepon.

Selanjutnya, disusun rencana/program dengan target-target terukur, serta mengimplementasikam program yang telah disusun dengan baik. Yang dapat mengintegrasikan kebutuhan dan praktik pendidikan, penelitian, dan pengabdian kepada masyakat menjadi suatu keniscayaan. Hendaknya disadari pula bahwa lembaga pendidikan tinggi sebagai bagian dari ekosistem inovasi yang kompleks akan kegiatan-kegiatan inovatif perlu terus-menerus

dilakukan dengan tujuan mempromosikan pembangunan dan masyarakat, baik di tingkat lokal, nasional, bahkan global.

Hal penting yang perlu mendapat perhatian para pendidik adalah bahwa peserta didik pada era digital memiliki karakteristik yang berbeda dengan era saat pendidik hidup di usianya. Prensky menyebut bahwa generasi yang lahir di era digital ini adalah digital native, yang artinya, sejak lahir telah dilingkupi oleh berbagai macam peralatan digital seperti computer, video game, digital music player, kamera video, telpon seluler serta berbagai macam perangkat khas era digital (Prensky, 2001). Kondisi ini berdampak besar pada psikologis anak-anak muda bangsa ini, termasuk siswa dan mahasiswa. Tidak jarang terjadi pula pergeseran nilai dan makna pada mereka dalam memandang, menyikapi, dan mengatasi suatu permasalahan. Pendidik diharapkan dapat memerankan diri secara baik dalam praktik pembelajaran. Pendidik ditutut mampu memfasilitasi kebutuhan peserta didik dalam belajar untuk mengembangkan kompetensi dan kreativitas mereka.

*Menurut* Z Iskandar ( 2020) bahwa *teknologi informasi menjadi basis dalam meyelesaikan masalah sosial di era masyarakat 5.0. Masyarakat 5.0 adalah masyarakat yang muncul akibat era revolusi industri 4.0. Era ini telah menyebabkan segala hal menjadi tanpa batas dan juga telah mendisrupsi banyak bidang, tidak terkecuali bidang pendidikan. Masyarakat 5.0 adalah jawaban atas semua tantangan yang muncul akibat era revolusi Industri 4.0. Konsep masyarakat 5.0 pertama kali muncul di Jepang, 2016, dan sejak saat itu menyebar dan konsep dasarnya terus dibentuk. Masyarakat 5.0 menginginkan transformasi dalam pembelajaran. Dalam hal ini dikhususkan pada aspek pembelajaran bahasa Indonesia (peran pendidik, kebutuhan peserta didik, penggunaan bahan ajar berbasis digital, dan pola bauran dalam pembelajaran).*

Pada era society 5.0, teknologi digital diaplikasikan pada kehidupan manusia. Society 5.0 merupakan penetralisir atas tantangan yang diciptakan pada era industri 4.0. yang menghasilkan berbagai industrialisasi dan inovasi. Pada Era 4.0 terjadi disrupsi pada berbagai

sektor dan aktivitas kehidupan manusia, termasuk pada bidang ilmu pengetahuan dan teknologi (iptek) serta bidang pendidikan. Untuk menghadapi era society 5.0, diperlukan sebuah iklim pendidikan yang mendukung. Di dalam konteks pembelajaran siswa/mahasiswa harus lebih dibiasakan dan ditekankan untuk berpikir kritis, konstruktif dan inovatif agar nantinya pengetahuan yang disampaikan dapat benar-benar diterapkan dalam kehidupan sehari-hari secara konkret serta dapat memecahkan suatu permasalahan yang ada dengan menggunakan pengetahuan dan keterampilan sebagai wujud luaran dari pembelajaran diperoleh oleh siswa/mahasiswa.

Emawati (2020) Untuk menghadapi era society 5.0, diperlukan sebuah iklim pendidikan yang mendukung. Di dalam konteks pembelajaran siswa/mahasiswa harus lebih dibiasakan dan ditekankan untuk berpikir kritis, konstruktif, dan inovatif agar nantinya pelajaran yang disampaikan dapat benar-benar diterapkan dalam kehidupan sehari-hari secara konkret serta dapat memecahkan suatu permasalahan yang ada dengan menggunakan pengetahuan dan keterampilan sebagai wujud luaran dari pembelajaran di sekolah.

Penelitian ini menggunakan penelitian kepustakaan (riset) literatur). Dalam penelitian kepustakaan ini peneliti menggunakan teknik pengumpulan data seperti membaca dan mencatat serta mengolah bahan penelitian. Kemudian dalam pengumpulan data peneliti melakukan proses peninjauan dan jelajahi beberapa jurnal dan sumber data atau informasi lainnya dianggap relevan dengan penelitian

**Pembahasan**

Perubahan pada era Industri 4.0 sesungguhnya tidak jauh berbeda dari revolusi sebelumnya, yakni digerakkan oleh teknologi, mengganggu, dan membalikkan tatanan yang ada. Saat kita memasuki gelombang baru industrialisasi, kita seharusnya mendorong bentuk pendidikan untuk berubah. Namun demikian, sifat perubahan tersebut tentu sangat berbeda karena kita tidak lagi tahu seperti apa pekerjaan mada masa depan.

## A. Proses pembelajaran Bahasa dan Sastra Indonesia di era Society 5.0,

Cara memperoleh pengetahuan tidaklah sama dengan dulu karena teknologi telah membuat pengetahuan sangat mudah diakses. Hal yang sangat dihargai hari ini adalah bagaimana seseorang menerapkan pengetahuan dalam kehidupan nyata. Dengan kata lain, pembelajaran menekanan pada keterampilan. Seturut dengan itu, pembelajaran bahasa Indonesia di sekolah dan perguruan tinggi harus merujuk pada empat karakter belajar abad 21, yaitu berpikir kriris dan pemecahan masalah, kreatif dan inovasi, kolaborasi, dan komunikasi atau yang dikenal dengan 4C (critical thinking dan problem solving, creative and innovation, collaboration, and communication). Untuk itu, pembelajaran bahasa dan Sastra Indonesia yang menekankan pada ekspositori harus direduksi.

Pendidikan bahasa dan sastra memiliki peran yang cukup penting bagi peningkatan kualitas sumber daya yang terus berkembang pada kehidupan sosial khususnya dalam masyarakat. (Fahirun, 2020) peranan kehidupan masyarakat memiliki redefinisi terhadap pendidikan bahasa dan sastra Indonesia yaitu (a) institusi sosial, (b) keseimbangan, keserasian dan kepedulian terhadap perubahan sosial ekonomi, (c) kepekaan sosial dan penguatan sistem komunikasi, (d) isu-isu keberagaman, kesetaraan dan penghargaan atas perbedaan. Pengetahuan keterampilan bahasa, peranan dan memiliki manfaat sebagai aspek pembelajaran, karena hal tersebut menjadi sangat penting suatu pendidikan. Peran pembelajaran bahasa dan sastra Indonesia dalam kehidupan masyarakat perlu dikendalikan pada kegiatan sosial dalam menghadapi perubahan dari era 4.0 ke era 5.0.

Dalam pembelajaran Bahasa dan sastra keterampilan berpikir tingkat tinggi (HOTS) perlu diperhatikan yakni Berpikir itu lebih dari sekedar mengingat, mengulang, dan juga Merujuk tanpa melakukan pengolahan, melainkan kemampuan berpikir untuk belajar informasi yang kritis, kreatif, kreatif, dan mampu memecahkan masalah.

## B. Tantangan pembelajaran Bahasa dan sastra di era 5.0.

Dalam beberapa jurnal dan hasil pengamatan di beberapa sekolah ditemukan beberapa tantangan yang harus dihadapai oleh guru dalam mengajar khususnya guru Bahasa Indonesia. Beberapa tantangan dunia Pendidikan Indonesia menuju era 5.0, sebagai berikut : a) perangkat pembelajaran yang harus disiapkan oleh pemerintah menyongsong era Pendidikan 5.0, b) perubahan dalam pendidikan harus dilakukan c) Pendidikan dipengaruhi oleh kemampuan menuju 5.0, d. Pendidikan 5.0 arahnya pada penguasaan teknologi.

Tantangan-tantangan yang telah dijelaskan di atas, harus segera ditindak lanjuti, sehingga para pendidik dapat mencetak generasi unggul dan bermartabat. Oleh karena itu kita harus mempersiapkan anak didik menjadi; a) Memiliki motivasi dan minat dalam kehidupan, b) menjaga perbedaan, c) memupuk kecerdasan berdasarkan bakat dan minatnya, d) meningkatkan cara berpikir jernih dan kritis, e) memiliki sikap cinta tanah air f). mampu menjaga moral, g) Memiliki semangat bekerja, , h) bertanggungjawab terhadap lingkungan, i) mampu beradabtasi secara baik, j). meningkatkan keterampilan.

## C. Penyiapan materi pembelajaran Bahasa dan sastra Indonesia di era 5.0.

Dalam pembelajaran bahasa dan sastra Indonesia di era masyarakat 5.0, seorang guru dan perlu memiliki pengetahuan teknologi (technological knowledge), yaitu pengetahuan tentang bagaimana menggunakan perangkat keras dan perangkat lunak dan hubungan antara keduanya. Guru dan dosen memiliki kompetensi mengenai isi materi pelajaran (pengetahuan isi). Selain itu, guru dan dosen juga harus memiliki kompetensi mengenai pengetahuan pedagogik (pedagogic knowledge), yaitu pengetahuan tentang ciri-ciri siswa/siswa, teori belajar, model atau metode pembelajaran, serta penilaian proses dan hasil pembelajaran.

Era 5.0 memaksa guru dan dosen serta lembaga pendidikan untuk mengubah pembelajaran, dari pembelajaran manual menjadi digital. Kurikulum sekolah dan universitas di Indonesia menyarankan

pentingnya literasi, tidak hanya literasi lama (membaca, menulis, dan matematika), tetapi juga literasi data, literasi teknologi, dan literasi manusia. Literasi data adalah pemahaman membaca, menganalisis, menguraikan, menggunakan data dan informasi (big data) di dunia. Di era 5.0, tidak dapat dipungkiri bahwa siswa dalam melakukan pembelajaran mereka dapat menggunakan "chatting" melalui media sosial yang ada, seperti Facebook, WhatsApp, twitter, dan Instagram. Dengan ketersedian fasilitas ini diharapkan guru atau dosen mau tidak mau harus dapat meningkatkan dan mempersiapkan dirinya dalam dunia teknologi yang kian hari kian berkembang pesat.

## Kesimpulan

Berdasarkan uraian di atas dapat disimpulkan bahwa pembelajaran Bahasa dan sastra harus dipersiapkan secara matang dengan menggunakan perangkat-perangkat teknologi yang ada**.** Jika keadaan ini berjalan dengan baik, maka harapan akan sistem pendidikan nasional kita akan dapat melahirkan dan menciptakan tatanan masyarakat 5.0, yakni sebuah tatanan masyarakat yang berbasis pada teknologi informasi, yang super cerdas, sejahtera, bermartabat dan berkeadaban.

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# CASE STUDY: TEACHER'S POINT OF VIEW ON THE PANCASILA STUDENT PROFILE PROGRAM IN TERMS OF CREATIVITY

Nurratri Kurnia Sari[1)], Muhlis Fajar Wicaksana[2)], Tri Sutrisno[3)]
nuurratrikurniasari@gmail.com[1)] ,
muhlisfajarwicaksana@gmail.com2),
triynwasutrisno@gmail.com[3)]

*The aim of this research is to describe teachers' views on the Pancasila student profile program in terms of creativity in Indonesian language subjects at SD Negeri 02 Jatiroto. This research includes descriptive research with a qualitative approach. The subjects in this research were Class IV teachers and students. The object of this research is the teacher's views on the Pancasila student profile program in terms of creativity in Indonesian language subjects at SD Negeri 2 Jatiroto. Data collection techniques using observation, interviews and documentation. The validity of the data in this research uses triangulation. The data analysis technique uses three data procedures, namely data reduction, data presentation, and drawing conclusions. The results of the research show that class IV students at SD Negeri 2 Jatiroto in terms of creativity in Indonesian language subjects can be viewed from 4 indicators, including: 1). From the Fluency indicator, students have not come up with ideas in a paragraph, 2). From the Flexibility indicator, students have not been able to produce varied ideas, questions and answers. 3). From the originality indicator, students have not been able to produce new and*

*unique expressions in the paragraph. 4). From the Elaboration indicator, students have not been able to develop an idea in a paragraph.*
***Keywords:*** *Creativity, Pancasila Student Profile, Indonesian Language Learning*

## INTRODUCTION

The Pancasila Student Profile Program exists as an effort to integrate Pancasila values into the educational curriculum. This program aims to provide students with a deep understanding of the basics of Indonesian life philosophy, as well as to form a character based on the noble values of Pancasila (Mery, M., Martono, M., Halidjah, S., &; Hartoyo, A., 2022). With a focus on personal and social development, the Pancasila Student Profile Program not only emphasizes cognitive aspects, but also pays attention to the formation of attitudes, behaviors, and concern for the environment. Through a holistic approach, this program is designed to stimulate the potential of creativity and form a positive attitude that is in accordance with the values of Pancasila.

The Pancasila Student Profile Program has a crucial role in opening space for the development of students' creative potential. By instilling Pancasila values such as gotong royong and justice, this program creates a foundation that motivates students to produce creative thinking and innovative solutions (Safitri, A., Wulandari, D., &; Herlambang, Y. T, 2022; Irawati, D., Iqbal, A. M., Hasanah, A., &; Arifin, B. S, 2022). The created learning environment provides opportunities for students to develop their creativity through the exploration of ideas and concepts that are based on instilled moral values. Thus, the Pancasila Student Profile Program not only acts as character education, but also as a driver to stimulate students' creative potential in responding to complex problems and challenges in society.

Creativity is a person's ability to create something that emphasizes originality in expression with an imaginative approach (Webster in Anik Pamilu, 2017). Creativity comes from thinking differently from the individual. Mental abilities that are unique to the human person by creating something unique, different, original, new, beautiful, efficient, right on target, and effective are interpreted as creativity (Chandra in Sugihartono, et al, 2017). Creativity is one of the important things, with human creativity will be able to solve problems that arise in his life. Children have unlimited potential and can be developed with a variety of simple things. As a result, if creativity is not improved, students cannot solve problems in their lives and do not have the ability to create something new or unique. In the learning process of Indonesian subjects in the independent learning curriculum, the creativity of teachers and students is needed in order to find solutions to problems that exist during the learning process. This means that the learning process can be carried out and can be said to be active, if students and educators have a creative spirit in the learning process. The level of thinking ability of students is proven in their creativity when using their abilities by creating a unique solution, not yet existing or new.

Elementary school students in Indonesia often show creativity through art activities such as painting, handicrafts, and performing arts at school. This creates a space for them to express their imagination and artistic talent (Reference: Center for Curriculum and Bookkeeping, Ministry of Education and Culture of the Republic of Indonesia, 2013) In this context, learners are given space and opportunity to express their imagination and artistic talent. Art activities are not only part of the curriculum but also recognized as an effective means to stimulate children's creativity at the elementary level. Through painting, crafts, and performing arts, learners can develop their artistic skills while expressing their ideas and feelings creatively.

Teachers' efforts in strengthening the creative dimension of the Pancasila Student Profile involve a series of concrete steps to encourage student creativity in the context of Pancasila values. Several studies on AD, O. Y., Ariyanto, P., &; Huda, C. (2022); Saputra, R., Rochmiyati, S., &; Khosiyono, B. H. C. (2023) Teachers design learning that encourages students to think creatively. This could include the use of active learning methods, creative projects, or the use of technology in learning. In addition, teachers also strive for tasks given by teachers can be designed to promote students' creative thinking while reflecting the values of Pancasila. This can involve writing, art, or research projects that invite students to present their views in creative ways (Morrison, 2014). This study aims to describe the teacher's views on the Pancasila student profile program on the dimension of creativity in Indonesian learning.

**Profil Pelajar Pancasila**

According to Susilawati et al, (2021: 5) "The profile of pancasila students is a way to achieve understanding and character that is in accordance with pancasila values so that pancasila remains the basis of ideology". According to (Rusnaini et al, 2021: Susilawati et al, 2021) "The Pancasila student profile is one of the efforts to develop the quality of education that prioritizes character building". Rusnaini et al, (2021) explained that strengthening the profile of Pancasila students focuses on instilling character and abilities in everyday life instilled in individual students through school culture, intracurricular or extracurricular learning.

Pancasila student profile is a graduate profile that is expected with the aim of showing the character and competence expected to be achieved by students. In addition, the Pancasila student profile is also to strengthen students with the noble values of Pancasila (Ministry of Education and Culture, 2020). "Indonesian students are lifelong students who are competent, have character, and behave according to the values of Pancasila". (Sufyadi et al 2021:3) . This situation is in line with the vision of Indonesian education, namely "Realizing an

Advanced Indonesia that is Sovereign, Independent, and Personable through the Creation of Pancasila Students". The Pancasila student profile is one of the mandates of the President of the Republic of Indonesia as stated in the Regulation of the Minister of Education and Culture No. 20 of 2018 concerning the determination of the Pancasila student profile. In his direction and vision, he revealed that "the national education system must prioritize divine values, which have strong character and noble character and excel in innovation and technology". The things that encourage the formation of the Pancasila student profile are character educators who have begun to be eroded by time and increasingly forgotten. In character education, Pancasila students are formed which become the profile of the Indonesian nation in the national and international realm.

The Ministry of Education and Culture sets 6 indicators from the Pancasila student profile. The six indicators are listed in the Restra of the Ministry of Education and Culture (2020) and explained again by the Minister of Education and Culture (Kompas, 2020), including: 1) Have faith in fear of God Almighty, and have a noble character; 2) Global diversity, 3) Mutual cooperation, 4) Independent, 5) Critical reasoning, 6) Creative

**Creativeness**

According to John W. Haefele, creativity is the ability to do something new and socially valuable (Munfarijah, 2018: 2). According to Husna Handayani, (2018: 2), creativity is a need in the present and the future. Creativity is needed in order to invite centuries of competition for the development of creativity of someone who creates innovative work or something new and needed today. According to Santrock, creativity is the ability to think about something by using unusual ways to solve problems. According to Sujiono, creativity is the ability to think, create, procure, and find an original new form or idea that can be useful for the person himself and others (Adriyanto, 2017: 2). Creativity is the process of unifying knowledge from different fields of experience in forming useful ideas

by using new ways better and being able to realize them (Istiqomah, 2017: 2).

Creativity is the ability to create new products either completely new or modify what is already new (Fauziddin, 2016: 2). According to NACCCE (National Advisory Committee on Creative and Cultural Education) revealed that creativity is an activity that is carried out with imagination and creates new and valuable things (Nirvana, Widyaningsih, &; Sapaile, 2019).

According to Filsaime, (2018), the ability in the creative thinking process is referred to as divergent thinking skills, where the answers produced in divergent thinking will be different and varied with pre-existing answers, so as to produce creative solutions for solving existing problems. According to Kusadi et al, (2020: 4), indicators in creative thinking are fluency, flexibility, originality, and elaboration.

**The Nature of Indonesian Learning**

Learning is a process to achieve educational goals. The main task of teachers in learning is to condition their learning space and environment so that the learning atmosphere becomes pleasant and the process of changing behavior is good for students. According to Darmika, et al (2017: 2) the teaching and learning process is essentially to convey information to the recipient of the message. Indonesian language learning is the main part of the educational process in schools. Learning Indonesian is often underestimated by students because it is considered easy and boring. Teachers must strive to implement innovative Indonesian language learning in order to increase success, such as doing effective, active and creative learning methods or innovations.

Indonesian language learning is one of the subjects that must be taught in elementary schools. Language is a communication tool used as a national language and is one of the characteristics of the Indonesian nation. One of the reasons Indonesian language is taught at all levels of education, especially in elementary schools because it is

the basis of all learning. According to Roysa (2014), Indonesian language learning is the process of interaction between students and learning resources in a learning environment that is oriented towards transferring knowledge and developing four language skills. Indonesian language learning is essentially learning communication which aims to develop the ability to use Indonesian language in all its functions, ranging from means of thinking, reasoning, communicating, means of unity, and culture.

According to Atmazak in the journal of elementary school teacher education (Khair, 2018), Indonesian language learning aims to make students have the ability to communicate effectively and efficiently in accordance with applicable ethics, both orally and in writing, appreciate and be proud to use Indonesian as the language of unity and state language, understand Indonesian and use it appropriately and creatively to improve intellectual abilities.

## RESEARCH METHODS

This research uses a qualitative approach with a case study design. Case studies are used to investigate teachers' views on the Pancasila Student Profile Program with an emphasis on creativity in Indonesian learning. The case study method was chosen to allow for an in-depth exploration of the teacher's experience and perspective related to the program. This research was conducted at SD Negeri 2 Jatiroto. This research was conducted in August 2023 on grade IV students at State Elementary School 2 Jatiroto for the 2023/2024 academic year. Data collection techniques carried out in this study are observation, interviews, and documentation.

This research method involves the participation of teachers as research subjects, and relevant data collection techniques such as in-depth interviews, classroom observation, and document analysis will be applied. In-depth interviews will help understand the teacher's views, experiences and approaches to creativity in learning. Class observations can provide a direct picture of the implementation of the Pancasila Student Profile Program in real situations. Analysis of

documents, such as lesson plans and teaching materials, will provide additional context.

## RESULTS OF RESEARCH AND DISCUSSION

Based on the results of observations and interviews related to teachers' views on the Pancasila student profile program in terms of creativity in Indonesian language subjects at SD Negeri 2 Jatiroto, among others, as follows:

### 1. Fluency

From the results of research in the field shows that students still cannot express or spark ideas. Students still tend to be passive and inactive at the time of learning. The teacher's view of creativity is seen from the fluency indicator. Fluency is a fluent thinking skill that is characterized by expressing many opinions, answers, solving problems, providing many ways of doing things, and having assumptions of more than one answer.

Based on the results of interviews with grade IV teachers in fluency indicators.

> "There are some students who still haven't sparked or expressed their ideas, because during learning students tend to be passive and inactive. When students are not able to spark their ideas, the teacher stimulates students to express their ideas by providing concepts or images that are easy to understand so that students can give their responses." (Annisa Fitriani, S.Pd., interview August 24, 2023).

This is in accordance with the results of the interview, that teachers can provide encouragement to students when students cannot spark or express their ideas. When students do not understand the material, the teacher re-explains in detail the material that has not been understood by students, so that students can spark ideas, make suggestions, and trigger answers or

questions smoothly.

This is reinforced from observations, in the photo students still do not spark ideas or ideas much, even students still tend to be passive and inactive during learning. There are some students who are still confused in understanding the material explained by the teacher. When the teacher explained the material, there were some students who did not pay attention or listen to the teacher's explanation. During group discussions, one group only relies on one or two people working on the other discussion task to be silent. When the teacher provides a concept or picture that is easy to understand, students are better able to understand the material explained by the teacher. Therefore, to encourage students so that students can spark ideas, teachers must provide concepts or images that are easy to understand so that students can spark ideas and provide many suggestions for problem solving.

Previous research stated that creativity itself can be interpreted as a process of establishing various ideas in facing a problem or problem as a process of play, so with ideas and elements in mind is a fun and challenging action for active students. (Akmal Hawi, 2015: 190) Basically, every individual has creative potential.

Based on the results of the study, it can be said that students still have not sparked many ideas or ideas, because students are still confused in understanding the material explained by the teacher. When the teacher explained the material, there were some students who did not pay attention or listen to the teacher's explanation. During group discussions, one group only relies on one or two people working on the other discussion task to be silent. So students still can't come up with their ideas.

**2. Flexibility**

The ability to generate various ideas or ideas or answers to existing problems and the direction of thinking is not the same as others. From the interview results of grade IV teachers

"That students are still not able to provide answers or varied questions. Students are more silent during the learning process, more active teachers than students. Teachers provide more direction and encouragement to students so that students are able to develop answers". (Annisa Fitriani, S.Pd., interview August 24, 2023).

This is in accordance with the results of the interview, that students are still unable to provide answers or questions that vary. When students still do not understand the learning material, teachers can provide concepts or images that are easy to understand and teachers can give homework assignments at home so that students continue to study while at home.

This is reinforced by observations, that students have not given varied answers. But more to the teacher who gives answers during group discussions and during the teaching and learning process because students do not really understand the learning material. Students do not listen and pay attention to the teacher's explanations so that students cannot give varied answers. Because students only rely on one book in learning so that students lack knowledge and understanding.

Previous research states that the ability of skills in the creative thinking process (creative thinking skills) can be referred to as divergent thinking skills, where the answers produced in divergent thinking will vary and coincide with previously existing answers, this can create creative solutions for solving existing problems. (Filsaime 2018:3)

Based on the results of the study, it can be concluded that, students have not given varied answers. But more to the teacher who gives answers during group discussions and during the teaching and learning process because students do not really understand the learning material. When looking at problems from different angles, it is natural for teachers and can be used as a matter of discussion with students.

### 3. Originality

From the results of the study showed that, students are still unable to give birth to new and unique expressions. Originality is the ability to give birth to new and unique expressions, thinking of unusual ways to express oneself. From the interview results of grade IV teachers indicators of originality.

> "That some students do not understand the material taught by the teacher so that students' understanding and knowledge become reduced. Using learning tools and media can help students understand the learning material. For example, by using PPT or learning videos that make students can easily understand the learning material". (Annisa Fitriani, S.Pd., interview August 24, 2023).

This is in accordance with the results of the interview that, because learning that only relies on books makes students lack of understanding and knowledge. Students become bored and bored during the learning process. From this reinforced by observations, students still cannot think of answers that have never been thought of by others. Students are still assisted by the teacher in answering the questions. Because when answering the questions, students still refer to the book, so the students' answers are still the same as the answers in the book. And because when answering questions, students still refer to books, students cannot give birth to new and unique expressions.

Previous research stated that creativity creates future generations who are able to explore their potential in finding ideas to solve various problems both personal, group and even culturally (Kurniawan, 2016: 168; Munandar, 2014:31). That creativity in students is one of the most important potentials. Creativity cannot be separated from the behavior of individuals who dare to express unique and different opinions based on their knowledge.

**4. Elaboration**

The results showed that students have not been able to develop an idea. Elaboration is the ability to enrich and develop an idea or product. From the interview results of class IV teachers.

> "Students still have difficulty in developing an idea. Lack of knowledge and understanding of students in understanding student material becomes difficulty in developing ideas. In developing an idea, namely by choosing media or learning tools that are in accordance with the learning material, so learning does not only refer to books. By using media or learning tools, students can more easily develop an idea." (Annisa Fitriani, S.Pd., interview August 24, 2023).

This can be reinforced from the observation, from the photo that students have not been able to develop an idea well, because the learning process that only relies on books makes students lack knowledge and understanding of the learning material that has been taught by the teacher. The monotonous learning process makes students become bored and bored while studying. CBSA-based lessons (Record Books Until They End) make learning monotonous and not varied so that it can inhibit student creativity.

Previous research suggests that creativity can help come up with new solutions that were previously not clearly visible. This is because the creative process in solving problems involves sorting out things that are known in various areas of life (Beetlestone, 2013).

## Conclusion

Based on the results of research and discussion about Teachers' Views on the Pancasila Student Profile Program in terms of creativity in Indonesian subjects at SD Negeri 2 Jatiroto, it can be reviewed from 4 indicators, including: From the Fluency indicator students have

not sparked ideas in a paragraph. From the Flexibility indicator students have not been able to produce ideas, questions and answers that vary. From the originality indicator, students have not been able to give birth to new and unique expressions in paragraphs. From the Elaboration indicator students have not been able to develop an idea in the paragraph.

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# CHARACTER EDUCATION IN THE PEPALI TEXT OF KI AGENG SELA PUPUH POCUNG VERSES 1-81 COMPILED BY KI DARMASUGITA

R. Adi Deswijaya[1], Agus Efendi[2,] Harsono[3], Tri Widiatmi[4]
Department of Regional Language and Literature Education,
FKIP, Univet Bantara
adides2016@gmail.com[1]
aguse0968@gmail.com[2]
sonsjava@gmail.com[3]
triwidiatmi@gmail.com[4]

The purpose of this study is to describe the direction of character education goals and the kinds of character education in the Pepali Ki Ageng Sela text. Descriptive qualitative research method with character education approach and content analysis were used in this research. The data of this research are words and sentences in the Latin Javanese text of Pepali Ki Ageng Sela related to the purpose of character education and the forms of character education in the text of Pepali Ki Ageng Sela. The research data source is the text of Pepali Ki Ageng Sela compiled by Ki Darmasugita. The results of this study show that character education in the text of Pepali Ki Ageng Sela is intended for a wife in running a household and various kinds of character education related to the duties of a wife in the family and general human character.
**Keywords:** Pepali Ki Ageng Sela Text, Education, Character.

## Introduction

The development of civilization has transformed everything that was previously private into openness so that it is known by the public. Technological developments make everything open without any secrets. Mass media makes everything that is privacy open.

Issues of moral erosion have been widely reported lately in the mass media. Cases of infidelity adultery leading to divorce, cases of murder of parents against biological children or vice versa children against parents, rape and so on have spread in this real life.

News of infidelity leading to adultery and divorce is happening among artists recently. News of infidelity seems to happen repeatedly and has become a habit nowadays. The perpetrators, who are actors or artists, feel calm when asked for confirmation in public. They seem to feel no guilt and have no shame when the news is exposed in the mass media bluntly. The phenomenon of the erosion of human morals also occurs in cases of murder of parents against children or vice versa children against parents.

The problems of life above need to be raised in research because they are related to the education of aklaq or character of a person as a living being, and these actions are condemned by Allah as stated in the Qur'an and the hadith of the Prophet Muhammad SAW.

The majority of infidelity leads to adultery. Allah SWT has emphasized and openly prohibited adultery, as stated in Surah Al Isra' verse 32 which reads: Wa laa taqrabuzzinaa innahụ kaana faaḥisyah, wa saa`a sabiilaa 'And do not approach adultery, indeed adultery is an abominable act. And a bad path' (Setya, 2023). The Prophetic Hadith also emphasizes the prohibition of human adultery. This is stated in the Hadith narrated by Muslim as follows. From Abu Hurairah Ra. The Prophet SAW said, "Verily, man has been determined by the fate of adultery which is not impossible and will definitely be lived. The adultery of the eyes is seeing, the adultery of the ears is hearing, the adultery of the tongue is speaking, the adultery of the hand is striking, the adultery of the foot is stepping, the heart is desiring and fantasizing, and the private parts confirm all that, or deny it." (HR

Muslim) (Setya, 2023).

There have been many studies related to infidelity. One example is a study entitled Factors Causing Household Divorce Due to Infidelity, which concluded that the factors of divorce due to infidelity include: economic factors, ex-boyfriends, lack of husband or wife time for family, age differences, opportunity, low morals, disappointment, dissatisfaction, conflict, environment, and social media (Nugraha et al., 2020). Research with the title Infidelity: Scientific Exploration of Infidelity also concluded that the development of internet technology can contribute and one of the factors supporting the ease of conducting infidelity which is not limited by time, place and space (Shaleha & Kurniasih, 2021).

Apart from adultery, other acts that are cursed by Allah and will be put into Hellfire are murder. Allah SWT says in Surah Al Isra' verse 33 which means: "And kill not the soul which Allah hath forbidden, but with a just cause." Surah Al Maidah verse 32 also explains which reads: "Whoever kills a human being, not because of killing another, or because of causing mischief on earth, it is as if he has killed all humanity." An-Nisa' verse 93 also emphasizes the perpetrator of murder which translates as follows. "Whoever kills a believer intentionally, his recompense shall be Jahanam, and he shall abide therein, and Allah shall be angry with him, and curse him, and prepare a great punishment for him." (TIM HUMAS, 2022). The reward for people who commit murder is a very painful torment in the afterlife and is cursed by Allah SWT, because it can destroy the value system of life that has been built by the will of Allah SWT and deprive the victim of life (Mentari, 2020).

Based on the verses of Allah SWT and the Prophet's Hadith above, it is clear that the perpetrators of adultery and murder will be placed in Jahanam hell. These actions include acts that are abominable and cursed by Allah SWT. Anticipating unwanted things so that they do not become more widespread, there is a need for an effort to deal with the problems of the crisis through character or character education.

Character education has been written in the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, Chapter II Article 3, which explains that national education has a function in developing abilities and shaping the character and civilization of a dignified nation in order to educate the nation's life, aims to develop the potential of students to become human beings who are faithful and devoted to God, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (President of the Republic of Indonesia, 2003).

*The function of National Education in shaping a character is not only limited to the family and school level, but can also be done in the neighborhood through workshops at the neighborhood to village level. For example, a workshop to dissect the content contained in a literary work categorized as piwulang.*

*Literary works require character education. Literary works in the form of writing can be used as a learning platform. Learning in literary works is a form of expression from the author about the situation around him, which is then conveyed to the readers with the aim of providing information or as a form of invitation. Based on the content of literary works, the target of literary works is not only for students from elementary to high school levels, but the learning targets are so broad and can be accepted by any reader. As a form of writing, literary works become something that floats freely, can be directed to anyone and refers to anything that exists in various possible spaces and times (Faruk, 2017). Literary works are containers of human ideas or ideas as a means of communication whose contents can be implemented into today's life.*

In order for this research to focus on research problems and to produce novelty from research, researchers really need to review previous studies similar to the theme of character education. Based on this, researchers conducted a literature study on the results of previous studies and described as follows.

Referring to previous research such as that researched by Ni Made Surawati and friends with the title Implementation of Character Education Values in the Mahabharata Novel by Nyoman S. Pendit which discusses the importance of character education for students in the era of globalization in Nyoman's Mahabharata Novel. The data collection method used in this research is through distributing questionnaires to students. The analysis technique uses descriptive data. The results of the study found that various kinds of character education, including love of peace, love for the country, hard work, honesty, creativity, religion, and responsibility, were able to be applied by students of class XI IPA SMA Negeri 1 Atap Lembongan, Nusa Penida District, Klungkung Regency well (Surawati et al., 2022).

Faza Fauziyyah and Dadan Rusmana's research entitled Analysis of the Contents of Ki Ageng Selo's Pepali Fiber and its Benefits for Today's Generation analyzed the contents of Pepali Fiber and the authorship of Ki Ageng Selo. The method used is descriptive method through literature review technique. This research data is obtained and processed based on the results of literature studies by searching for data through journals, websites, and books. The results found can be known the form of literary works in the past and the literary side of Ki Ageng Selo (Fauziyyah & Rusmana, 2022).

Another research related to character education with the title Implementation of Polite Character Education Through Akidah Akhlak Learning by Fernanda Rahmadika Putra and friends. This research discusses (1) Akidah Akhlak learning, (2) forms of polite character education behavior, (3) cultivation of polite character education, (4) supporting factors for cultivating polite character education, (5) optimizing the utilization of supporting factors for cultivating polite character education, (6) obstacle factors in cultivating polite character education, and (7) solutions to obstacles in cultivating polite character education. This research resulted in, among others: (1) Akidah Akhlak learning in teaching and learning activities runs smoothly, effectively, and innovatively, (2) the form of

polite character education behavior has been formed, just add to the existing shortcomings, (3) the cultivation of polite character education Mr. and Mrs. Teachers provide examples of noble attitudes, encourage, and accustom noble behavior, (4) supporting factors in the cultivation of polite character education, namely supported by good and adequate classroom infrastructure and high student interest in learning, (5) optimizing the utilization of supporting factors for the cultivation of character education, schools must be able to be responsible for developing the cultivation of noble character education, (6) obstacle factors encountered in the cultivation of polite character education, namely environmental factors, the diversity of students, choosing the wrong friends, and (7) solutions made from character education cultivation obstacles, namely giving advice, giving punishment or warning in the form of a warning (putra et al., 2020).

The next research that has been done before is with the title Application of Character Education in Mathematics Learning by Pascalian Hadi Pradana. This study discusses 1) the application of character education planning in mathematics learning, 2) the implementation of character education in the implementation of mathematics learning, 3) the application of character education in evaluating mathematics learning. Data collection techniques are observation, interview and documentation. The results of the study found, among others: (1) the application of character education in mathematics learning planning to develop an application of character education into a curriculum. The curriculum in this case includes a syllabus and lesson plans, while the lesson plans are applied for each mathematics learning activity, (2) implementing character education in the implementation of mathematics learning including the implementation of character education in instilling discipline and responsibility to students, the implementation of character education in core activities is carried out with group discussions so as to train students to work hard, creatively, think logically, and critically. In the closing stage, the implementation of character education is carried out

by giving observation tasks on the accuracy of the material to train students, (3) the implementation of character education in the evaluation of mathematics learning is carried out by giving reprimands and sanctions when there are exams or tests to train students' honesty and responsibility (Pradana, 2016).

Referring to the four previous studies above, 3 of them have in common research on character education, the difference lies in the object of study, namely this research in the form of Javanese Classical Latin texts in Javanese. One previous study is different in its study, while the object of study is the same, namely the Pepali Ki Ageng Sela text which has different versions.

The definition of text is handwriting on sheets made of paper, daluwang, palm, bamboo and so on (Oman Fathurahman, 2015). Classical Javanese texts are the literacy products of the ancestors. The content of classical Javanese texts is divided into several categories, including: history, genealogy, laws and regulations, wayang, wayang literature, literature, piwulang and suluk, Islamic religion, primbon and pawukon, language, music, dance, customs, and others (Behrend TE, 1990).

Ki Ageng Sela was famous as a figure during the Demak-Pajang palace, who is said in Babad Tanah Jawi to be able to catch lightning while in the middle of a rice field. Ki Ageng Sela, the son of Getas Pandawa, has brought down the kings of Islamic Mataram. The word pepali means prohibition. The presence of the word pepali in the title of the text contains content related to things that are prohibited. What character education is contained in the Pepali Ki Ageng Sela text and who is it intended for?

## Method

This research uses a descriptive qualitative research method, because it describes the characters contained in the Pepali Ki Ageng Sela text. The data in this study are words, sentences and discourses in the Pepali Ki Ageng Sela text related to character education. The data source of this research is Pepali Ki Ageng Sela text compiled by Ki

Darmasugita in 1962, published by Djodjobojo Publishing Foundation Surabaya.

Data collection was done by listening and recording, without interviews. Listening relates to words, sentences, and discourse in the manuscript related to the problems of this study, then after being found, recording is carried out. This was done because this research only focuses on character education. The analysis technique uses content analysis with character education studies.

**Finding and Discussion**

Referring to the problem above, which is based on the Pepali Ki Ageng Sela text compiled by Ki Darmasugita, some character education can be found in Pupuh Pocung stanzas 1-81 as follows.

**1. Character Education for a Wife in Domestic Life**

Character education in married life in the text of Pepali Ki Ageng Sela is preceded by a wife's obligation to her husband as follows.

**a. Respect to husband**

A woman if married will become the responsibility of a husband and is not allowed to leave the manners towards her husband. This can be seen in data 1 and 2 below.

Data 1. *Estri iku datan wurung dadya pucung / kawengku ing priya/ tingkahnya den reh ing laki / pangrasane kang priya asoring tingkah //* (Pocung, Bait 1)

The woman will eventually become a pucung / owned (betrothed) man / all her behavior is regulated by the husband / the husband's assumption, the wife has bad behavior //

Data 2. *Nora pisan yen nganggep laki nggeguru / dhingin kadang tuwa / ing mengko wus dadi laki / laki kadang nora tinggal tatakrama //* (Pocung, Bait 2)

Never once thought of studying with a husband / originally an old brother / now a husband / husband and brother are still the same, they cannot leave the manners //

**b. Knowing Household Manners.**

There are three things that a wife must do in carrying out household manners. The following data 3-5 shows this.

Data 3. *Tur punika wus kawedal antepipun / anggepnya akrama / tatakramane akrami / ingkang dhihin ing panganggep kumawula //* (Pocung, Bait 3)

Already expressed his intention / to get married / married manners / the first is compared to serving //

Data 4. *Ping dwinipun panganggepmu laki guru / ing donya akerat / aja anglirwakke tuding / anuhoni anurut ngalor ngidulnya //* (Pocung, Bait 4)

Second, in serving your husband / in the world hereafter / do not leave his orders / must obey and follow to the North or to the South //

Data 5. *Kaping telu anganggepa bapa babu / lawan kadang tuwa / wenang mulang awal akhir / datan ana mulang rabi pinrih ala //* (Pocung, Bait 5)

Third, think of your husband as a father and mother / and an old brother / who is authorized to give instructions from beginning to end / no husband teaches his wife to behave badly //

**c. Trust**

Data 6 below shows that a wife must have trust in her husband so that there is no suspicion in the family.

Data 6. *Mulanipun mengkono estri linuhung / wit saking pitaya / nora darbe sanggarunggi / trusing manah pracaya ing kakungira //* (Pocung, Bait 6)

A good wife / starts from trust / has no feelings of suspicion / in her heart always believes in her husband //

**d. Fear**

A wife must have fear of her husband as evidenced by her words. This is stated in data 7 below.

Data 7. *Ajrihipun aja amis benges wuwus / nyatakna ing ujar / piwulange kang kawiji / aja watak bengesan nganggep mring priya //* (Pocung, Bait 7)

Fear not only pretend in the mouth / prove it in saying / the teachings conveyed / do not be pretentious towards your husband //

**e. Sincerely sincere**

Data 8. *Eklas terus jroning tyas estri kang luhung / pawestri kang nistha / ing akrama datan yekti / awit dene karam budi tan saranta //* (Pocung, Bait 10)

A noble wife must be sincere in her heart / a wife who is bad / when undergoing marriage is not in earnest / so that an impatient nature will meet bad luck //

Data 8 above shows that a good wife must be sincere in her heart, and must have patience.

**f. Speak pleasantly**

A wife when reminding her husband should use pleasant words so as to make her husband's heart calm. Data 9 below shows this.

Data 9. *Lamun tutur den ririh kang manis arum / campuren slenggara / mamrih lejare panggalih / yen wus lejar mesthi manut marang sira //* (Pocung, Bait 18)

If reminding must be with sweet or pleasant words accompanied by affection / so that his heart melts / if it has melted it will definitely obey you //

**2. Character Education for the Public**

In addition to character education for a wife, Ki Ageng Sela's Pepali text also contains character education for the public. The following are the forms of character education for anyone.

**a. Give in**

Data 10 below illustrates that someone who has the trait of relenting to others will find victory or excel. The meaning of victory or excellence here is to find safety or peace in the heart.

Data 10. *Tepa tepus tan nilar sariranipun / ngesoraken raga / wani ngalah mring sasami / nemu menang wong ngalahi mring sasami //* (Pocung, Bait 31)

Moreover, do not leave manners / always humble / dare to give in to others / people who are happy to give in to others will find victory //

**b. Love each other.**

Data 11. *Datan wurung wong ngalah amanggih luhur / yakti nora cidra / yen asih marang sesami / winales sih sihireng sagung manungsa //* (Pocung, Bait 32)

Finally, people who are happy to give in will get nobleness / will definitely keep their promises / if you love others / then you will get affection from others //

Data 11 above explains that people who like to give in will be noble and always keep their promises. In addition, people who love others will get love back from others.

**c. Understanding other people's feelings**

Data 12. *Sartanipun olah panggraiteng kalbu / nuksmeng tyasing janma / **jenjem tyas sawiji-wiji** / janma tama ngawruhi osiking janma //* (Pocung, Bait 37)

Accompanied by mysticism / until it can dive into everyone's heart / until it seems to be able to understand one by one the wishes of people's hearts / that is called the main man //

People who have the main character are people who can dive into the heart or feelings of each person, so that they can take care or nurture when interacting. This character is shown in data 12 above.

**d. Willing and believing in God's power**

Data 13. *Rila terus asih samining tumuwuh / anggepnya wlas arsa / tan ana kang den sengiti / tyas pracaya marang Hyang Kang Maha Mulya //* (Pocung, Bait 40)

His heart is willing and always love among others / love for fellow creatures / no one is hated / his heart believes in the power of God //

Data 14. *Kang panemu tan ana inganggep satru / amung anggepira / sadaya janma samya sih / sih-sinihan rila jaluk-jinalukan //* (Pocung, Bait 41)

In his heart, he thinks that in this world there are no enemies / only thinks / that all humans love each other / love to love willingly if they ask each other //

The explanation of people who have the character of helping others and their hearts believe in the power of God is shown in data 13 above. The character in data 13 is reaffirmed in data 14 above, that people who like to help, in their hearts there is no one who is their enemy, all are considered to love each other and are willing to give if something they have is requested by others.

**e. Confident (no worries)**

Data 15. *Budenipun idhep mantep wijil luhur / datan pupulasan / tan ngraket budi tan yekti / tyas utama datan watak taha-taha //* (Pocung, Bait 43)

What is held is the nobleness of nature / not pretending / not wanting to have a bad disposition / so that one who has a major (good) heart has no worry //

Not worrying is the character of someone who has a noble (main) heart, so that in his heart he does not have any worries. This character is as described in data 15 above.

**f. Not two-faced (*mbuntut arit*)**

Data 16. *Teteg teguh ririh rereh ruruh arum / eklas jroning nala / tan watak ambuntut arit / yen wus mulung ing asta atine rila //* (Pocung, Bait 44)

Brave character strong patience / sincere heart / not two-faced / if you have helped his heart sincerely //

The character of not being two-faced appears in data 16 above. This character has a brave character who is patient and sincere when helping others.

**g. Not easily jealous**

Data 17. *Aywa manuh budi butarepan kulup / nuli singgahana / yeku wong jinise eblis / saru nistha wong lanang tindak mangkana //*

Don't be jealous son / stay away / it's the devil's character / men with that character are very shameful and not good //

Data 17 above describes the character of not being jealous easily. The character of being easily jealous is a demonic character, so it is inappropriate for a man to have a jealous character because it is very shameful and bad.

**h. Many friends**

Data 18. *Iku mungguh potang luhur uripipun / sugih pawong sanak / manggih ganjaran yen mati / nadyan darbe kumet ngangge duga-duga //* (Pocung, 77)

As for when his life has a noble character / many friends brother / if he dies will get a reward / although stingy but has a character that can calculate //

Having many friends is recommended in data 18 above, because having many friends will get a reward even though it is rather stingy but has a character that can master the situation.

**Conclusion and Recommendation**

**Conclusion**

After conducting research and obtaining research results related to character education in the Pepali Ki Ageng Sela text above, it can be concluded as follows.

1. The text of Pepali Ki Ageng Sela is very conducive to the teaching of character education for a wife in navigating the household and society in general.

2. The text of Pepali Ki Ageng Sela literary work has education including: respect for the husband, trust, fear, sincerity, saying pleasant things, giving in, loving each other, understanding other people's feelings, willing and believing in God's power, confidence (not worrying), not being two-faced, not being jealous easily, and having many friends.

**Recommendation**

Classical Javanese texts can be used as reference material for character learning for students and society in general.

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*Book Chapter*
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# EDUCATION ISSUES
## IN DIGITAL ERA

Sebuah karya *bookchapter* ini menjadi salah satu wujud pengembangan profesionalitas Fakultas Keguruan dan Ilmu Pendidikan (FKIP) Universitas Veteran Bangun Nusantara untuk dapat berbagi informasi ilmiah yang dapat diterapkan oleh seluruh pihak. Aspek-aspek yang dikaji dalam *bookchapter* ini adalah: 1) Bidang Pendidikan dan Pengajaran; 2) Metode Pembelajaran; 3) Bidang Evaluasi Pembelajaran; 4) Kurikulum; 5) *Lesson Study*. Keberadaan *bookchapter* ini merupakan bentuk dari pelaksanaan tridarma pendidikan oleh dosen. Tentu saja *bookchapter* ini ditulis sebagai refleksi hasil riset sederhana para dosen dan mahasiswa sesuai dengan bidangnya masing-masing. Pada gilirannya, penerbitan semacam ini, selain dapat dimanfaatkan oleh para mahasiswa dan dosen dalam proses pembelajaran, juga merupakan wujud kontribusi keilmuan fakultas dan program studi bagi pengembangan ilmu secara umum.

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