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PREFACE

Praise and gratitude are sincerely offered to the Most Forgiving Allah ‘Azza wa Jalla, for by His mercy and grace, METODIK DIDAKTIK: Journal of Elementary Education containing research findings or studies equivalent to research in this January 2025 edition, Volume 21 Number 1, can be published. Blessings and peace be upon the exemplary role model, Prophet Muhammad SAW, his family, his companions, and upon us as his devoted followers.

In this edition, we present seven articles with the following titles: 1) Utilization of Audiovisual Media in Understanding Procedural Texts in Grade IV at SDN Jatimekar 6 (Dilla Aulia Ramadani, Herlina Usman, Mahmud Yunus), 2) Development and Validation of Mathematical Literacy Instruments Based on Ethnomathematics for Primary School Students (Teten Ginanjar Rahayu, Alfiana Nurussama, Hafiziani Eka Putri, Arina Zahra Saskia, Meiliani Intan Safitri, Restika Wahyuni, Try Rahmawati), 3) Effectiveness of Using Norm Bags in Improving Pancasila Learning Outcomes in Grade IV Students at Pengkol 01 Elementary School (Sholaikah Dina Marfuah, Rindiani Tiara Fitri, Putut Sartuti, Tri Sutrisno, Sri Rahayu), 4) The Synergy of Numerical Intelligence and Learning Interest in Determining the Mathematics Achievement of Students at SD Negeri 1 Passo (Vione Delia Horman, Nessy Pattimukay, La Suha Ishabu), 5) Improving Reading and Writing Skills in Essay Writing through the Use of Comic Strips among 5th Grade Elementary School Students (Shinta Listiani, Pratiwi Kartika Sari, Lieony Jiansyahdry), 6) Validity of Internship Program Instrument in Primary School Teaching College, Timor-Leste (Mariano Dos Santos, Ahmad Ahmad), 7) 21st Century Education Reform in Facing the Challenges of the Times in the Era of Disruption (Seka Andrean), 8) The Implementation of the Pancasila Student Profile Rahmatan Lil’ Alamin Approach on the Religius Character of Elementary School (Dewi Puspitasari, Muhlasin Amrullah, Vanda Rezania), 9) Development of Math Learning Media: Math Fraction App in Elementary School (Verra Ayu Fatmawati, Ari Susandi, Mochammad Miftachul Huda), 10) The Role of Discipline in Character Education for Elementary School Students in The Digital Era (Muhammad Afif Bahar Nurdien, Subar Junanto, Latifah Permatasari Fajrin).

We would also like to express our utmost gratitude and appreciation to the Editorial Board for:

1. The Director and Vice Director of UPI Purwakarta Campus who have given their approval for the publication of this journal.
2. The Head of the PGSD Study Program at UPI Purwakarta Campus who has guided and encouraged the publication of this journal.
3. The authors of articles, both those whose works have been published and those whose submissions were not accepted, and
4. Rekan-rekan civitas akademika UPI Kampus Purwakarta yang telah membantu penerbitan jurnal ini.
5. The colleagues of the academic community at UPI Purwakarta Campus who have supported the publication of this journal.

In closing, it is hoped that the content presented in this edition of the journal will be beneficial to the educational community in general and to the authors in particular.

Purwakarta, July 2025

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Utilization of Audiovisual Media in Understanding Procedural Texts in Grade IV at SDN Jatimekar 6

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ABSTRACT

Difficulties in reading comprehension among elementary students remain a persistent challenge, particularly when learning procedural texts. This study aims to explore the implementation of audiovisual media to improve reading comprehension in Indonesian language learning for fourth-grade students at SDN Jatimekar 6. The research employed a qualitative descriptive method, involving 28 students and one teacher, with five students selected for interviews. Data were collected through classroom observations, interviews, and documentation, then analyzed using Miles and Huberman's interactive model. The findings reveal that the majority of students demonstrated increased attention, engagement, and understanding of procedural steps after the use of instructional videos. Approximately 85% of students were able to confidently explain the sequence of making a simple drink using relevant vocabulary. The teacher also observed higher motivation and classroom interactivity. It is concluded that audiovisual media are effective in enhancing elementary students' reading comprehension of procedural texts.

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1. INTRODUCTION

Reading proficiency is a fundamental component in achieving academic success at the elementary school level. Reading involves not only the recognition of linguistic symbols but also comprehension, interpretation, and the ability to relate textual information to students' prior experiences and knowledge. Thus, reading comprehension serves as a key indicator in assessing students' literacy competence. Students need to acquire reading skills to gain knowledge and competencies, as most learning activities are conducted through reading (Prasetyo et al., 2022).

However, field observations show that fourth-grade students at SDN Jatimekar 6 experience difficulties in comprehending reading materials, including literal, inferential, and evaluative levels. These difficulties lead to low academic achievement and reduced student motivation to engage actively in learning. The problem is further exacerbated by the use of conventional teaching methods, in which learning is teacher-centered and students tend to remain passive (Hayati et al., 2022). The limited use of innovative and contextual learning media results in monotonous and unengaging learning processes (Fitri et al., 2025). Instructional media play a crucial role in creating more engaging learning experiences, especially through interactive media that allow students to interact directly with content via videos, animations, or digital applications (Ariyani et al., 2024). The scarcity of innovative media is a major contributing factor to the low reading comprehension of students, as teachers continue to rely heavily on textbooks and lectures, making it difficult for students to build meaningful connections with the texts (Putrihana et al., 2021). Teaching approaches that are unresponsive to students' needs negatively affect their reading comprehension (Apandi, 2022).

With technological advancement, audiovisual media have emerged as a promising solution to these issues. This type of media integrates images, texts, sounds, and animations into a cohesive unit, making learning more appealing and enhancing information retention. The use of audiovisual media in Indonesian language learning has been shown to significantly increase students' reading interest and comprehension (Etnawati, 2019).

Theoretically, this is supported by Mayer's (2009) Cognitive Theory of Multimedia Learning, which asserts that learning becomes more effective when information is delivered through both verbal (auditory) and visual channels simultaneously. Similarly, Paivio's (1986) Dual Coding Theory explains that encoding information through verbal and non-verbal systems strengthens the comprehension process. Audiovisual media, which combine text, images, and sound, enable dual encoding that supports memory retention and understanding.

From a sociocultural perspective, Vygotsky's Sociocultural Theory highlights the importance of social interaction and cognitive stimulation in the learning process. Audiovisual media serve as an instructional aid that facilitates interaction through contextual visual presentations and narratives that foster critical and collaborative thinking. Previous studies have also demonstrated the effectiveness of audiovisual media. Usman (2016) reported that the use of visualization media improved students' reading comprehension by up to 95.4%. Riniwanti et al. (2024) added that developing interactive audiovisual media using Kinemaster was effective in enhancing students' motivation and active participation during learning.

Although numerous studies have confirmed the benefits of audiovisual media in reading instruction, research specifically addressing its implementation to improve reading comprehension among fourth-grade students remains limited. Reading comprehension is a complex skill that requires adaptive and multimodal approaches. Therefore, the research problem that this study seeks to address is: *How is audiovisual media implemented to improve*

reading comprehension of procedural texts among fourth-grade students at SDN Jatimekar 6?

The purpose of this study is to describe the implementation of audiovisual media in teaching procedural texts to fourth-grade students at SDN Jatimekar 6. The findings of this study are expected to provide practical contributions for teachers in designing technology-based and contextual literacy instruction strategies and contribute to improving the quality of basic education in the digital era.

2. METHODS

This study employed a qualitative descriptive method to gain a comprehensive understanding of the implementation of audiovisual media in enhancing the reading comprehension of fourth-grade students at SDN Jatimekar 6. The qualitative approach was chosen because it allows researchers to explore phenomena in a natural context and reveal meaning from the participants' perspectives. It is appropriate for classroom-based studies where interaction, behavior, and context are important elements to be observed holistically (Moleong, 2017).

The research was conducted on Tuesday, April 29, 2025, at SDN Jatimekar 6, located in the Graha Indah Complex, Jl. Tangkuban Perahu, RT 003/RW 015, Jatimekar, Jatiasih Subdistrict, Bekasi City, West Java. The study focused on the Indonesian language learning process, particularly on the teaching of procedural texts using audiovisual media in the form of instructional videos projected in class. A total of 28 fourth-grade students participated in the observation. In comparison, interviews were conducted with one teacher and five students selected through simple random sampling to ensure a range of perspectives.

Data collection was carried out using three techniques: observation, interviews, and documentation. Observations were guided by an instrument developed based on Mayer's (2021) Cognitive Theory of Multimedia Learning. This instrument consisted of 20 indicators, which were categorized into three main aspects: the use of audiovisual media, the students' comprehension of procedural texts, and their level of engagement and interaction during learning. The indicators included students' attentiveness to audiovisual content, ability to recall and retell the steps of a procedure, verbal responses using target vocabulary (such as *pour*, *stir*, *boil*), and peer collaboration after media exposure.

Interviews were conducted in a semi-structured format to explore the perceptions of both the teacher and students regarding the use of audiovisual media. The interview guide for the teacher included questions about instructional strategies, classroom management during video use, perceived student responses, and challenges in implementation. For students, the interviews focused on their learning experiences, preferences, comprehension of the material, and perceived differences between traditional and media-assisted instruction. In addition, documentation in the form of photographs, screenshots of the learning video, and student-written responses was used to support and triangulate the data.

The research procedure followed three systematic stages. In the preparation stage, the researcher conducted a preliminary observation of the class, selected appropriate instructional video material, designed the observation sheet and interview guides, and obtained permission from the school. During the implementation stage, data were collected in one learning session through classroom observation, followed immediately by interviews and documentation of the learning process. In the analysis stage, the data were processed using the interactive model of Miles and Huberman, which consists of four interconnected components: data collection, data reduction, data display, and conclusion drawing.

To ensure the validity of the data, the study used the technique of triangulation by comparing the results of observations, interviews, and documentation. This methodological approach ensured data consistency and strengthened the credibility of the findings (Sugiyono, 2016).

3. RESULTS AND DISCUSSION

3.1. Results

This research was conducted to examine how the implementation of audiovisual media contributes to improving reading comprehension, specifically in the context of procedural texts, among fourth-grade students at SDN Jatimekar 6. The data were collected through classroom observations, teacher and student interviews, and documentation. The lesson observed was an Indonesian language class in which a procedural text was delivered using audiovisual support, specifically an instructional video accessed via YouTube.

At the start of the lesson, the teacher initiated a stimulus activity by asking contextual questions designed to activate students' prior experiences. For instance, the teacher asked, *"Who has ever made their drink at home?"* and *"How do you prepare your breakfast?"* Although these questions were relevant and connected to the theme of the lesson, initial responses from students were limited. A number of students appeared disengaged; they either failed to respond or provided minimal answers. This indicates that, before the use of media, classroom interaction was not optimal, and student focus was relatively low.

The classroom dynamic shifted significantly when the audiovisual media were introduced. The teacher played a five-minute educational video depicting the step-by-step process of making a beverage. As the video played, observable changes occurred in student behavior. Most students sat upright, kept their eyes on the screen, and showed increased focus. The narration, visual cues, and motion in the video collectively captured their attention.

The observation data were analyzed using an instrument adapted from Mayer's (2021) Cognitive Theory of Multimedia Learning, which consisted of 20 indicators grouped into three dimensions: media response, reading comprehension indicators, and student engagement (see **Table 1**).

Table 1. Summary of Student Behavior During Learning Activities Based on Observation Indicators

Indicator Category	Specific Indicators Observed	Observation Result	Notes
Media Engagement	Students watched the video without distraction	Achieved	Students were quiet and focused during video playback
	Students followed audio narration with visual synchronization	Achieved	Students nodded, repeated words, and showed responsive facial expressions
Reading Comprehension	Able to recall and retell procedural steps in the correct sequence	Achieved	Several students retold the steps of making tea/orange juice confidently
	Use of target vocabulary (pour, stir, boil)	Achieved	Vocabulary was used in both oral and written tasks
	Able to summarize video content orally	Achieved	Students provided summaries in their own words with appropriate details
Peer Interaction	Students initiated discussions with peers	Achieved	Informal group discussion emerged post-video viewing
	Students responded to friends' opinions and elaborated on ideas	Achieved	Peer correction and extension of explanations occurred spontaneously

Indicator Category	Specific Indicators Observed	Observation Result	Notes
Motivation	Students voluntarily raised their hands to answer or share opinions	Achieved	A higher number of voluntary responses compared to previous sessions
Task Completion	Students completed procedural writing tasks enthusiastically	Achieved	Creative tasks: iced milk, instant noodles, etc.
Focus and Discipline	Students stayed on task without being reminded repeatedly	Achieved	The classroom remained orderly during and after video playback

Figure 1. The teacher begins the lesson with stimulus questions.

Figure 2. Students attentively watch the procedural text video.

These observations suggest that the audiovisual media did not merely attract student attention but also enhanced their cognitive processing. After the video, the teacher asked comprehension questions, and students responded using accurate vocabulary and well-organized sentences. For example, one student answered: *"First we boil the water, then add tea and sugar. Stir it well, then it is ready."* This response shows not only memory recall but also understanding of the procedural sequence and terminology.

Moreover, several students who were typically passive became more active participants. They volunteered to come forward and retell the procedural steps orally. One student explained the steps of preparing orange juice and emphasized squeezing the fruit, filtering the pulp, and pouring it into a glass. This demonstrated that students had not only memorized steps but also internalized the concept and visual process.

Figure 3. A student orally retells the video content in front of the class.

During the final stage of the lesson, the teacher assigned students to write a procedural text based on an activity from their daily life. Students eagerly began to write about topics such as making instant noodles, preparing iced chocolate milk, or refilling a gallon of water. The structure of their texts generally followed the correct format of title, goal, materials, and steps.

In addition to observation, interviews were conducted with the Indonesian language teacher (Teacher F). She explained that audiovisual media had become one of her main instructional strategies, especially when introducing abstract or procedural concepts:

Compared to only reading or writing on the board, students learn faster and enjoy the class more with videos. They become curious and more confident to ask questions."

She also stated that the video helped her maintain classroom control. The students paid more attention and required fewer reminders to stay focused:

"The class was more manageable. I did not have to keep asking for silence because the video already captured their attention."

When asked about student comprehension, she noted a marked difference:

"They not only remembered the steps but also used the vocabulary that we previously struggled to teach using books. Words like 'boil' or 'pour' became easy for them because they saw it in action."

The five students interviewed gave similar responses. One mentioned:

"This feels like watching YouTube, but we are learning. It is not boring."

Another shared:

"I usually do not like answering questions, but after watching the video, I understood and wanted to talk."

Some even reported that the video helped them complete the final writing task because they already had an example in mind to model from.

These results were further triangulated with documentation, including student-written texts and photographs taken during the learning session. Written products showed consistent use of procedural structure and vocabulary, while documentation confirmed student attentiveness and participation throughout the lesson.

3.2 Discussion

The findings of this study reveal that audiovisual media have a significant positive influence on students' reading comprehension and learning engagement, particularly in the context of procedural text instruction. Data obtained through classroom observation demonstrated that students became more focused, responsive, and expressive when audiovisual media were integrated into the learning process. This condition reflects the principles of Mayer's Cognitive Theory of Multimedia Learning (2021), which emphasizes that effective learning occurs when both auditory and visual channels are activated simultaneously. The use of instructional video enabled students to observe and listen to the steps of a procedure in real time, facilitating better understanding and retention.

The students' ability to apply vocabulary accurately and understand the sequential structure of a procedure also aligns with Paivio's Dual Coding Theory (1986). According to this Theory, learning becomes more effective when information is processed through verbal and non-verbal systems concurrently. In this study, the combination of narration and visual demonstration allowed students to develop stronger conceptual understanding. This was evident in their ability to recall steps correctly, retell content fluently, and use target vocabulary such as "pour," "stir," and "boil" in both oral and written expressions.

In addition to cognitive benefits, the use of audiovisual media contributed to a notable transformation in the classroom environment. Students who were previously passive began to participate more actively, initiating discussions, responding to peer explanations, and engaging in group work. This change is consistent with Vygotsky's sociocultural Theory, particularly the concept of the Zone of Proximal Development (ZPD). The video functioned as a form of scaffolding, helping students grasp abstract or unfamiliar content that would be difficult to comprehend through text alone. Peer interaction that emerged organically during the learning process demonstrated that students were not only receiving information but also co-constructing knowledge through social engagement.

Motivational aspects also played a central role. Students expressed enjoyment during the video session and demonstrated increased willingness to complete learning tasks. The media format, which resembled familiar entertainment platforms, reduced learning anxiety and increased enthusiasm. These findings are supported by previous studies such as those by Usman (2016) and Riniwanti et al. (2024), which highlight the capacity of audiovisual media to promote learner autonomy, interest, and active participation in the classroom.

While the study presented promising outcomes, several limitations were encountered. First, the research was conducted in a single classroom within one school, focusing on one lesson session. As such, the findings cannot be generalized to wider populations or extended to long-term learning outcomes without further investigation. Future studies involving multiple schools and longitudinal data collection would offer more comprehensive insights.

Second, the study concentrated solely on one procedural text; thus, the effectiveness of audiovisual media in teaching other genres, such as narrative or descriptive texts, remains an area for further research. Expanding the scope of media-based instruction to different text

types could provide a more holistic understanding of its pedagogical value.

Another limitation involves the availability and reliability of technical infrastructure. During the implementation, challenges such as unstable electricity, limited access to the internet, and inadequate multimedia equipment were noted. These factors can significantly affect the consistency and sustainability of audiovisual learning in schools, particularly those with minimal resources. In addition, the reliance on external media platforms such as YouTube raises concerns regarding content relevance, accessibility, and alignment with curriculum objectives. Teachers may require support in selecting, adapting, or even producing educational audiovisual content that is both pedagogically effective and contextually appropriate.

Despite these challenges, the study concludes that, when integrated with proper planning and sufficient technical support, audiovisual media have the potential to enrich reading instruction in elementary schools. It serves not only as an instructional aid but also as a tool to foster student engagement, deepen comprehension, and facilitate collaborative learning. The use of such media aligns with contemporary educational goals that emphasize digital literacy, multimodal learning, and student-centered pedagogy.

4. CONCLUSION

The results of this study indicate that audiovisual media effectively enhance students' comprehension and engagement in learning procedural texts in the fourth grade of elementary school. By presenting real-world processes through video, students were better able to visualize each step, understand vocabulary in context, and demonstrate confidence in both speaking and writing activities. The integration of audiovisual content also contributed to a more interactive and focused classroom environment, with students showing increased motivation and participation.

In light of these outcomes, the use of audiovisual media can be considered a relevant and supportive strategy for language instruction at the elementary level. However, successful implementation requires consideration of infrastructure readiness and the capacity of teachers to select or design appropriate media. While the study offers promising insights, its scope was limited to one genre of text and one educational setting.

Future research is encouraged to explore the development and application of other types of learning media that may further support literacy development, such as animations, digital storybooks, or student-created video projects. Expanding the research to different grade levels or educational contexts could provide a deeper understanding of the adaptability of media-based instruction. In addition, the use of quantitative methods is recommended to complement qualitative findings and to assess the effectiveness of audiovisual media through measurable learning outcomes.

5. AUTHORS' NOTE

This article is part of the research conducted at SDN Jatimekar 6 as a contribution to the development of learning media at the elementary school level. The author expresses gratitude to the fourth-grade teacher, identified as F, for the opportunity and support provided during the observation and interview process. Thanks are also extended to all fourth-grade students who actively participated and contributed valuable data throughout the study.

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Development and Validation of Mathematical Literacy Instruments Based on Ethnomathematics for Primary School Students

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ABSTRACT

Mathematical literacy has become one of the essential skills required by students to face the dynamics and challenges of the 21st century. This study aims to develop an ethnomathematics-based mathematical literacy test instrument for elementary school students at phase B. The research method employed is Research and Development (R&D) using the ADDIE model. The developed instrument consists of 10 essays that integrate local cultural contexts. The item validity test results showed significance values ranging from 0.296 to 0.712, with most items meeting the validity criteria (r ≥ 0.3). The reliability test produced a Cronbach's alpha value of 0.85, indicating very good internal consistency of the instrument. The item difficulty analysis showed that 50% of the items were classified as easy (P > 75%), 40% as moderate (25% ≤ P ≤ 75%), and 10% as difficult (P < 25%). Based on these results, it can be concluded that the developed ethnomathematics-based mathematical literacy test instrument is valid, reliable, and feasible to be used as an evaluation tool for elementary school students' mathematical literacy abilities.

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1. INTRODUCTION

The improvement of mathematical literacy has become one of the main focuses in 21st-century mathematics education because this ability is essential for solving everyday problems and facing global challenges. (Trisnaningtyas & Khotimah, 2022). The assessment instruments used to measure students' mathematical literacy must be valid, reliable, and contextual so that the measurement results truly reflect students' abilities and learning experiences. One approach considered effective in developing such instruments is ethnomathematics, which links mathematical concepts with local cultures that are close to students' lives (Diana & Fitriani, 2024; Fauzi et al., 2024; Muzaki & Masjudin, 2019; Purwanti et al., 2020).

Elementary school students' mathematical literacy consists of four main indicators: (1) formulating mathematical problems by identifying relevant information from real contexts; (2) applying mathematical concepts through calculations and problem-solving strategies; (3) interpreting solutions by connecting mathematical answers to real situations; and (4) evaluating the feasibility of solutions based on logical and contextual criteria. (Syah et al., 2024). Mathematical literacy is very important for elementary school students because it forms the basis for critical thinking and enables them to solve everyday problems, such as financial management and data interpretation, while also preparing them to face complex challenges according to international PISA standards (OECD, 2017). In addition, mastery of mathematical literacy also increases students' motivation and metacognitive abilities through the integration of contextual learning (Sofiyah et al., 2024).

Recent research shows that the development of ethnomathematics-based mathematical literacy test instruments has a positive impact on the motivation, participation, and learning outcomes of elementary school students. Diana & Fitriani (2024) Developed a mathematical literacy test instrument based on East Java culture for elementary school students using the ADDIE model. The validity test results showed that all items had a significance value below 0.05, while the reliability test resulted in a Cronbach's alpha value of 0.684 (>0.6), meaning that the instrument is valid and reliable. The difficulty level of the questions also varied from easy to difficult, so the instrument is suitable for evaluating the mathematical literacy abilities of elementary school students (Diana & Fitriani, 2024).

Other research by Fauzi et al. (2024) Developed an ethnomathematics-based mathematical literacy instrument for elementary school students in Lombok using the Tessmer model. The developed instrument was tested through expert validation, one-to-one, small group, and field test stages. As a result, the instrument was declared valid with a V Aiken score of 0.76 and reliable with a Cronbach's alpha value of 0.687. This instrument also has good question difficulty and discrimination indices. It has successfully integrated local cultural concepts, such as traditional weaving patterns, traditional buildings, and traditional foods, into mathematical literacy questions. This makes mathematics learning more relevant and meaningful for students (Fauzi et al., 2024).

Furthermore, research by Fauzi et al. (2024) and Litik & Argarini (2023) also shows that the development of ethnomathematics-based mathematical literacy evaluation instruments—both from the perspective of multiple intelligences and the exploration of cultural artifacts—can increase the effectiveness of mathematics learning and students' literacy. The developed

instruments not only meet validity and reliability criteria but are also able to increase students' activeness and understanding of mathematical concepts in their cultural contexts (Fauzi et al., 2024; Litik & Argarini, 2023).

Although much research has proven the effectiveness of ethnomathematics-based instruments, the development of mathematical literacy test instruments that have truly tested validity, reliability, difficulty, and discrimination levels, and are relevant to various local cultures in Indonesia, is still very limited. This limitation is an important research gap, especially in the context of Indonesia's cultural diversity. Most existing instruments are developed based on one or two specific local cultures, so they cannot yet meet the needs of measuring students' mathematical literacy in various regions with their cultural uniqueness. In addition, the wider integration of local cultures into mathematical literacy test instruments has not been systematically explored.

This research aims to develop an ethnomathematics-based mathematical literacy test instrument that can accommodate the diversity of local cultures in Indonesia more comprehensively. The developed instrument not only aims to meet validity, reliability, difficulty, and discrimination criteria but is also designed to be adapted and used in various local cultural contexts. Thus, this instrument is expected to become a reference for more inclusive and relevant mathematical literacy measurement for all elementary school students in Indonesia.

Based on the above description, this research aims to develop an ethnomathematics-based mathematical literacy test instrument that is valid, reliable, and feasible for measuring the mathematical literacy abilities of elementary school students. With this instrument, it is hoped that the process of mathematics learning evaluation will become more authentic, contextual, and supportive of strengthening students' mathematical literacy by their local cultural characteristics.

2. METHODS

This research uses the Research and Development (R&D) method with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), adapted from (Diana & Fitriani, 2024; Fauzi et al., 2024) The research aims to develop a valid and reliable ethnomathematics-based mathematical literacy test instrument for elementary school students.

This research uses the Research and Development (R&D) method with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) to develop an ethnomathematics-based mathematical literacy test instrument (Fauzi et al., 2024; Yuliana et al., 2023). The analysis stage begins with a needs study through a review of the Merdeka Curriculum Phase B (Kemendikbudristek, 2022) and PISA 2023 mathematical literacy indicators (OECD, 2023), as well as identification of local cultural practices such as West Java batik motifs and Central Java traditional congklak games (Larasati et al., 2025). In student analysis, researchers focus on the cognitive characteristics of 19 grade V students at SDN 03 Nagrikaler Purwakarta as the initial trial subjects. This analysis includes students' understanding of basic mathematical concepts, abstract thinking abilities, and skills in applying mathematics in everyday life (Diana & Fitriani, 2024). In the design stage, the

instrument grid is designed by integrating mathematical competencies (numbers, geometry, data) and ethnomathematics contexts (Assegaff & Bonyah, 2024; Herrera et al., 2024), resulting in 10 essay questions with a 0–4 scale rubric. The development stage involves expert validation by two elementary school mathematics experts and one cultural expert using a 1–4 Likert scale, with content validity analysis through Aiken's V (V ≥ 0.75) (Mejía-Clavo, 2024; Fauzi et al., 2024). The implementation stage includes limited trials on 30 grade V students at three elementary schools in the Purwakarta region, while the evaluation stage uses ANOVA analysis for item validity (Pearson correlation ≥ 0.3), reliability (Cronbach's alpha = 0.85), and question difficulty level (Azwar, 2022).

Table 1. Stages of the ADDIE Model in the Development of Ethnomathematics-Based Mathematical Literacy Test Instruments

ADDIE Stage	Activities
Analysis	Needs analysis (curriculum & PISA), identification of local culture, student cognitive analysis
Design	Designing an instrument grid, developing 10 essay items with a rubric
Development	Expert validation (math & culture), content validity (Aiken's V)
Implementation	Limited trial with 30 students from 3 elementary schools in Purwakarta
Evaluation	Item analysis (validity, reliability, difficulty) using ANATES

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Analysis Stage

The development of an ethnomathematics-based mathematical literacy test instrument begins with a review of the Merdeka Curriculum currently implemented in elementary schools (Kemendikbudristek, 2022). The development of mathematical abilities refers to five main competencies: understanding, problem-solving, communication, connection, and mathematical reasoning, as stated in recent studies (Trisnaningtyas & Khotimah, 2022). The learning achievements selected for phase B include material on whole numbers up to 10,000, fractions, picture patterns, number patterns, area and volume measurement, two-dimensional shapes, as well as pictograms and bar charts. The selected learning achievements focus on students being able to measure the length and weight of objects using standard units, and being able to determine the relationship between standard units of length. They can measure and estimate area and volume using non-standard units and standard units in the form of whole numbers.

3.1.2 Design Stage

In the design stage, learning objectives and indicators of mathematical literacy test abilities are formulated based on phase B learning achievements. The developed instrument consists of essay questions arranged in a mathematical literacy test grid by integrating cultural elements from various regions in Indonesia. The question grid covers indicators of mathematical literacy abilities and local cultural contexts, such as East Kalimantan, West Nusa Tenggara, Bali, North Sumatra, Central Java, South Sulawesi, West Java, and East Java. Examples of indicators include comparing the total area of several rectangles, identifying

geometric shapes in traditional wells, and interpreting the meaning of symbols and diagrams in cultural contexts. The test to be developed consists of essay questions. Then, a mathematical literacy test grid is arranged.

Table 2. Mathematical Literacy Ability Test Grid

Learning Achievement	Indicators of Mathematical Literacy Test	Question Number	Cultural Elements
Students are able to measure the length and weight of objects using standard units, and can determine the relationship between units of length. They can measure and estimate area and volume using non-standard units and standard units in the form of whole numbers.	**Formulate:** understanding and applying mathematical ideas • (comparing the total area of several rectangles) • (identifying the number of cakes with the area of the wrapper leaves) • (identifying geometric shapes (cylinders) in problems in the context of local culture (traditional wells)) • (estimating the size of banana leaves shaped like rectangles)	1, 2, 3, 10	East Kalimantan, West Nusa Tenggara, Bali, North Sumatra
	Employ: conducting an exploration (estimation) • (analyzing two parts of rectangles, calculating the area of each, and adding the results to obtain the total area) • (estimating the additional area for planting crops) • (estimating the amount of paint needed)	4, 5, 6	Central Java, South Sulawesi
	Interpret: translating and interpreting the meaning of symbols, tables, diagrams, pictures, graphs, as well as mathematical sentences • (understanding the characteristics of measuring volume, and making visualizations) • (naming, describing, and calculating the dimensions of cuboids) • (understanding the concept of geometry, volume formulas, and area formulas)	7, 8, 9	Central Java, West Java, East Java

3.1.3 Development Stage

The developed test instrument consists of 10 essay questions with a maximum score of 100. A picture accompanies each question to make it easier for students to reason and understand the context of the question. For example, question number 1 invites students to calculate the area of a Kalimantan batik motif using the concept of a rectangle as an application of ethnomathematics in the context of local culture. Below is one of the questions on the developed instrument.

1. Perhatikan gambar berikut!

Di desa Dayak, ada tradisi membangun rumah panggung dengan bentuk lantai yang terdiri dari beberapa persegi panjang. Jika ada rumah panggung dengan lantai yang terdiri dari dua persegi panjang, yang satu berukuran 6 meter × 4 meter dan yang lainnya 5 meter × 3 meter, bandingkanlah dari kedua lantai tersebut. Manakah yang lebih luas?

Figure 1. Example of Mathematical Literacy Ability Test Questions

3.1.4 Implementation Stage

The instrument was tested on 19 grade V students at SDN 03 Nagrikaler Purwakarta in the 2024/2025 academic year. The selection of trial subjects is based on the cognitive readiness of grade V students who have studied all the material in the instrument, so it is appropriate to test the validity and reliability of the instrument.

3.1.5 Evaluation Stage

Based on the trial results, the feasibility of the instrument was tested through validity and reliability tests using the ANATES software. The validity test results showed that the item significance value ranged from 0.296 to 0.712, with the highest value on question number 10. The reliability test resulted in a Cronbach's alpha value of 0.85, indicating that the instrument is highly reliable (Fauzi et al., 2024). Analysis of the question difficulty level showed four questions in the moderate category, five easy questions, and one difficult question, so the instrument is feasible to use as an evaluation tool for elementary school students' mathematical literacy abilities.

Rata2= 26.00 Simpang Baku= 3.68 KorelasiXY= 0.74 Reliabilitas Tes = 0.85

No.Urut	No. Subyek	Kode/Nama Subyek	Skor Ganjil	Skor Genap	Skor Total
1	1	Adzkia	13	13	26
2	2	Ali	12	12	24
3	3	Alwi	11	13	24
4	4	Alya	13	13	26
5	5	Anisa	10	14	24
6	6	Aqila	13	16	29
7	7	Azkia	13	14	27
8	8	Byan	10	12	22
9	9	Dyla	15	16	31
10	10	Ervina	12	14	26
11	11	Faidah	11	16	27
12	12	Fahri	14	16	30
13	13	Ghazi	11	14	25
14	14	Habibi	9	9	18
15	15	Haniar	11	12	23
16	16	Hasna	14	14	28
17	17	Jibril	11	13	24
18	18	Qinar	16	19	35
19	19	Rafka	12	13	25

Figure 2. Hasil Output ANATES Uji Validitas dan Reabilitas

3.2 Discussion

Mathematical problem-solving is an important aspect of mathematics learning because it can increase students' self-confidence and decision-making abilities in everyday life (Trisnaningtyas & Khotimah, 2022). The instrument developed in this research integrates cultures from various regions in Indonesia, such as East Kalimantan, West Nusa Tenggara (Lombok), Bali, Central Java (Joglo), South Sulawesi (Toraja), and North Sumatra. The ethnomathematics approach was chosen because culture is very close to children's lives, thus increasing their motivation to solve problems related to everyday experiences (Diana & Fitriani, 2024).

The validity test results show that each item has an adequate significance value, with the highest value on question number 10 (0.712). The reliability test with a Cronbach's alpha value of 0.85 indicates very good internal consistency of the instrument. The varied question difficulty level, with the majority of questions being easy and moderate, shows that this instrument can accommodate students with various ability levels (Fauzi et al., 2024).

Thus, the developed ethnomathematics-based mathematical literacy test instrument can be used as a valid and reliable evaluation tool to measure students' mathematical literacy abilities in phase B. This is in line with the minimum standards for good test instruments according to the latest (Fauzi et al., 2024; Trisnaningtyas & Khotimah, 2022). Analysis of the difficulty level of each item shows that this instrument is dominated by questions with a low difficulty level, so it is suitable for the elementary school level. Therefore, this instrument is feasible and good to use as an evaluation tool for elementary school students' mathematical literacy abilities. The ADDIE development method used in this research has proven effective in producing valid, reliable, and contextual mathematical literacy ability test instruments.

4. CONCLUSION

This research has successfully developed an ethnomathematics-based mathematical literacy test instrument for elementary school students by following the stages of the ADDIE development model. The resulting instrument contains items that integrate local cultural contexts from various regions in Indonesia, making it more relevant and meaningful for students. The validity test results show that all items meet content and empirical validity criteria, while the reliability test results in a Cronbach's alpha coefficient of 0.85, indicating very good internal consistency of the instrument. The varied question difficulty level, with a greater proportion of easy and moderate questions, shows that this instrument is suitable for use with elementary school students. Thus, the ethnomathematics-based mathematical literacy test instrument developed in this research is proven to be valid, reliable, and feasible to use as an evaluation tool for elementary school students' mathematical literacy abilities. The use of this instrument is expected to help teachers carry out more authentic and contextual assessments, as well as support the strengthening of students' mathematical literacy following their local cultural characteristics and the demands of the Merdeka Curriculum. This instrument not only meets psychometric standards but is also relevant to

local cultural contexts so that it can support more meaningful and contextual mathematics learning.

This study acknowledges several limitations: (1) cultural coverage remains partial relative to Indonesia's full diversity; (2) trials were confined to Grade V students in Purwakarta, limiting generalizability; (3) implementation requires teacher training not addressed here; and (4) long-term impacts on literacy development were not measured. Future research should expand cultural representation, test cross-grade applicability, and develop teacher support modules.

5. AUTHORS' NOTE

The authors declare that there are no conflicts of interest in the publication of this article. The authors also confirm that this article is free from plagiarism.

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Effectiveness of Using Norm Bags in Improving Pancasila Learning Outcomes in Grade IV Students at Pengkol 01 Elementary School

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ABSTRACT

This issue stems from learning methods that are less engaging and tend to be monotonous, causing students to become passive and less enthusiastic in class. This study aims to enhance student learning motivation by utilizing a visual learning medium called Norm Pocket. The research employs Classroom Action Research (CAR) conducted in two cycles, each consisting of four stages: planning, action, observation, and reflection. Data collection techniques include observation and interviews, while data analysis is performed both qualitatively and quantitatively. Quantitative analysis employs percentage formulas to assess the effectiveness of the media in enhancing student motivation. The results indicate that using the Norm Pocket has a positive impact on students' enthusiasm for learning. In Cycle I, the percentage of motivated students was 50%, which increased to 75% in Cycle II. This improvement demonstrates that the Norm Pocket is effective in creating an enjoyable learning atmosphere, supporting the achievement of learning objectives in Pancasila Education. Therefore, the Norm Pocket is a viable and innovative alternative learning medium for use in primary schools.

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1. INTRODUCTION

Education is the primary foundation for forming individuals who are characterized as intelligent and capable of competing in the future (Rahmat, 2016). Education aims to create a supportive atmosphere where learners feel comfortable and motivated to engage in learning actively, enabling them to develop their full potential (Ratnaningsih & Nastiti, 2018). As teachers, we certainly understand the conditions and background of each learner better. Not infrequently, we encounter students who tend to be passive during learning, especially in the subject of Pancasila Education (Suratman, 2018).

Pancasila education is a subject that plays a role in shaping the character and personality of students (Natalia & Saingo, 2023). Through this learning, the fundamental values of Pancasila can be instilled in students, enabling them to grow into citizens who are faithful, responsible, and love their country. Learning about Pancasila in class often feels less interesting for students, as it tends to be theoretical and monotonous. As a result, their enthusiasm for learning becomes low. Therefore, it is important to use learning media that can revive their enthusiasm for learning (Febryana et al., 2023).

Based on observations made by the teacher during teaching and learning activities, it was found that the enthusiasm for learning among fourth-grade students of SD N Pengkol 01 in the subjects of Pancasila Education was relatively low. By utilizing learning media Bags of Norms, it is hoped that students' enthusiasm for learning in Pancasila Education subjects, particularly in the material on Forms of Norms and Rules in Daily Life, will increase. Learning media play an important role in stimulating the spirit of learning. The use of simple visual media can also help students understand the material more easily, making learning more meaningful (Ikrom et al., 2025).

Based on previous research, learning media have been proven to help increase students' learning motivation. Research conducted by Cahyati & Rhosalia (2020) showed that the use of image media can increase students' enthusiasm for learning mathematics. In Cycle I, the level of achievement in students' learning enthusiasm reached 74.58%, while in Cycle II, this figure increased to 89.58%. This study aims to enhance the learning enthusiasm of fourth-grade students at Elementary School Pengkol 01 in their Pancasila Education lessons by utilizing the Norm Bag media. Through this research, it is hoped that students' enthusiasm for learning will increase, and the Bag of Norms media can be used effectively as a tool that motivates students to be more enthusiastic in learning.

2. METHODS

This research employs the Classroom Action Research (PTK) method, which is conducted directly in the classroom with the primary objective of enhancing the quality of learning. The research process was conducted in stages through several cycles, each involving four main steps designed to achieve better results. The stages begin with action planning, which is then implemented in classroom learning activities. After the action is taken, the following process involves observation of its implementation. The final step is reflection, which involves analyzing the data obtained during the implementation of the action to evaluate its success and determine the next step for improvement (Arikunto, 2012).

This research focuses on Pancasila Education subjects, specifically material on Forms of

Norms and Rules in Daily Life, in class IV at Elementary School Pengkol 01, which consists of 24 students, 10 boys and 14 girls. In learning, the Norm Bag Media is used to help the learning process. This research aims to support teachers' professional development, thereby increasing students' enthusiasm for learning through targeted steps. Additionally, this research offers learners opportunities to express their opinions, both individually and in groups.

This research consists of four stages in each cycle, namely planning, implementation, observation, and reflection. Data were obtained through observation, interviews, and documentation. After that, the data obtained were analyzed qualitatively and quantitatively. To measure the effectiveness of using Kantong Norma media in increasing students' learning motivation, the data from the questionnaire were processed and presented in percentage form (Ratnaningsih & Nastiti, 2018).

Quantitative data analysis was conducted using student observation sheets. To determine learning outcomes, instruments such as multiple-choice tests and short-answer tests were used, along with evaluations provided by teachers. The test results were then calculated in percentage form using the formula from (Satriani, 2016):

$$\textit{Average Score Percentage} = \frac{\text{Total Score}}{\text{Maximum Score}} \text{ x } 100\%$$

The observation scores obtained from all students are classified based on the categories according to (Syafitri et al., 2023) as follows:

Table 1. Observation Score Categories

Score Range (%)	Category
81-100	Very good
61-80	Good
41-60	Simply
21-40	Less

In addition, individual absorption is calculated using Purwanto's formula (Syafitri et al., 2023):

$$NP = \frac{R}{Sm} \times 100$$

Description:

- NP: Expected percentage value
- Raw scores obtained by learners
- SM: Ideal maximum score of the test
- 100= Constant

Meanwhile, the classical learning completeness of fourth-grade students of Elementary School Pengkol 01 in Pancasila Education subjects is calculated using the formula from (Satriani, 2016):

$$\textit{Classical of Students who passed} = \frac{\text{Number of students who passed}}{\text{Total number of students}} \times 100\%$$

3. RESULTS AND DISCUSSION

Based on the researcher's observations of teacher and student activities during Pancasila Education learning using the Norm Bag media, it is evident that positive developments have occurred. In cycles I and II, student activities and the way teachers teach using this media show an increase that falls into the good category. Additionally, the percentage of teacher activity in the learning process falls into the good category. Thus, it can be concluded that learning Pancasila Education using the Kantong Norma media is effective.

3.1. Pre-Cycle

This research begins with a pre-cycle stage to understand the initial conditions of the learning process at Elementary School Pengkol 01. Researchers observed the course of learning and analyzed the learning outcomes of Pancasila Education in grade IV students. Based on the results of observations, it is known that in learning Pancasila Education, educators have never utilized the Norm Bag media.

The use of visual learning media encourages students to be more active in their learning. Pre-cycle result data is presented in the following table:

Table 2. Pancasila Education Learning Outcomes of Pre-Cycle Class IV Students

No.	Indicator	Value
1	Number of learners	24
2	Learners who completed their study	10
3	Students who have not completed their learning	14
4	Percentage of classical completion	42%
5	Percentage of classical incompleteness	58%
6	Average value	72

Based on the data in the table, only 42% of students achieved learning completeness, specifically 10 out of 24 students. The average score obtained by students is 72, while the Minimum Completion Criteria (KKM) for Pancasila Education subjects at SD N Pengkol 01 is set at 75. Therefore, it is necessary to make improvement efforts to help improve students' learning outcomes.

3.2 Cycle I

In implementing the first cycle, the researcher utilized the Bag of Norms media to teach material about values in daily life as part of the Pancasila Education learning process. This activity was conducted in two meetings. Initially, researchers prepared all learning tools, including teaching modules, teaching materials, learning media, LKPD, and evaluation sheets. Learning begins with opening activities that include prayer, attendance, and providing initial motivation to students. Then, the core activities begin with sparking questions, followed by the presentation of relevant learning videos. After that, learners are divided into groups to

work on the Candy Norm LKPD and present the results of their discussions.

During the learning process, active students are given appreciation through the use of the Norm Bag, which is a bag containing cards with positive norms in line with Pancasila. The purpose of providing the Norm Bag is to enhance students' learning outcomes in the subject of Pancasila, specifically about norms. Based on observations in the first cycle, the learning outcomes of some students were still low. However, the use of the Norm Bag media has proven to be quite effective in improving the learning outcomes of fourth-grade students at Elementary School Pengkol 01 in the subject of Pancasila Education.

The evaluation data in this cycle is presented in the following table:

Table 3. Learning Outcomes of Pancasila Education Students in Class IV Cycle I

No.	Indicator	Value
1	Number of learners	24
2	Learners who completed their study	12
3	Students who have not completed their learning	12
4	Percentage of classical completion	50%
5	Percentage of classical incompleteness	50%
6	Average value	76

Based on the data in the table, the level of classical completeness has reached 50%, but it has not met the targeted percentage of completeness in this study, which is 65%. Therefore, further action is needed in Cycle 2, considering that 12 students have not yet met the Minimum Completion Criteria (KKM) in Pancasila Education subjects.

3.3 Cycle II

In the implementation of the second cycle, researchers again utilized Pancasila Education learning through the Norm Bag media, focusing on the application of Pancasila values in everyday life, just as was done in the first cycle. This cycle was carried out in two meetings. In the planning stage, researchers and collaborators discussed finding solutions to the various challenges encountered in the previous implementation. Researchers also prepared teaching tools, which included teaching modules, teaching materials, learning media, student worksheets (LKPD), and evaluation sheets. The teaching modules and evaluation sheets that were prepared were customized to accommodate students' abilities and characteristics, allowing for optimal learning. The learning process followed the flow outlined in the teaching module, progressing from the introduction stage to the core part and concluding with the closing. In this second cycle, student engagement improved significantly compared to the first cycle. Learners who were previously more passive began to show enthusiasm for learning and obtained better results. This improvement occurred because the Norm Bag media used was quite interesting and fun, thus helping students understand the material more easily.

The results of observations during Cycle 2 showed that student learning outcomes improved significantly. The data on student test results are presented in the following table.

Table 4. Learning Outcomes of Pancasila Education Students in Class IV Cycle II

No.	Indicator	Value
1	Number of learners	24
2	Learners who completed their study	18
3	Students who have not completed their learning	6

No.	Indicator	Value
4	Percentage of classical completion	75%
5	Percentage of classical Incompleteness	25%
6	Average value	80

Based on the data displayed in the table, it can be concluded that the use of the Bag of Norms media in learning Pancasila Education has had a positive impact on students' learning outcomes. Classical completeness reached 75%, with 18 students having reached the KKM and six students still not. In the reflection stage, the researcher analyzed and compared the results from the first and second cycles to assess the extent to which the learning outcomes of fourth-grade students at SDN Pengkol 01 had improved and whether these results were achieved by the predetermined success criteria. The analysis results showed that the percentage of completeness increased from 50% in the first cycle to 75% in the second cycle. Improvement: This has met the success indicators determined in the study, so the action was stopped at cycle 2. The test results data are presented in the following table.

Table 5. Results of Assessment of Pancasila Education Learning Outcomes of Class IV Students

No.	Indicator	Pre Cycle	Cycle I	Cycle II
1	Class average	72	76	80
2	Learners who completed learning	10	12	18
3	Learners who have not yet completed learning	14	12	6
4	Percentage of completion of classical	42%	50%	75%
5	Percentage classical incompleteness	58%	50%	25%

Based on the data shown, using Norm Bag media in teaching Pancasila Education to grade IV students at SD Negeri Pengkol 01 has proven to be quite effective in enhancing student learning outcomes. The level of learning completeness reached 75%, indicating improvement compared to the results of the first cycle. Additionally, the rise in class average scores further supports that the Norm Bag media is a practical and applicable teaching strategy for helping students better understand Pancasila Education material. This media not only impacts cognitive aspects but also creates a more fun and interactive learning environment. Students appear more enthusiastic, focused, and less easily bored during lessons, making the learning process more effective.

The effectiveness of Norm Bag's media aligns with various international research findings that confirm interactive and contextual learning media can significantly enhance student learning outcomes and motivation. For example, the development of interactive learning media has been shown to enhance understanding of the concept of citizenship and improve actual student learning outcomes (Rachmadtullah et al., 2018; Setiyadi et al., 2019). Story-based media, such as comics and picture books, have also proven effective in conveying Pancasila values in an engaging and easy-to-understand manner for elementary school students (Astri & Rahman, 2021). Additionally, digital media such as video tutorials and interactive multimedia are known to significantly boost students' motivation to learn through a pleasing multisensory and visual approach (Martiani & Tetep, 2018; Neacsu & Bucuroiu, 2020).

Therefore, incorporating Norm Bag's media into Pancasila Education helps improve students' academic performance while also boosting their emotional engagement and interest in learning. This aligns with 21st-century learning principles that emphasize an active, engaging, and meaningful approach.

4. CONCLUSION

This study demonstrates that the use of Kantong Norma media in Pancasila Education learning for grade IV students at Pengkol 01 Elementary School has significantly improved student learning outcomes. The completion rate increased from 50% in cycle 1 to 75% in cycle 2, indicating that Kantong Norma media is effective in supporting the achievement of learning objectives. As a form of reward and reinforcement of values, Kantong Norma improves student learning outcomes. Overall, this study demonstrates that interactive and enjoyable learning using Kantong Norma media can enhance learning outcomes, improve academic achievement, and foster a more meaningful learning environment. Therefore, this medium is highly suitable for use as a learning medium to improve learning outcomes in Pancasila.

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The Synergy of Numerical Intelligence and Learning Interest in Determining the Mathematics Achievement of Students at SD Negeri 1 Passo

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ABSTRACT

The background of this study is the low learning outcomes of students influenced by internal factors such as numerical intelligence and learning interest. The purpose of this study is to examine the influence of numerical intelligence and learning interest on student learning outcomes. This research method employs a quantitative approach, utilizing correlation analysis to examine the relationship between variables. The sample size of this study consisted of 23 students. Data were collected using various instruments, including questionnaires, tests, observations, and surveys. The significance value of numerical intelligence and learning interest on learning outcomes is usually linearly distributed. The results of the analysis indicate that numerical intelligence and learning interest determine students' mathematics learning outcomes. The implication is that it is necessary to differentiate learning to improve students' numerical intelligence, and the learning process must use a concrete and visual approach.

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1. INTRODUCTION

Education is a conscious and continuous learning process that creates an environment enabling students to develop and realize their potential (Kemendikbud, 2020). The primary goal of education is to equip students with spiritual and religious strength, self-control, noble character, intelligence, morality, and the competencies needed in personal, social, and national life (Permendikbud, 2022). As such, education plays a vital role in a nation's progress by serving as a means to enhance human resources, which is increasingly significant in the era of global competition (NCTM, 2014).

According to Law No. 20 of 2003, education is a consciously designed effort to create a learning atmosphere where students actively develop their potential in spiritual, social, and intellectual domains. Despite this well-articulated vision, the quality of education in Indonesia, especially in mathematics, remains a concern (OECD, 2019, 2023). Mathematics is a foundational discipline taught from elementary school through higher education, as it fosters logical, analytical, and critical thinking (Stacey, 2006). Unfortunately, student achievement in mathematics consistently underperforms at various educational levels, highlighting the need for continuous improvement (OECD, 2023).

Ironically, mathematics is often perceived as a problematic and uninteresting subject by many students, leading to fear and avoidance behavior (Mariamah et al., 2021). This negative perception is driven by challenges in understanding mathematical concepts, which ultimately hinders students from achieving optimal learning outcomes (Saputri et al., 2024). If learning barriers such as these are not adequately addressed, students' reasoning abilities and overall achievement in mathematics will remain suboptimal.

One of the promising approaches to overcoming students' difficulties in learning mathematics is by enhancing both numeracy intelligence and interest in learning (Achdiyat & Utomo, 2017). Numerical intelligence specifically relates to a student's ability to understand and process numbers, recognize relationships, and solve mathematical problems (Anwar, 2023). According to Noemy et al., (2017), numerical intelligence facilitates the development of effective reasoning strategies, making it easier for students to process and solve mathematical problems and potentially strengthening their interest in the subject.

Learning interest, as discussed by Harefa (2023) it is a form of engagement manifested through persistent attention, curiosity, and active participation during learning. Recent research supports that students who show genuine interest in mathematics are more motivated to participate and tend to achieve better results. Interest not only increases the likelihood of sustained learning but also encourages enjoyment and satisfaction in the learning process.

Students who are genuinely interested in learning are often more active, frequently ask questions, and are more motivated to understand the material, which can significantly enhance their learning success. A person tends to remain focused on activities they enjoy, accompanied by a feeling of enjoyment while doing them. Interest is a stable Tendency to pay attention to and remember a particular activity. Interest plays a crucial role in learning activities. Without interest, learning activities are often not carried out wholeheartedly or sincerely. Recent studies confirm that high interest in mathematics encourages students to engage more deeply, improves their persistence in facing challenges, and is positively correlated with their academic performance (Arni et al., 2024; Harefa, 2023; Retnawati & Wawan, 2022). Additionally, motivated students are more likely to exert effort and

demonstrate resilience when faced with challenging mathematical concepts. Thus, fostering learning interest not only supports the mastery of mathematics but also helps to build important social and emotional skills required in lifelong learning (Fitrianti & Nur, 2018).

A supportive learning environment—both external and internal—plays a decisive role in students' enthusiasm and learning outcomes (Fitrianti & Nur, 2018; Wibowo et al., 2021). If the internal and external conditions are favorable, students become more focused, enthusiastic, and able to develop mathematical thinking skills such as critical, creative, thorough, and logical reasoning (Fitrianti & Nur, 2018; Gao & Fu, 2017; Sinaga, 2022). This will ultimately improve their achievement, especially in challenging topics such as equivalent fractions.

Based on these explanations, the research problem formulated in this study is: "Is there an influence of numerical intelligence and learning interest on students' learning outcomes in equivalent fractions in Grade IV at SDN 1 Passo?" The objective is to determine the Influence of numerical intelligence and learning interest on mathematics achievement, specifically for the topic of equivalent fractions in Grade IV at SDN 1 Passo. Therefore, this study is entitled "The Synergy of Numerical Intelligence and Learning Interest in Determining the Mathematics Achievement of Students at SDN 1 Passo".

2. METHODS

This study employs a quantitative approach, utilizing the correlation method, a commonly used technique to determine the degree of relationship between research variables (Creswell & Creswell, 2018; Sugiyono, 2013). In correlation studies, there are generally independent variables and dependent variables involved. Specifically, this method was chosen to examine the influence of numerical intelligence and learning interest on student learning outcomes, as correlation analysis is effective in identifying and measuring these relationships (Hanushek & Jackson, 2013).

The steps in conducting research include identifying the problem, formulating the problem and hypotheses, determining the research variables, and selecting the population and sample. Subsequently, research instruments are prepared and tested for validity and reliability, followed by data collection, processing, and analysis. This sequence aligns with methodological procedures for quantitative studies, aiming for scientific rigor and replicability (Sugiyono, 2013).

The population in this study consisted of fourth-grade students at SD Negeri 1 Passo, while the sample comprised 23 students from Class IV B at the same school. Sampling was carried out only in one class of the entire population. The sampling technique used was purposive sampling, which involves selecting a class from two available classes based on characteristics that best meet research requirements (Arikunto, 2019; Etikan et al., 2016).

The data collection technique in this study employed tests and surveys through questionnaire instruments, focusing on numerical intelligence and learning interest. The numerical intelligence questionnaire contains 24 statements covering four indicators: (1) mathematical calculation ability; (2) logical and systematic thinking; (3) problem-solving ability; and (4) recognition of patterns and numerical relationships. Meanwhile, the learning interest questionnaire comprises four indicators, namely: (1) pleasure; (2) attention level; (3) curiosity (interest); and (4) student involvement, elaborated into 24 items. Development of the instrument refers to established practices in quantitative educational research to ensure content validity (Creswell & Creswell, 2018; Suhudi et al., 2024).

Prior to their use in research, the instruments were tested on respondents outside the sample of 23 students to establish their validity and reliability. Instrument testing is necessary to ensure the quality of the data and to verify the suitability of the instrument for further analysis (Sugiyono, 2013).

Validity testing was conducted using statistical tests on responses after distributing the questionnaires. Each item score was compared with the r-table value, taking into account the number of respondents and a significance level of 5%. This procedure aims to select items that validly measure the intended constructs (Suhudi et al., 2024).

Data analysis techniques included normality tests, linearity tests, autocorrelation tests, and several linear regression analyses. This sequence ensures that prerequisite assumptions for regression are met, supporting accurate inference regarding the relationship between variables (Ghozali, 2018; Hanushek & Jackson, 2013).

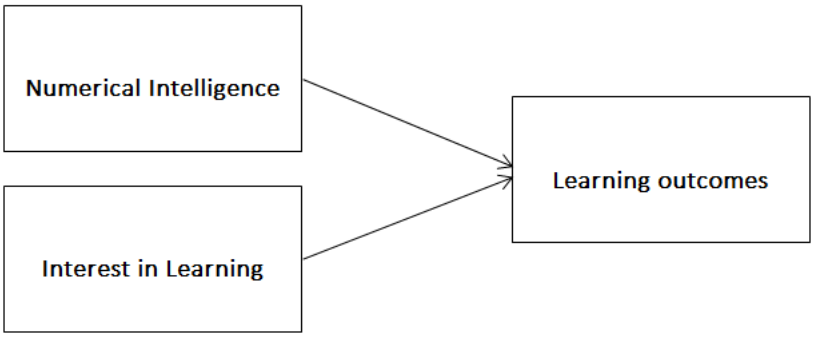


Figure 1. Conceptual Framework

3. RESULTS AND DISCUSSION

3.1. Results

This study used a quantitative approach with a correlation method. This method was chosen because the study aimed to analyze the relationship between numerical intelligence and learning interest in mathematics learning outcomes in the topic of equivalent fractions. Therefore, this study did not compare two groups, but instead used only one class as the research subject: class IV B at SD Negeri 1 Passo.

3.1.1 Descriptive Analysis

a. Validity Test

According to Azwar (2018), validity refers to the degree to which a test or scale accurately performs its function as a measuring tool.

Table 1. Question Validity Test Results

Indicator	Information
S1	Valid
S2	Valid
S3	Valid
S4	Valid
S5	Valid

Based on the results of the validity test conducted using SPSS 23, all questions listed in the table were declared valid. Therefore, all questions can be used to measure student abilities accurately.

b. Reliability Test

The reliability of an instrument is crucial to ensure that the items consistently measure the desired abilities. According to Sukendro (2019), reliability supports validity because valid statements are generally reliable, although reliable statements are not necessarily valid.

Table 2. Reliability Test Results

Numerical Intelligence

Cronbach's Alpha	N of Items
,758	4

Interest in Learning

Cronbach's Alpha	N of Items
,668	4

Based on the reliability test results for the valid elements, the Cronbach's alpha values were 0.758 for the Numerical Intelligence Questionnaire and 0.668 for the Learning Interest Questionnaire. These values are greater than 0.60, indicating reliability. These values meet the reliability criteria because the Cronbach's alpha values are 0.758 and 0.668, both of which exceed the recommended threshold of 0.60.

c. Learning Outcome Data

After administering the treatment, a learning outcome test was conducted by distributing questions on equivalent fractions to a sample group of 23 students.

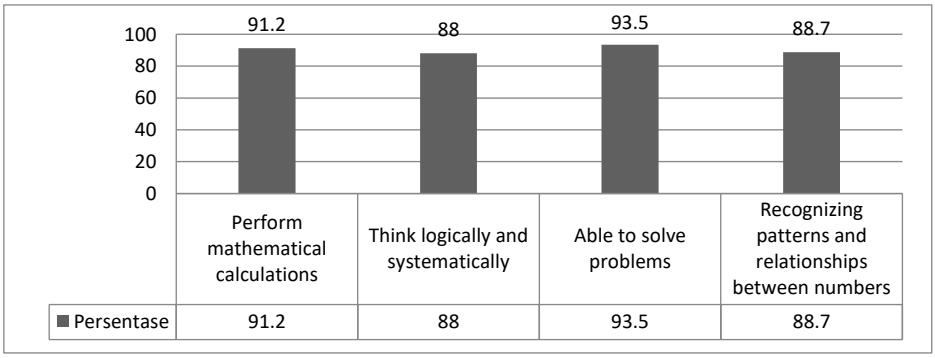
Table 3. Student Learning Outcomes Data

Acquisition	Learning outcomes
Minimum	79
Maximum	100
Average	92,4

d. Questionnaire Data

Questionnaire data is data collected through a survey, where respondents provide answers to a series of questions. The purpose of a questionnaire is to obtain direct information from respondents regarding a variable being studied.

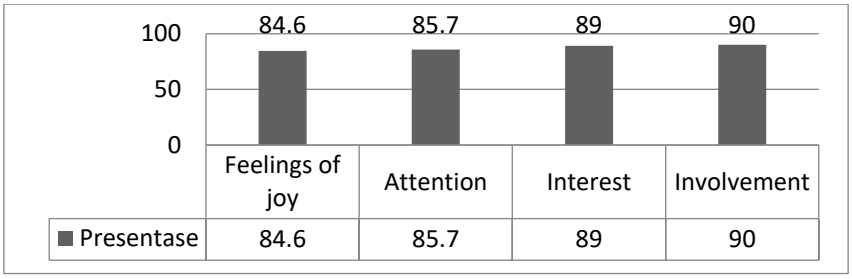
Figure 2. Numerical Intelligence Questionnaire Chart



Based on the graphic image above, seen from the results of student responses in the class obtained from the numerical intelligence questionnaire, it can be seen that the percentage of the logical and systematic thinking indicator is 88% with a high category, the indicator of

recognizing patterns and relationships between numbers is 88.7% with a high category, the indicator of performing mathematical calculations is 91.2% with a very high category and the indicator of being able to solve problems is 93.5% with a very high category.

Figure 3. Learning Interest Questionnaire Graph



Based on the graphic image above, seen from the results of student responses in the class obtained from the provision of a learning interest questionnaire, it can be seen that the percentage of the feeling of pleasure indicator is 84.6% with a high category, the attention indicator is 85.7% with a high category, the interest indicator is 89% with a very high category and the student involvement indicator is 90% with a very high category.

3.1.2 Data Analysis

a. Normality Test

To determine whether data is normally distributed, the Shapiro-Wilk test can be used. If the significance value (asymptotic significance) of a variable is greater than 0.05, then the variable is considered to be normally distributed.

Table 4. Output of Normality Test Results

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Learning Outcomes	,179	23	,053	,918	23	,060
Numerical Intelligence	,142	23	,200*	,946	23	,240
Learning Interest	,127	23	,200*	,943	23	,210

From the table above, we can see that numerical intelligence, learning interest, and learning outcomes are normally distributed, as the significance values of all variables are greater than 0.05. The graph of the normality test results is as follows:

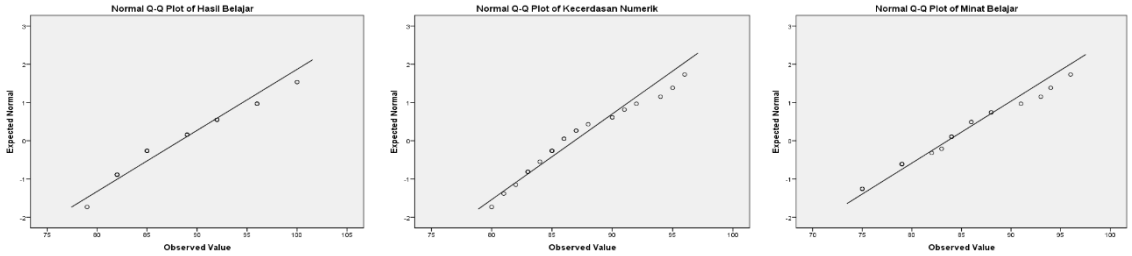


Figure 4. The graph of the normality test results

b. Linearity Test

Linear regression is based on the assumption that the variables being analyzed have a linear relationship with each other. ANOVA can be used to verify this linear relationship.

Table 5. Output of Linearity Test Results for X_1 and Y

ANOVA Table

			Sum of Squares	Df	Mean Square	F	Sig.
Learning Outcomes * Numerical Intelligence	Between Groups	(Combined)	691,203	14	49,372	2,301	,119
		Linearity	443,229	1	443,229	20,655	,002
		Deviation from Linearity	247,973	13	19,075	,889	,592
	Within Groups		171,667	8	21,458		
	Total		862,870	22			

Table 6. Output of Linearity Test Results for X_2 and Y

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes * Learning Interest	Between Groups	(Combined)	588,570	10	58,857	2,575	,062
		Linearity	419,259	1	419,259	18,342	,001
		Deviation from Linearity	169,311	9	18,812	,823	,608
	Within Groups		274,300	12	22,858		
	Total		862,870	22			

Based on the table above, the linear value of numerical intelligence and learning interest on learning outcomes is less than 0.05. Therefore, H0 is rejected, which means that numerical intelligence and learning interest have a linear relationship with learning outcomes.

c. Autocorrelation Test

The purpose of the autocorrelation test is to test whether there is a correlation between the nuisance error in period t and the nuisance error in period t-1 (previously) in the linear regression model. This autocorrelation phenomenon is detected using the Durbin-Watson (DW) test.

Table 7. Autocorrelation Test Result Output

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,844[a]	,713	,684	3,519	2,158

From the table above, the model summary data yields a Durbin-Watson (DW) value of 2.158. This value will then be compared with the table value using a significance level of 5% (0.05), an n of 23 samples, and a k value of 2 (k = 2), resulting in a dU value from the Durbin-Watson table of 1.5435.

If formulated based on decision-making, i.e., dU < d < 4–dU, it becomes 1.5435 < 2.158 < 2.4565. Based on the results of this decision-making formulation, it can be concluded that there are no signs of autocorrelation in the independent variables in this study.

d. Multiple Linear Regression Analysis

Multiple linear regression analysis was employed to investigate the impact of numerical intelligence and learning interest on the dependent variable, specifically learning outcomes.

Table 8. Multiple Linear Regression Results Output

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	409,227	2	204,613	9,021	,002[b]
	Residual	453,643	20	22,682		
	Total	862,870	22			

From the table above, the F-value of 9.021 indicates a statistically significant model overall, and the p-value of 0.002 is statistically significant at the 0.05 (5%) level of significance. Because the significance value of 0.002 < 0.05, H0 is rejected, which means that numerical intelligence and learning interest Influence student learning outcomes.

3.2 Discussion

Based on the data analysis results, it was found that numerical intelligence and learning interest have a significant Influence on student achievement, particularly in mathematics subjects at SD Negeri 1 Passo. According to research conducted by Ridwan et al. (2023), the analysis of their study's results concluded that numerical ability had a 5.5% Influence on mathematics learning outcomes for students, while the remaining 94.5% was influenced by other variables not included in the study. This research is also relevant to that conducted by Hanifah & Masruroh (2022), which showed a significant Influence between student learning interest and student learning outcomes, as evidenced by the results of F-count > F-table (28.15 > 4.49) at the 5% level, where Ha was accepted and H0 was rejected.

Previously, mathematics learning outcomes in grade IV of SD Negeri 1 Passo, based on observations, indicated that the average score obtained by students fell into the low category. This was suspected to be due to students' lack of numerical ability and interest in learning mathematics, especially fractions. This is in line with research by Kheirkhah et al. (2023), which states that each person's intelligence can be improved through specific methods such as training and brain stimulation activities.

Thus, students were allowed to explore their initial understanding of fractions and build their interest in learning. Furthermore, discussions were held to determine the extent to which students understood the importance of fraction concepts in everyday life. Next, questionnaires were administered on numerical intelligence and learning interest, which aimed to determine a person's ability to think and calculate using numbers and students' interest in learning mathematics.

Then, material related to basic fraction operations, such as fraction elements and the fractional form of a picture, is presented. This session employs various instructional methods, including concrete illustrations and step-by-step practice problems, to refine students' numerical skills.

Additionally, students are encouraged to work in groups to enhance interaction and motivation. This is followed by a discussion of multiplying and dividing equivalent fractions. At this stage, students are given more complex exercises to test their understanding of the concepts they have learned. Students are given challenges in the form of problems that

require them to use creative thinking strategies to solve them. Class discussions are held to help students understand various methods for solving fraction problems. Students are also given applications of the concept of equivalent fractions in various everyday life contexts.

Next, students are given assignments in the form of case studies and problem-solving related to fractions. Through these activities, students are expected to be able to connect mathematical concepts with real-world experiences, thereby increasing their interest in learning the subject. Finally, a written test is administered, covering a range of difficulty levels, from basic questions to those requiring more complex problem-solving. The results of this test are then analyzed to determine the relationship between numerical intelligence, learning interest, and student learning outcomes in understanding the concept of equivalent fractions.

Based on the calculation of the multiple regression hypothesis test, the significance value is 0.002 < 0.05, so the null hypothesis H0 is rejected and the alternative hypothesis Ha is accepted. Therefore, it can be concluded that numerical intelligence and learning interest Influence student learning outcomes in fraction material at SD Negeri 1 Passo.

This research is further supported by Pratiwi & Alyani (2022) Research has found that numerical intelligence positively contributes to math problem-solving skills, particularly in materials that require an understanding of fraction concepts. Similarly, research by Indrawati (2015) It was found that students with high levels of numerical intelligence demonstrated better academic performance in mathematics.

Research by Sulfiani et al. (2024) concluded that student learning interest is closely related to academic success in mathematics. Another study by Maskur et al. (2020) explained that students who enjoy mathematics have better learning outcomes than those who are not interested.

This study has several limitations that should be taken into consideration. First, the study was conducted in only one class, so the results cannot be broadly generalized to the entire population of elementary school students. Second, the instrument used to measure numerical intelligence and learning interest was a questionnaire, which could potentially introduce subjective bias from respondents. Third, the study only examined two independent variables—numerical intelligence and learning interest—without considering other variables that could potentially Influence learning outcomes, such as learning styles, intrinsic motivation, family environment, or teacher teaching methods.

Based on these limitations, it is hoped that further research can use more samples, conduct observations or interviews to obtain a more objective picture of the variables of numerical intelligence and learning interest, add other variables in the research model, namely learning motivation, self-confidence, or parental support to obtain a more comprehensive understanding of the factors that Influence students' mathematics learning outcomes, and examine learning interventions to see the direct impact on improving numerical intelligence and learning outcomes.

4. CONCLUSION

Based on the results discussed, it is evident that numerical intelligence and learning interest determine student learning success at SD Negeri 1 Passo. This is supported by the statistical test results presented, which rejected the null hypothesis and accepted the alternative hypothesis. Therefore, numerical intelligence and learning interest play a crucial role in student progress and development, particularly in mathematics.

For teachers, it is expected to continually develop numerical intelligence skills by providing practice questions that range from easy to more complex, in addition to improving problem-solving and logical thinking skills, and utilizing learning media that capture students' attention. Also, develop students' interest in learning, so that this interest can later produce good results. Increasing student interest in learning can be achieved by enhancing students' sense of engagement in their learning activities. Then, teachers must also be able to attract students' attention to the subject. In this case, attracting students' attention can be achieved by providing different variations, such as varying language styles and methods used in delivering the material, so that it does not seem monotonous and boring.

Schools are expected to develop numeracy support programs, such as extracurricular math activities, weekly quizzes, or creative numeracy competitions, to enhance students' numeracy skills. Furthermore, they should provide training to teachers in differentiated learning approaches and strategies for increasing student interest in learning, as well as providing learning facilities that support students' numeracy development.

For further researchers, it is advisable to expand the scope by involving more than one school or class to increase the generalizability of the results and to incorporate additional variables such as learning motivation, learning style, or parental support.

5. AUTHORS' NOTE

This research was conducted as part of an effort to understand the internal factors that Influence elementary school students' mathematics learning outcomes, particularly regarding equivalent fractions, which are often challenging. Numerical intelligence and learning interest were chosen as the focus of the research because both are considered important in students' cognitive and motivational processes during mathematics learning.

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Improving Reading and Writing Skills in Essay Writing through the Use of Comic Strips among 5th Grade Elementary School Students

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ABSTRACT

This study aims to support students' ability to read and write essays by utilizing comic strips in Indonesian language learning. This study employs the Classroom Action Research (CAR) method, using the Kemmis and McTaggart model. The study subjects were fifth-grade students at Pondok Benda 01 Elementary School, with data collected through tests, observations, and documentation. Data analysis was carried out in a descriptive, quantitative, and qualitative manner. The study was conducted in two cycles: Cycle I and Cycle II. The study's results showed an increase in students' reading and writing abilities, as evidenced by the comparison of the average percentage score in Cycle I, 41.37% (value range: 44-81), which increased to 100% (value range: 80-98) in Cycle II. The use of comic strip media in education has been proven to enhance students' reading and writing skills.

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1. INTRODUCTION

Language functions as a communication tool, enabling humans to interact in verbal or written form, conveying ideas, desires, and emotions (Devianty, 2017). Therefore, mastery of Language is a fundamental matter that every individual must study through formal and non-formal education (Aini & Nugraheni, 2021). Speaking skills refer to someone's ability to apply language (Widyantara & Rasna, 2020). In learning Indonesian, students used the four skills of speaking, listening, reading, and writing (Johan, 2020). Of the four skills, speaking, reading, and writing are sufficient for the Language.

Reading is an activity for capturing and understanding content, ideas, or expressed thoughts implied in a text, so that the reader is capable of understanding the meaning of the information conveyed by the author (Sukma & Puspita, 2023). Reading is also a thinking process that involves understanding, telling, and interpreting the meaning of symbols written, involving vision, movement of the eyes, inner dialogue, and memory (Harianto, 2020). Meanwhile, reading skills are the ability to read text correctly and effectively, so that one can catch the message contained therein (Putri et al., 2023). Reading skills are the main capital for students. With the ability, they can learn various knowledge, convey ideas, and express themselves (Suparlan, 2021). In addition to speaking skills, the next skill is writing. Writing is a skill that students in learning Indonesian must master, after they have control of the skills of listening, speaking, and reading (Pahrun, 2021). Writing cannot be separated from other aspects of the learning process faced by participants when learning at school (Fahmi, 2021). Writing also helps participants educate themselves to feel and appreciate aspects, strengthening their ability to understand or interpret, find solutions to problems faced, and compile experiences in a regular way (Widyantara & Rasna, 2020). Meanwhile, writing skills are also essential for students, besides skills in listening, speaking, and reading, both in the educational process and in life in society (Sahno, 2022).

Writing a text essay is one of the steps to increase reading and writing ability. One of the materials for learning Indonesian is a text essay. An essay is one of the types of work writing that conveys ideas and emotions by the writer cohesively and comprehensively (Musyawir & Loilatu, 2020). An essay is a simple early writing used as a step in the learning process of writing (Prasetyo et al., 2023). An essay is also interpreted as an arrangement of thoughts or expressing emotions presented through structured writing (Musyawir & Loilatu, 2020). An essay is a form of communication that involves a written explanation or depiction of an object in a detailed and in-depth manner, by the conditions, actually, of objects that have ever been experienced (Chandra et al., 2022). Essays play an important role in the practice of reading and writing skills for students, because through activities, they can develop ideas, express ideas, and strengthen the language skills required throughout their lessons, especially in Indonesian lessons.

For developing skills in reading and writing, students need to understand and practice them, one of which involves writing a text essay, which has become an important part of learning Indonesian. One of the reasons the ability to write is still low is that they have not yet understood the method to write an essay correctly. Participants are not yet fully ready to write essays, especially when it comes to finding a suitable idea for the theme that will be described. In addition, they often feel confused and in need, for example, formerly. For trigger thinking, they. (Qadaria et al., 2023). One of the main problems in learning to write an essay in Indonesian is the difficulty for students in translating their thoughts into writing. Difficulties often occur, including word choice, determination of theme, and development framework

(Sahno, 2022). The ability to write an essay must be kept sharpened sustainably, because disturbance or difficulty will be seen in poor and unrelated writing results that are readable. This shows that the inability to control skills written since early can cause delays in the learning process at school (Utari & Rambe, 2023). The low level of writing ability in students is also caused by a lack of habit of writing and a lack of use of tools to help teaching, causing students to be too passive and inclined to be passive in the learning process. (Aziezah, 2022).

The results of observations at SDN Pondok Benda 01 found that the interest of reading and writing students in grade 5 is still classified as low, especially in writing text essays. Many students feel difficulties and lack motivation to write due to a lack of learning media interesting and engaging learning media. However, the reality is that interest-read and write Indonesian children are still classified as low. Problems with literacy have become an important issue that needs attention from Indonesian society. This is supported by PISA data, which shows that the ability of Indonesian children to read is still below standards set by the Organization for Economic Cooperation and Development (OECD) (Nabila et al., 2024). Indonesia ranks 62nd out of 70 countries, among the 10 countries with the lowest literacy rates (Hijjayati et al., 2022). In addition, the results of the survey from the Most Literate Nation in the World 2016 revealed that interest in reading in Indonesian society is very low, if compared to other countries (Novelita et al., 2023).

Therefore, the required tool helps various learning media to awaken students' interest and increase their interest in reading and writing. One of them is using learning media. Learning media convey a message or information to the student as the recipient. Some media are also capable of processing messages and responses from students, thus being known as interactive media (Zulfitria & Kartikasari, 2018). Learning media in the form of comics is thought to be able to increase students' interest in reading and writing essays. Comics are a type of cartoon that depicts characters and presents a story sequentially through interconnected images, and are created to entertain readers (Putra & Milenia, 2021, in Putri & Sari, 2025). The media used are comic strips. Comic strips are a type of comic consisting of several panels, where the story involves several characters with dialogue within it (Mahardhika et al., 2022). However, research on the use of comic strips in writing essay learning in elementary schools is still minimal and has not been studied in depth. Learning media comic strip contains a picture or a series of images that form A story (Pritandhari, 2016). By utilizing comic strip media, students can more easily understand the structure of a story and develop their ideas creatively when writing essays. Based on the description, the formulation problem in the study is: Can comic strip media increase the ability of students to read and write in a text essay?

This study aims to increase the ability of students in the 5th grade to read and write by using comic strips to write text essays. Comic strips are suspected to help students control the content of their stories visually and easily, allowing them to develop ideas and compile essays with more interesting and creative content. Therefore, the researcher will conduct research entitled "Increase Reading and Writing Skills with Writing Composition Text Using Learning Media Comic Strips for Students in Grade 5 Elementary School."

2. METHODS

Research methods are procedures systematically carried out scientifically to obtain relevant data and achieve a specific objective. The type of research used in these studies is Classroom Action Research (CAR), which is a method that involves activities conducted within the classroom to address problems identified by teachers, thereby improving quality and

outcomes. The study also applies new methods to help improve the quality and results. Place implementation study: This is SDN Pondok Benda 01. As for the sample research used, it is a student class from V SDN Pondok Benda 01. With the subject 'Study', there are 29 students, comprising 14 boys and 15 girls. In this study, researchers use instrument evaluation in the form of module learning, Instrument Assessment, and LKPD.

Data collection techniques used include tests, observations, and documentation. Test write used for known improvement ability write student before and after actions, the instruments used in the test. This is a grid test that contains indicators that you want to achieve. Question test written composition to measure students' skills in compiling a text essay, to evaluate the results, researchers use a rubric evaluation writing that includes aspects of content, text structure, language, and students' creativity. Observation was done to observe the activities and involvement of students during the learning process. The instruments used are sheet observation, taking notes on the behavior of students, including activeness, enthusiasm, cooperation, and how students use learning media. The following documentation was used to gather proof of the physical activity learning, such as student essays and photos of the activity.

As for the design, his research used Kemmis and Mc. Taggart's research model is a result of Kurt Lewin's model. There are four components in every cycle of this model, namely planning, action, observation, and reflection. Each cycle is done with adjustments to achieve the desired target. If a student still has not yet reached cycle 1, then the student's ability to write a text essay is still not according to expected results , so cycle II must be implemented, and so on. Cycle. This will stop when the student's ability to write a text essay is marked. The average is 75%. The system here is a spiral system, where the entire system is continuous. An illustration of this model is shown in the figure below.

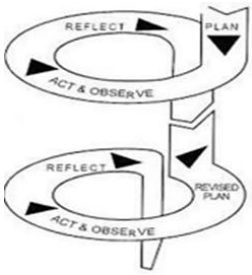

Figure 1. PTK Cycle Model Kemmis & Mc.Taggart

This Classroom Action Research (CAR) uses the Kemmis & McTaggart method. Each cycle has four stages: planning, implementing actions, observing, and reflecting (Farhana et al., 2019).

a. Planning is the process of designing actions to be taken as a solution to increase the ability of students to write text essays. Activities: This is done after analyzing problems and identifying the root cause. At this stage this, researcher designing Plan Implementation Learning (RPP) with integrating comic strip media, preparing material learning, composing instrument study in the form of rubric evaluation writing that includes aspect content, structure text, language, and creativity, as well as prepare the worksheet Students (LKPD) and worksheets observation For observe activity student during learning ongoing.

b. Implementation action is a teacher's process in operating step repair, improvement, or directed modification to reach goals that have been set. Stage: This is the implementation of plans that have been designed previously. In the core activity, the teacher introduced comic strip media to the students. Students, guiding students to identify elements of a story in a comic strip, explaining the structure of text essays, and guiding students to train in writing text essays based on comic strips that have been observed. Learning ended with an activity closing, where students presented their results in an essay they and the teacher gave a reflection and strengthened the ongoing learning.
c. Observation or observation done to monitor implementation actions taken for students. Activities are ongoing during the learning process to obtain data directly related to implementation action. Data covering the results of students' work is collected in the form of a text essay, documentation of learning activities through photos and notes, and behavior-relevant observations of students with an objective study.
d. Reflection is a process of evaluating, examining, and considering the way actions, as well as their impact on the process and results of learning. From the results reflection, it can be determined that steps can be taken to overcome problems faced by teachers and students during learning. At this stage, the analysis results test write student based on rubric assessment, evaluation, and improvement of writing ability from before and after actions, as well as observational data analysis about activities and involvement of students. Based on the results, the reflection said that it was determined whether the cycle needs to be continued or if the criteria for success have been met, at the same time designing improvements for the cycle, if required.

Criteria for success action, minimum learning, or KKM, namely with a score of 70. Therefore, it is said that students can succeed in writing a text essay when they reach a mark of 70 or at least meet the criteria for a good grade. Determination in determining the ability to write a text essay, students, namely, with adapted marks and average reading and writing abilities in categories below :

Table 1. Categorization Ability Writing Composition Text

Criteria	Range
Very well	80-100
Good	66- 79
Enough	56- 65
Not enough	40- 55
Not enough	<40

Participant education is said to be complete if they fulfill the minimum score of 70. Then, the class is also said to have passed when 75% of the students have completed it. As for the formula value completeness, namely :

$$\text{Completion} = \frac{\sum \text{students who completed}}{\sum \text{all student}}$$

If the indicator This Already can be achieved, then the cycle will stop, and the analysis results can be studied.

3. RESULTS AND DISCUSSION

3.1. Results

The results of this study were obtained from an action research project conducted in Grade V of Pondok Benda 01 Elementary School, utilizing comic strips as a learning medium. This research was conducted in two cycles, each consisting of a single meeting.

3.1.1 Results of Cycle I Actions

In cycle I, learning to write essays using comic strips was introduced and implemented. Based on observations, "students appeared enthusiastic and interested in the learning media used because of its attractive appearance and attractive visuals." However, evaluation results showed that many students still struggled to organize ideas into complete and logical paragraphs. Some students were also unable to effectively align the essay content with the flow of the comic strips. Additionally, time management during the lesson was suboptimal, resulting in some students not having sufficient time to complete their essays.

Figure 2. Learning Media "Comic Strip"

3.1.2 Results of Cycle II Actions

Based on the reflections from Cycle I, the researcher made improvements to the lesson plan in Cycle II by adding examples of compositions that matched the comic images, preparing more structured student worksheets (LKPD), and refining time management strategies. The researcher also provided individual guidance to students experiencing difficulties.

In cycle II, "students appeared to have a better understanding of the steps for writing essays based on comic strips." Evaluation results showed that most students were able to construct coherent paragraphs, with more focused ideas and a wider range of vocabulary. The approach of using essay outlines significantly assisted students in composing their texts, and the provision of individual guidance made students more confident and active. Time management was also improved, allowing almost all students to complete their writing assignments.

3.1.3 Student Learning Outcomes Data

The data on student learning outcomes in the Pre-Cycle, Cycle I, and Cycle II are as follows:

Table 2. Results of Students' Reading and Writing Skills

No.	Indicator	Pre Cycle	Cycle 1	Cycle 2
1.	Students Complete	3	12	29
2.	Students Not Yet Completed	26	17	0
3.	Total Score	1590	1932	2699
4.	Highest Score	80	81	98
5.	Lowest Score	40	44	80
6.	Average value	54.82759	66.62069	93.06897
7.	Completion Percentage	10.34%	41.37%	100%
8.	Percentage of Incompleteness	89.65%	58.62%	0%

Table 2 presents the results of the reading and writing skills in Cycle I. Overall, the results of Cycle I are still incomplete, as the percentage completion index has only reached 41.37%.

Table 3. Categories of Students' Reading and Writing Ability

Cylcle	Average score	Category
Pre Cycle	10.34%	Very Low
Cycle I	41.37%	Low
Cycle II	100%	Tall

The table above provides information indicating that students' reading and writing skills improved from Cycle I to Cycle II after the implementation of the comic strip learning media, specifically from 41.37% initially to 100%. This indicates that when Cycle I was implemented, there were still many areas that had not been achieved and required improvements to help students enhance their reading and writing skills, aligning with the success index. Therefore, the researcher then conducted cycle II. In this second cycle, students' reading and writing skills experienced an overall increase, reaching 100% or the high category. It can be said that students have achieved the indicators of success for the action, making the entire process in Cycle II successful. Additionally, students' reading and writing skills have continued to increase from initially low to a high category.

3.2 Discussion

3.2.1 Effectiveness of Comic Strip Media in Learning

The results of the study showed that comic strip media was proven effective in improving the reading and writing skills of fifth-grade students of Pondok Benda 01 Elementary School. The increase in the percentage of completion from 10.34% in the pre-cycle to 100% in the second cycle showed a significant impact on learning. The effectiveness of this media can be explained through three main aspects: attractive visualizations help students understand the

storyline more easily, the sequential strip format facilitates understanding of logical story structures, and attractive visual stimuli increase students' motivation and enthusiasm in learning to write. The learning approach, which utilized essay outlines in the second cycle, also made a significant contribution, helping students organize their ideas systematically and overcome difficulties in composing complete and logical paragraphs.

The improvement in students' abilities from cycle I to cycle II indicates that improvements in learning methods have a positive impact, with more intensive individual guidance helping students who are experiencing difficulties. This is reflected in the increase in students' lowest scores, which rose from 44 in cycle I to 80 in cycle II. The results of this study are in line with the findings of Pratiwi (2018) who stated that strip-shaped media designs facilitate students in understanding the storyline and developing ideas independently, as well as research by Lenwening (2023) which showed an increase in the percentage of learning outcomes from 48% in cycle 1 to 84% in cycle 2, proving that comic strips facilitate understanding story structure and the development of creative ideas in Indonesian language learning.

3.2.2 Implications and Limitations of the Study

This research has significant practical implications for Indonesian language learning in elementary schools, demonstrating that comic strips can be an effective alternative learning medium for improving students' reading and writing skills. Implementing this medium requires careful planning, particularly in terms of preparing visual materials that align with learning objectives, effective time management, and providing intensive individual guidance to students who are experiencing difficulties. The approach of using an outline before writing has been shown to help students organize ideas systematically and produce more structured essays.

Although this study yielded positive results, several limitations should be noted. First, the suboptimal time management in cycle I demonstrates the importance of careful planning in implementing comic strip media. Second, this study was conducted in only one class at one school, so the generalizability of the results should be interpreted with caution. Third, the use of comic strips requires more intensive preparation from the teacher in preparing appropriate visual materials. Thus, it can be concluded that comic strips are effective in improving students' reading and writing skills, but their implementation requires careful planning and continuous improvement to achieve optimal results.

4. CONCLUSION

Based on the research results, it can be concluded that the use of comic strip media in learning has succeeded in improving the literacy skills of fifth-grade students in writing essays in Indonesian subjects. This can be seen from the results in the first cycle, which showed a percentage of 41.37% (value range 44-81), then increased to 100% (value range 80-98) in the second cycle, or from the low category to the high category. Additionally, students' literacy skills increased by 58.63% from Cycle I to Cycle II. Thus, the application of comic strip media has been proven to improve students' literacy skills in the Indonesian language learning process.

Teachers are encouraged to utilize this comic strip learning medium creatively and contextually in Indonesian language learning. Not only does it engage students, but it can also facilitate idea development, clarify storylines, and help them understand the structure and content of written texts. Teachers can also involve students in creating simple comic strips as part of an active and enjoyable learning experience.

Similar research should be conducted at different grade levels or school levels to determine the effectiveness of this media in various learning environments. Furthermore, other visual media, such as infographics and storyboards, should be developed. A board or simple animation can be a relevant alternative. Quantitative research can also be conducted to obtain more measurable data and broader generalizations regarding the impact of visual media use on students' literacy skills.

5. AUTHORS' NOTE

The authors declare that there are no conflicts of interest regarding the publication of this article and confirm that it is free from plagiarism.

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Validity of Internship Program Instrument in Primary School Teaching College, Timor-Leste

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ABSTRACT

This study aims to test the validity of the construct of the assessment instrument of the internship program for pre-service elementary teachers at the Instituto Católico para a Formação de Professores (ICFP), Baucau, Timor-Leste, using the Confirmatory Factor Analysis *(CFA) approach. The initial instrument consists of 40 items covering seven primary constructs: Teaching Preparation, Introductory Presentation of Lessons, Lesson Explanation, Pedagogic Ability, Gender-Based Participation, Special Needs, Assessment During Lessons, and Lesson Closure. The data was obtained from the assessments conducted by supervisors and teachers on 350 Pre-service elementary teachers who participated in the internship program. The CFA analysis showed that the measurement model had a reasonable match rate, with Chi-square/df values < 2,* p-value *≥ 0.05, RMSEA < 0.08, CFI ≥ 0.90, and SRMR ≤ 0.05. Of the initial 40 items, 32 were declared valid and significant in measuring the construct. The results of this study show that the internship assessment instrument has strong construct validity and can be used to assess pre-service elementary teachers effectively in the local context. This instrument can be a reference for developing and evaluating teaching practice programs in other teacher education institutions.*

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Confirmatory Factor Analysis.

1. INTRODUCTION

Internship programs or field practice are essential components of the curriculum of educational institutions for education personnel to improve the quality of teacher education (Lantu et al., 2022; Tindowen et al., 2019; Wolinsky-Nahmias & Auerbach, 2022). Internships not only provide space for students to apply theories acquired in college to actual teaching practices but also serve as a reflection tool to assess the competence of pre-service elementary teachers in a real context (Abdelrahman et al., 2022; Anjum, 2020). At the Instituto Católico para a Formação de Professores (ICFP), Baucau, Timor-Leste, internships are integral to forming students' pedagogic competence. Through this program, students are expected to demonstrate the ability to plan, implement, and evaluate learning professionally.

However, the effectiveness of internship programs depends on the quality of assessment instruments used to evaluate student performance (Furtasan Ali Yusuf & Basrowi, 2023; Sukmawati, 2022). A good assessment must represent the competencies that pre-service elementary teachers should have, such as competence in designing learning, delivering materials, using inclusive strategies, and conducting formative and summative assessments. (Dixson & Worrell, 2016; Harrison et al., 2017; Ismail et al., 2022)A systematic validation process based on psychometric theory is needed to ensure that the instrument measures accurately and consistently. One of the most widely used approaches in construct validation is *Confirmatory Factor Analysis* (CFA), which allows researchers to test the relationships between indicators in a theoretical construct and the extent to which empirical data support the model (Moskotina, 2022; Norwalk et al., 2014).

Several previous studies have shown the importance of construct validation in developing pre-service elementary teacher assessment instruments. For example, research by Walker, (2012) Emphasizing that a valid and reliable assessment tool is a prerequisite for obtaining meaningful data in assessing the professional competence of pre-service elementary teachers. Moreover Shulman, (1987) Pedagogical Content Knowledge (PCK) is introduced as a theoretical basis for developing a teacher's ability measurement tool that includes mastery of teaching materials and strategies. This concept has been widely used in developing teacher competency assessment instruments, including in this study. Furthermore, validation using CFA has been widely used in various studies to test the feasibility of instruments in the context of teacher education, as done by Rahayu et al., (2021) In the local context of Indonesia.

However, there are still gaps at ICFP Baucau, where the long-used internship program assessment instruments have not been thoroughly tested for their construct validity using quantitative approaches such as CFA. This causes potential weaknesses in the assessment carried out by supervisors and teachers because not all indicators can be ensured to be relevant or accurately represent aspects of pre-service elementary teachers. Therefore, this research is important to answer the needs of institutions in developing valid, objective, and scientifically accountable assessment instruments.

This research is significant because it targets the development of theory-based evaluative instruments that have been statistically validated using the *Confirmatory Factor Analysis* (CFA). The validity of the construct is the primary key in ensuring that each indicator in the

instrument truly reflects the dimensions of the competency being measured (Hidayah et al., 2025; Van Huy et al., 2020). The results of this study are beneficial for the ICFP Baucau institution in improving the quality of internship programs. They are relevant for other educational institutions that are developing similar instruments. Thus, this research contributes directly to improving the quality of education of pre-service elementary teachers and strengthening the supervision and reflection process in educational practice. Although internship assessment instruments have been widely used in ICFP, there are still limitations in the empirical evidence regarding the validity of the constructs of each existing assessment indicator. Not all items in the instrument have been tested with proper statistical methods, especially using CFA. The absence of empirical data on model fit and the relationship between indicators results in potential bias in assessment and decision-making related to student competence (Rahayu et al., 2021).

This study aims to test the validity of the construct of the internship program assessment instrument at ICFP Baucau using *the Confirmatory Factor Analysis* (CFA) technique. In particular, this study will evaluate the extent to which each of the seven primary constructs, namely Teaching Preparation, Introductory Presentation of Lessons, Lesson Explanation, Pedagogic Ability, Inclusive Participation, Assessment During Lessons, and Lesson Closure, is compatible with the designed theoretical model, as well as identify statistically invalid items. This study is focused on testing the validity of the construct of the internship program assessment instrument in the ICFP Baucau, Timor-Leste. The scope of the research is limited only to construct validity using the CFA approach and does not include reliability, content validity, or implementation tests in the form of experiments. In addition, this study only focuses on data obtained from lecturers and field supervisors as assessors, and does not discuss student perceptions as assessed subjects.

2. METHODS

This study uses a quantitative approach with construct validity analysis techniques through *Confirmatory Factor Analysis* (CFA). The main objective of this study is to test the extent of the constructs in the assessment instrument of the internship program at ICFP Baucau using the designed theoretical model. The assessment instrument consists of several indicators that measure pre-service elementary teachers in various aspects of learning, and is prepared based on the theoretical foundation *of Pedagogical Content Knowledge* (PCK).

This assessment instrument consists of seven indicators and 40 assessment items related to the teaching components of the local context of Timor Leste. This indicator blueprint can be seen in the following table.

Table 1. Indicators of the assessment instrument of internship programs at ICFP Baucau

Yes	Indicators	Number of Points
1	Preparation to Teach	5
2	Introduction to Lessons for Students	5
3	Lesson Explanation Presentation For Students	5
4	Pedagogic Abilities	10
5	Gender-Based Participation and Students with Special Needs	5
6	Assessment during lessons	5
7	Conclusion presentation to students	5
	Sum	**40**

This instrument is given to assessors, including ICFP lecturers, field supervisors, and teachers at schools where students carry out internship programs. The pre-service elementary teachers' assessment amounted to 350 people and was spread across partner schools.

The data analyzed in this study came from the assessment form the supervisors and teachers had filled out after observing the implementation of learning by Pre-service elementary teachers. All data were collected and processed using CFA tests with the help of R Studio software. The CFA test aims to evaluate whether the indicators in each construct have a significant relationship, which the previously defined factor model explains. The assessment of model fit is carried out by paying attention to several model fit indices, such as Chi-square values, *p-values*, *Root Mean Square Error of Approximation* (RMSEA), *Comparative Fit Index* (CFI), and *Standardized Root Mean Square Residual* (SRMR). The results of this analysis were used to assess the construct structure's validity and the indicators' suitability in measuring pre-service elementary teachers during the internship program.

3. RESULTS AND DISCUSSION

3.1. Results

The following are the results of the CFA test on seven indicators on all 40 items in the internship program assessment instrument at ICFP Baucau. Confirmatory Factor Analysis (CFA) is a statistical technique to test whether data match a predetermined factor structure. (Norwalk et al., 2014). Here are the results of the analysis of each indicator:

1) Results of the analysis of Indicators of Preparation for Teaching

Confirmatory Factor Analysis (CFA) was conducted to test the suitability of the measurement model of indicators on the *Preparation for Teaching* variable. The model fit test is carried out by paying attention to several indices such as Chi-square, RMSEA, CFI, and SRMR. Details of the CFA analysis results for *the Preparation for Teaching* indicator are presented in **Table 2** below.

Table 2. CFA Analysis of Indicators of Preparation for Teaching

Model Fit Indices		Information	
Chi-square	7.977	X2/DF < 2	Model Fit
Df	5.000	X2/DF < 2	Model Fit
p-value	0.157	p 0.05≥	Model Fit
RMSEA	0.041	< 0.08	Model Fit
CFI	0.988	0.9≥	Model Fit
SRMR	0.029	≤ 0.05	Model Fit

The Confirmatory Factor Analysis (CFA) for the PUM construct in **Table 2** shows that the fit indices model is in a good range, with a Chi-square value of 7.977 (df = 5, p-value = 0.157), a Chi-square/df ratio = 1.595 < 2, RMSEA of 0.041, CFI of 0.988, and SRMR of 0.029.

Figure 1 below shows the diagram of the results of the Confirmatory Factor Analysis (CFA) for the latent variable "PUM" connected to five observation indicators (PUM1 to PUM5).

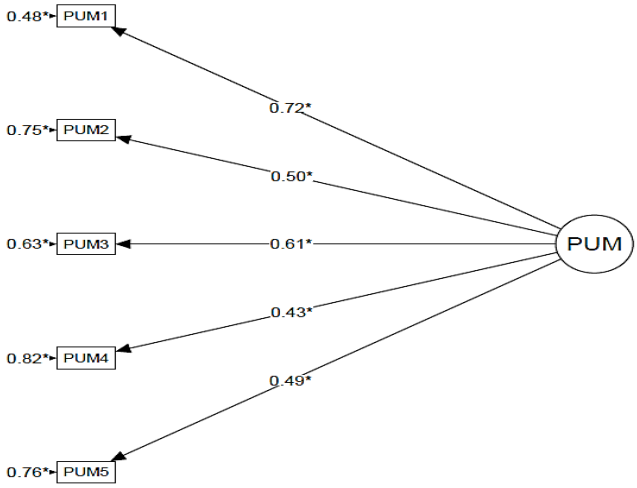

Figure 1. CFA Analysis of Indicators of Preparation for Teaching

Figure 1 shows that the factors of each indicator against the PUM construct show a significant relationship, with PUM1 (0.72), PUM2 (0.50), PUM3 (0.61), PUM4 (0.49), and PUM5 (0.43). The PUM1 and PUM3 indicators have a reasonably strong relationship with the PUM construct, while PUM2, PUM4, and PUM5 have a moderate relationship. Overall, the results of this CFA show that predetermined indicators measure the PUM construct well and are valid.

2) Results of analysis of Introduction to Lesson Presentation Indicators for Students

Furthermore, a CFA analysis was carried out to test the construct's validity on the variable indicators of the Introduction to Lesson Presentation for Students. The fit model is evaluated using several statistical indices to ensure the fit between the model and the empirical data. **Table 3** presents the complete results of the CFA analysis for the Introduction to Student Presentation indicator.

Table 3. CFA Analysis Introduction to Lesson Presentation Indicators for Students

Model Fit Indices		Information	
Chi-square	9.476	X2/DF < 2	Model Fit
Df	5.000	X2/DF < 2	Model Fit
p-value	0.092	p 0.05≥	Model Fit
RMSEA	0.051	< 0.08	Model Fit
CFI	0.987	≥ 0.9	Model Fit
SRMR	0.030	≤ 0.05	Model Fit

Based on the results of the Confirmatory Factor Analysis (CFA) for the PPPS construct in **Table 3**, it shows that the fit indices model is in a good range, with a Chi-square value of 9.476 (df = 5, p-value = 0.092), a Chi-square/df ratio = 1.895 < 2, an RMSEA of 0.051, a CFI of 0.987, and an SRMR of 0.030. The diagram of the results of the Confirmatory Factor Analysis (CFA) can be seen in **Figure 2** below.

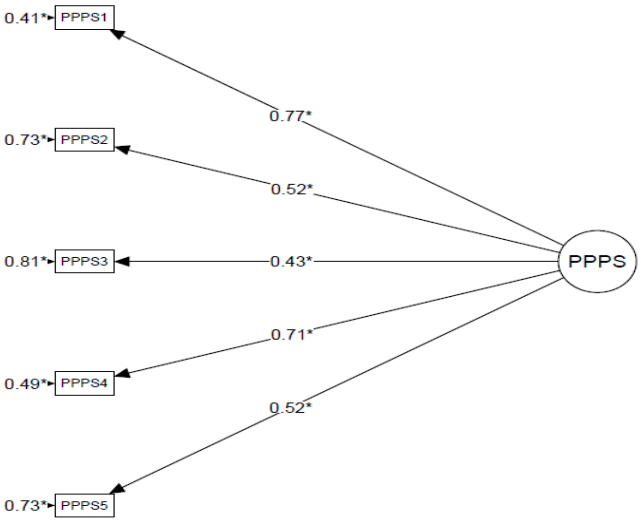

Figure 2. CFA Analysis Introduction to Lesson Presentation Indicators for Students

The factors of each indicator against the PPPS construct in **Figure 2** show a significant relationship, with PPPS1 (0.77), PPPS2 (0.52), PPPS3 (0.43), PPPS4 (0.71), and PPPS5 (0.52). The PPPS1 and PPPS4 indicators have a powerful relationship with the PPPS construct, while PPPS2, PPPS3, and PPPS5 have a moderate relationship. Overall, the results of this CFA show that the PPPS construct is well measured by the indicators that have been determined.

3) Results of analysis of Introduction to Lesson Presentation Indicators for Students

CFA analysis is also applied to the indicators in the *Introduction to Lesson Presentation variable for advanced students*. The goal is to ensure the measurement model remains consistent and valid on the expected factor structure. Evaluation used several model fit indices such as Chi-square, RMSEA, CFI, and SRMR. The results obtained showed that the model had an excellent match with the data. Details of the results of the CFA analysis can be seen in **Table 4** below.

Table 4. CFA Analysis Introduction to Lesson Presentation Indicators for Students

Model Fit Indices		Information	
Chi-square	2.707	X2/DF < 2	Model Fit
Df	5.000	X2/DF < 2	Model Fit
p-value	0.745	p 0.05≥	Model Fit
RMSEA	0.000	< 0.08	Model Fit
CFI	1.000	≥0.9	Model Fit
SRMR	0.015	≤ 0.05	Model Fit

The results of the Confirmatory Factor Analysis (CFA) for the PPPUS construct are in **Table 4**. showed that the fit indices model was in an excellent range, with a Chi-square value of 2.707 (df = 5, p-value = 0.745), a Chi-square/df ratio = 0.541 < 2, an RMSEA of 0.000, a CFI of 1.000, and an SRMR of 0.015. The diagram of the results of the Confirmatory Factor Analysis (CFA) can be seen in **Figure 3** below.

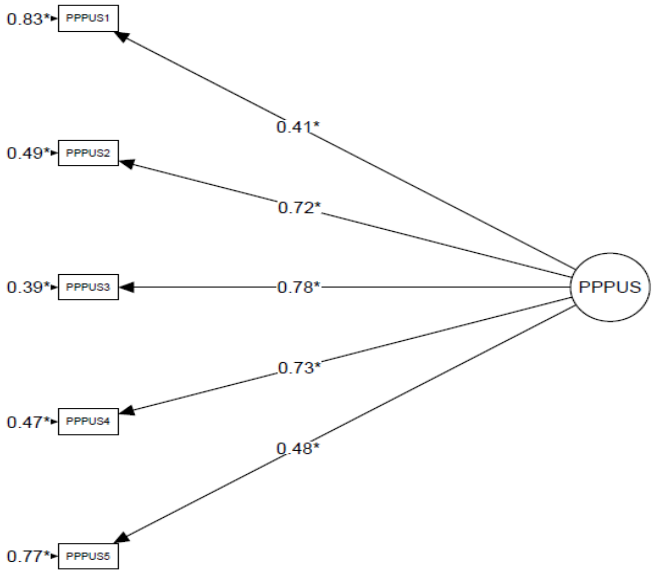

Figure 3. CFA Analysis Introduction to Lesson Presentation Indicators for Students

The factors of each indicator on the PPPUS construct in **Figure 3** show a significant relationship, with PPPUS1 (0.41), PPPUS2 (0.72), PPPUS3 (0.78), PPPUS4 (0.73), and PPPUS5 (0.48). The PPPUS2, PPPUS3, and PPPUS4 indicators have a powerful relationship with the PPPUS construct, while PPPUS5 has a moderate relationship. Overall, the results of this CFA show that the PPPUS construct is very well measured by the predetermined indicators, with excellent validity based on the fit indices model used.

4) Analysis Results of Lesson Explanation Presentation Indicators for Students

The next step is to analyze the indicators on the variables of *Lesson Explanation Presentation for Students* using CFA. This analysis aims to confirm whether these indicators form a statistically valid construct. Model fit criteria, including Chi-square, RMSEA, CFI, and SRMR values, are used to assess model suitability. The entire index value indicates that the model is within the recommended limits, indicating a good match. The full results of the CFA analysis for this indicator are presented in **Table 5** below.

Table 5. CFA Analysis Indicators Presentation Lesson Explanations For Students

Model Fit Indices		**Information**	
Chi-square	9.749	X2/DF < 2	Model Fit
Df	5.000	X2/DF < 2	Model Fit
p-value	0.083	p 0.05≥	Model Fit
RMSEA	0.052	< 0.08	Model Fit
CFI	0.993	≥ 0.9	Model Fit
SRMR	0.027	≤ 0.05	Model Fit

In **Table 5**, the final results of the CFA test for the KP construct show that the fit indices model is in a good range, with a Chi-square value of 9.749 (df = 5, p-value = 0.083) and a Chi-square/df ratio = 1.949 < 2. RMSEA of 0.052, CFI of 0.993, and SRMR of 0.027 all show excellent fit models. The diagram of the results of the Confirmatory Factor Analysis (CFA) can be seen in **Figure 4** below.

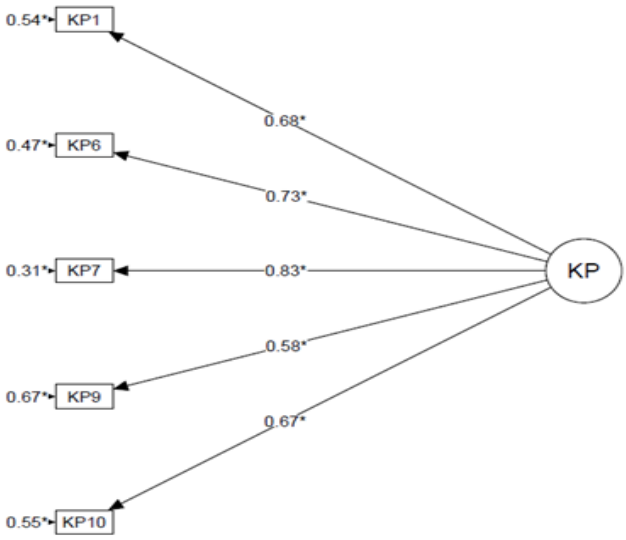

Figure 4. CFA Analysis Indicators Presentation Lesson Explanations For Students

The factors of each indicator against the KP construct in **Figure 4** show a significant relationship, with KP1 (0.68), KP6 (0.73), KP7 (0.83), KP9 (0.67), and KP10 (0.58). Overall, the results of this CFA show that the KP construct is well measured by the predetermined indicators, with good validity based on the fit indices model used. Previously, this indicator had 10 items, but after conducting the CFA test, only five indicators showed a significant relationship with the KP indicators, namely items 1,6,7,9, and 10.

5) Results of the analysis of Pedagogic Ability Indicators

Furthermore, a CFA analysis was carried out on the indicators in the *Pedagogic Ability* variable. This analysis is important to ensure that the indicators represent the construct. Model fit testing considers various fit indices such as Chi-square, RMSEA, CFI, and SRMR. The values obtained indicate an excellent level of model compatibility, even close to perfect. **Table 6** presents the complete results of the CFA analysis for *the Pedagogic Ability* indicator.

Table 6. CFA Analysis of Pedagogic Ability Indicators

Model Fit Indices		Information	
Chi-square	0.495	X2/DF < 2	Model Fit
Df	2.000	X2/DF < 2	Model Fit
p-value	0.781	p 0.05≥	Model Fit
RMSEA	0.000	< 0.08	Model Fit
CFI	1.000	≥ 0.9	Model Fit
SRMR	0.008	≤ 0.05	Model Fit

A solid CFA analysis of **Table 6** shows that the fit indices model is in the excellent range with a Chi-square value of 0.495 (df = 2, p-value = 0.781), a Chi-square/df ratio = 0.247 < 2, RMSEA 0.000, CFI 1,000, and an SRMR of 0.008. The diagram of the results of the Confirmatory Factor Analysis (CFA) can be seen in **Figure 5** below.

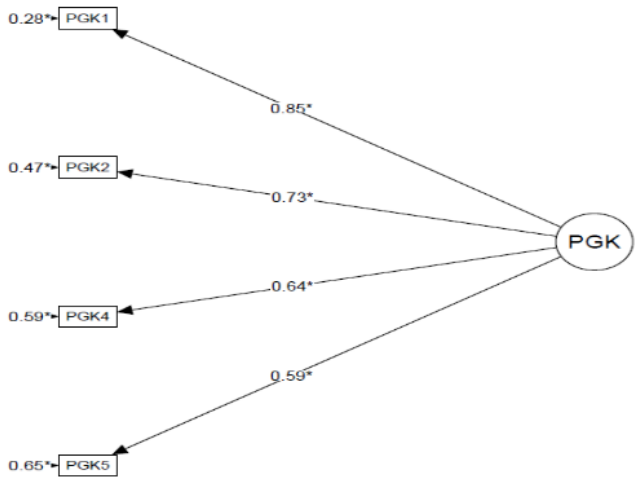

Figure 5. CFA Analysis of Pedagogic Ability Indicators

Figure 5 shows that all indicators (PGK1 = 0.85, PGK2 = 0.73, PGK4 = 0.64, PGK5 = 0.59) have a significant and strong factor load, suggesting that they measure the CKD construct well. Overall, the results of this CFA show that the CKD construct is very well measured and valid by the specified indicators. The KGK construct initially had five items, but through Confirmatory Factor Analysis (CFA) analysis, only four items fit the CKD model.

6) Results of the analysis of Participation Indicators Based on Gender and Students with Special Needs

The CFA analysis was also applied to the variable indicators *of Gender-based Participation and students with special needs*. This analysis aimed to assess the model's suitability in representing inclusive engagement in learning. Several fit model indices such as Chi-square, RMSEA, CFI, and SRMR are used to evaluate model fit. The results of the analysis show that the entire value of the index is within very good limits. **Table 7** presents a breakdown of the CFA results for participation indicators by gender and special needs.

Table 7. CFA Analysis of Participation Indicators by Gender and Students with Special Needs

Model Fit Indices		Information	
Chi-square	0.734	X2/DF < 2	Model Fit
Df	2.000	X2/DF < 2	Model Fit
p-value	0.693	p 0.05≥	Model Fit
RMSEA	0.000	< 0.08	Model Fit
CFI	1.000	≥ 0.9	Model Fit
SRMR	0.009	≤ 0.05	Model Fit

The Confirmatory Factor Analysis (CFA) results for PSP in **Table 7** show that the model matches well. Based on the Fit Indices given, the Chi-square of 0.734 with df 2 meets the criteria of X2/df < 2, and the p-value of 0.693 meets the criteria p >= 0.05. Other indices, such as RSMEA (0.000), CFI (1.000), and SRMR (0.009), also show excellent matches by meeting their respective criteria. The diagram of the results of the Confirmatory Factor Analysis (CFA) can be seen in **Figure 6** below.

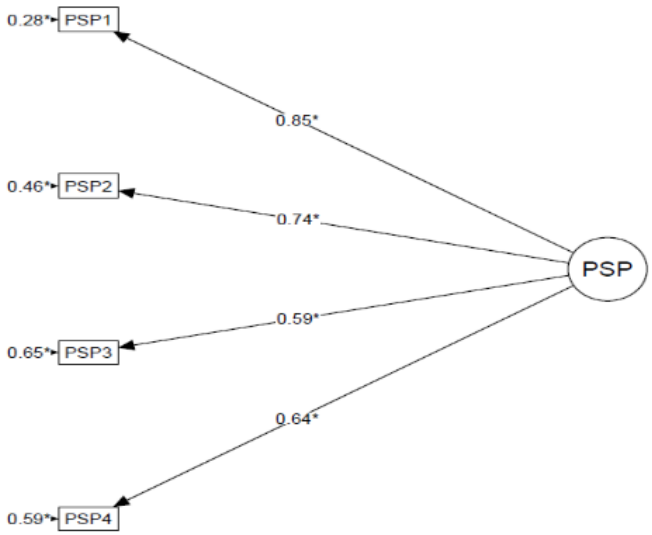

Figure 6. CFA Analysis of Participation Indicators by Gender and Students with Special Needs

The loading factors for PSP1, PSP2, PSP3, and PSP4 in **Figure 6** are 0.85, 0.74, 0.59, and 0.64, respectively, indicating that each indicator significantly contributes to the PSP construct. In conclusion, this CFA model shows good compatibility and strong construct validity.

7) Results of the analysis of the Assessment Indicators during the lesson

As the final part of the CFA analysis, tests were carried out on the indicators in the *Assessment During Lesson* variables. This analysis aims to ensure that each indicator validates the assessment aspects teachers carry out during the learning process. The evaluation was carried out by looking at the values of the fit model, such as Chi-square, RMSEA, CFI, and SRMR. All values indicate that the model has a good and acceptable level of compatibility. Details of the CFA analysis results for this variable are shown in **Table 8** below.

Table 8. CFA Analysis of Assessment Indicators During Lessons

Model Fit Indices		**Information**	
Chi-square	7.977	X2/DF < 2	Model Fit
Df	5.000	X2/DF < 2	Model Fit
p-value	0.157	p 0.05≥	Model Fit
RMSEA	0.041	< 0.08	Model Fit
CFI	0.988	≥ 0.9	Model Fit
SRMR	0.029	≤ 0.05	Model Fit

The Confirmatory Factor Analysis (CFA) results for the PKS in **Table 8** show that the model matches well. Based on the Fit Indices given, the Chi-square of 7,977 with df 5 meets the X2/df < 2 criteria, and the p-value of 0.157 meets the criteria p >= 0.05. Other indices such as RSMEA (0.041), CFI (0.988), and SRMR (0.029) also showed excellent matches by meeting their respective criteria. The diagram of the results of the Confirmatory Factor Analysis (CFA) can be seen in **Figure 7** below.

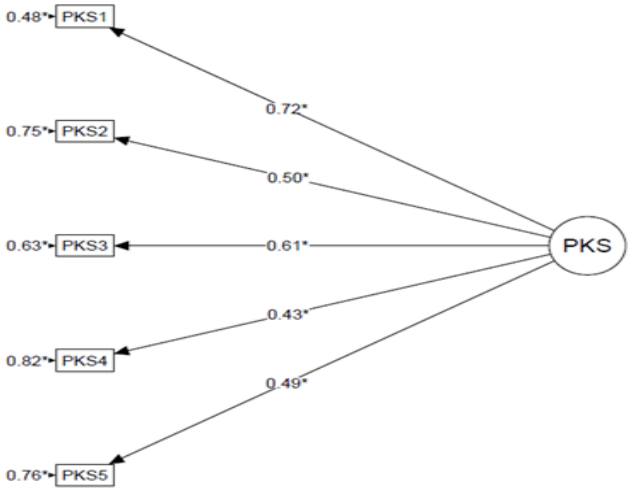

Figure 7. CFA Analysis of Assessment Indicators During Lessons

The loading factors for PKS1, PKS2, PKS3, PKS4, and PKS5 in **Figure 7** are 0.72, 0.50, 0.61, 0.43, and 0.49, respectively, indicating that each indicator significantly contributes to the PKS construct. In conclusion, this CFA model shows good compatibility and strong construct validity.

3.2 Discussion

1) Results of the Analysis of Indicators of Preparation for Teaching

The results of *the Confirmatory Factor Analysis* (CFA) of the *Preparation for Teaching* (PUM) construct show that the measurement model is compatible with empirical data. The Chi-square value of 7.977 with degrees of freedom (df) = 5 and *p-value* = 0.157 indicates that there is no significant difference between the proposed model and the observed data ($p \geq 0.05$). The Chi-square/df ratio of 1.595 is within the ideal limit (< 2), further strengthening the model's suitability. Other indices also support this conclusion, with RMSEA values = 0.041 (< 0.08), CFI = 0.988 (≥ 0.90), and SRMR = 0.029 (≤ 0.05). In addition, based on the factor estimation in **Figure 1**, all indicators have a significant contribution to the PUM construct, with the loading factor values PUM1 = 0.72, PUM2 = 0.50, PUM3 = 0.61, PUM4 = 0.49, and PUM5 = 0.43. The PUM1 and PUM3 indicators made the most substantial contributions, while the others were in the moderate category. These findings confirm that these five indicators validly measure the PUM construct and support the consistency and reliability of the measuring tools used in this study.

These findings are in line with the results of recent research by Radde et al. (2021) and Fitrizqi & Susanto (2021), which shows that construct validation using CFA is able to identify strong indicators in the assessment of teaching readiness and provides empirical evidence of the

instrument's reliability in the context of teacher training in a contextual and applicable manner.

2) Results of Analysis of Introduction to Lesson Presentation Indicators for Students

The Confirmatory Factor Analysis (CFA) analysis of the Introduction to Lessons for Students (PPPS) construct shows that the measurement model fits adequately. The Chi-square value of 9.476 with degrees of freedom (df) = 5 and *p-value* = 0.092 shows no significant difference between the model with empirical data ($p \geq 0.05$), with a Chi-square/df ratio of 1.895, which is still within the ideal limit (< 2). Other feasibility indices also support model suitability, namely RMSEA of 0.051 (< 0.08), CFI of 0.987 (≥ 0.90), and SRMR of 0.030 (≤ 0.05). In addition, the estimated value of the factor in **Figure 2** shows that all indicators have a significant contribution to the PPPS construct, with the values of the loading factor PPPS1 = 0.77, PPPS2 = 0.52, PPPS3 = 0.43, PPPS4 = 0.71, and PPPS5 = 0.52. The PPPS1 and PPPS4 indicators contributed most, while the others were moderate. These findings prove that the designed indicators validly measure the PPPS construct, show a stable factor structure, and support the theoretical foundation.

These findings are reinforced by research. Norwalk et al., (2014) and Katsikatsou et al., (2022)This also shows that the construct of the introductory presentation consistently forms a valid factor when tested with CFA, especially on indicators related to the clarity of learning objectives and the association of the material with the student experience. These indicators are shown to have the highest loading value in measuring the readiness and effectiveness of novice teachers in the classroom.

3) Results of Analysis of Introduction to Lesson Presentation Indicators for Students

Confirmatory *Factor Analysis* (CFA) analysis of the *Introduction to Lessons for Students* (PPPUS) construct shows that the measurement model has an excellent level of compatibility. This is shown by the Chi-square value of 2.707 with degrees of freedom (df) = 5 and *p-value* = 0.745, which indicates that the model does not differ significantly from the empirical data ($p \geq 0.05$). The Chi-square/df ratio of 0.541 is well below the maximum threshold of 2, confirming that the model is a perfect fit. In addition, all other match indices reinforce this conclusion, namely RMSEA = 0.000 (< 0.08), CFI = 1.000 (≥ 0.90), and SRMR = 0.015 (≤ 0.05). The factor estimation in **Figure 3** shows a significant contribution of all indicators to the PPPUS construct, with the loading values PPPUS2 = 0.78, PPPUS3 = 0.73, and PPPUS4 = 0.73 reflecting a powerful relationship, while PPPUS1 = 0.42 and PPPUS5 = 0.48 show a moderate relationship. Overall, these results provide strong evidence that the PPPUS construct is validly and consistently measured by the designed indicators and demonstrate a very adequate structural stability of the model.

These findings are in line with the results of a study by Hidayat et al., (2021), which suggests that the construct of an advanced introductory presentation has a strong and stable factor structure, especially when novice teachers can relate learning content to the local context and student experience. This significantly strengthens the validity of the model in CFA analysis.

4) Analysis Results of Lesson Explanation Presentation Indicators for Students

Analysis results *Confirmatory Factor Analysis* (CFA) against constructs *Lesson Explanation Presentations for Students* (KP) indicates that the measurement model is in the category of good fit. Chi-square value of 9.749 with degrees of freedom (df) = 5 and *p-value* = 0.083 indicates that the model does not differ significantly from the empirical data ($p \geq 0.05$), with a Chi-square/df ratio of 1.949 that is still within acceptable limits (< 2). Other indices also showed excellent model match, namely RMSEA = 0.052 (< 0.08), CFI = 0.993 (≥ 0.90), and SRMR = 0.027 (≤ 0.05). Based on the results of the factor estimation in **Figure 4**, the indicators that contribute significantly to the KP construct are KP1 (0.68), KP6 (0.73), KP7 (0.83), KP9 (0.67), and KP10 (0.58). The KP7 indicator shows the highest contribution, while other indicators show a strong to moderate relationship. Previously, the KP construct consisted of 10 indicators, but only five met the significant criteria in the CFA model. These findings show that the remaining five indicators validly measure the KP construct and support the quality of the measuring instruments used in the context of this study (Van Huy et al., 2020).

5) Results of the Analysis of Pedagogic Ability Indicators

Analysis *Confirmatory Factor Analysis* (CFA) against constructs *Pedagogic Abilities* (PGK) showed very satisfactory model fit results. Chi-square value of 0.495 with degrees of freedom (df) = 2 and *p-value* = 0.781 indicates no significant difference between the model and the empirical data, with a Chi-square/df ratio of 0.247, well below the threshold of 2. Other match indices also confirmed the excellent quality of the model, namely RMSEA = 0.000 (< 0.08), CFI = 1.000 (≥ 0.90), and SRMR = 0.008 (≤ 0.05). **Figure 5** shows that the four remaining indicators have a high and significant factor load on the CKD construct, namely PGK1 = 0.85, PGK2 = 0.73, PGK4 = 0.64, and PGK5 = 0.59. The PGK1 indicator makes the most contribution in measuring this construct, while the other three indicators also show strong to moderate contributions. Initially, the CKD construct consisted of five indicators, but only four were proven to meet the feasibility criteria of the CFA model. These results show that the *Pedagogic Abilities* are validly and reliably measured through the four indicators, and support the accuracy of the structure of the instruments used in the study (Sideridis et al., 2019).

6) Results of the Analysis of Participation Indicators Based on Gender and Students with Special Needs

Analysis results *Confirmatory Factor Analysis* (CFA) against constructs *Gender-Based Participation and Students with Special Needs* (PSP) show that the measurement model has an excellent match. A Chi-square value of 0.734 with a degree of freedom (df) = 2 results in a Chi-square/df ratio of 0.367, which is well below the ideal limit of < 2, and is supported by *p-value* = 0.693, which indicates that the model does not differ significantly from the empirical data ($p \geq 0.05$). Other feasibility indices are also very supportive, namely RMSEA = 0.000, CFI = 1.000, and SRMR = 0.009, all within optimal limits to declare model fit. In addition, the four PSP indicators' loading factor values significantly contributed to the construct: PSP1 = 0.85, PSP2 = 0.74, PSP3 = 0.59, and PSP4 = 0.64. The PSP1 indicator has the highest contribution, followed by PSP2 and PSP4, while PSP3 still shows a relatively substantial contribution. These findings confirm that these four indicators validly measure the PSP construct, and that the model used in this study has a consistent and reliable structure. (Mubarrak et al., 2022).

7) Results of the Analysis of the Assessment Indicators during the Lesson

Analysis *Confirmatory Factor Analysis* (CFA) against constructs *Assessment During Lessons* (PKS) shows that the measurement model matches empirical data well. The Chi-square value of 7.977 with a degree of freedom (df) = 5 results in a Chi-square/df ratio of 1.595, which is within the ideal range (< 2), and is supported by *a p-value of 0.157, which meets* the criteria $p \geq 0.05$. Other feasibility indices, such as RMSEA = 0.041 (< 0.08), CFI = 0.988 (≥ 0.90), and SRMR = 0.029 (≤ 0.05), also indicate that the model is in the category of excellent fit. Based on **Figure 7**, the loading factor values for the five PKS indicators showed a significant contribution to the construct, namely PKS1 = 0.72, PKS2 = 0.50, PKS3 = 0.61, PKS4 = 0.43, and PKS5 = 0.49. The PKS1 and PKS3 indicators made the most substantial contribution, while the other three indicators were still within the limit of moderate contribution. Overall, these results show that the PKS construct is validly measured by the five indicators used, with the support of a robust fit model and a stable factor structure in the context of the developed instrument (Rahayu et al., 2021).

4. CONCLUSION

Based on the results of the Confirmatory Factor Analysis (CFA) analysis of seven constructs in the internship program assessment instrument at ICFP Baucau, it can be concluded that the instrument has good construct validity and a measurement model based on empirical data. All primary constructs, namely Teaching Preparation, Introductory Presentation, Lesson Explanation, Pedagogic Ability, Gender and Special Needs Participation, Assessment During Lessons, and Lesson Closure, have *model fit indices* that meet statistical criteria, such as Chi-square/df < 2, *p-value* ≥ 0.05, RMSEA < 0.08, CFI ≥ 0.90, and SRMR ≤ 0.05. Some of the indicators initially included in the instrument did not show a statistically significant contribution and were excluded from the final model, leaving 32 items out of the initial 40 items that were considered feasible. This shows that not all indicators have the same power in representing the measured construct. This validation instrument has been proven to accurately measure pre-service elementary teachers in the context of implementing internships at schools. These findings are expected to strengthen the field practice assessment system and serve as a reference for developing similar instruments in other teacher education institutions in Timor-Leste and the broader context.

5. AUTHORS' NOTE

The authors declare that there are no conflicts of interest in the publication of this article. The authors also confirm that this article is free from plagiarism.

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21st Century Education Reform in Facing the Challenges of the Times in the Era of Disruption

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ABSTRACT

Education is expected to prepare students to master 21st-century competencies to create quality resources capable of contributing to developing social and economic order by developing a curriculum that meets the demands of 21st-century competencies. This research aims to understand the 21st-century education reforms in facing the challenges of the times in the era of disruption. The research method used is qualitative with a literature study approach, collecting literature sources including books, journals, national seminar proceedings, and scientific articles, then analyzing the findings objectively and systematically through descriptive data analysis techniques. The results of the study show that the implementation of quality education in facing the challenges of the times for elementary students is not sufficient on the aspect of knowledge alone, thus it needs to be supplemented with other skills. As stated in the framework for 21st-century innovative learning initiated by the Partnership for 21st Century Learning, among others: education must collaborate, learning must have context, student-centered learning, and schools must be integrated with the community.

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1. INTRODUCTION

The beginning of the 21st century was marked by rapid information and communication technology advances that touched almost all aspects of human life. The increasingly integrated and narrowing factor of "space and time" makes the use of information and communication technology an inseparable part of daily life, thus affecting changes in the qualifications and competencies of human resources. In addition, this condition brings various risks and uncertainties that students must face, considering that the world they live in is now much more complex than before. Therefore, students must continue learning and be proactive towards change to prepare themselves to face increasingly dynamic global challenges. In this context, developing adaptation and problem-solving skills is essential for them to compete effectively at the international level. Furthermore, collaborating across cultures and technologies is also key to facing the era of globalization that continues to grow rapidly.

In this case, the Indonesian government strives to improve the quality of education at every level sustainably by adjusting the development of world education, which is increasingly dynamic and complex. One of the strategic steps taken is to adopt and implement the 21st-century innovative learning framework initiated by the Partnership for 21st Century Learning in 2011 to develop the national curriculum. The framework emphasizes the development of critical skills, creativity, communication, and collaboration that are essential to meet the challenges of globalization. In addition, the government also encourages the effective use of information technology in the learning process in order to create a learning environment that is more interactive and adaptive to changing times. This is expected to prepare Indonesia's young generation to become competent human resources and ready to compete at the international level (BNSP, 2010).

In line with this, as stated in the Regulation of the Minister of National Education Number 16 of 2007, the development of information technology media is one of the main foundations in designing the 21st-century curriculum in Indonesia. This regulation emphasizes that educators must have qualifications and competencies related to the mastery and use of information technology in the learning process. Through this policy, it is hoped that teachers can integrate various forms of information technology media to support learning innovation and adapt to global developments. Thus, the application of information technology-based media not only enriches teaching methods but also strengthens efforts to improve the quality of national education that is responsive to the challenges and needs of modern times (Dewi & Hamami, 2019).

This has important consequences for all parties involved in the education process in Indonesian schools, as it requires mastery of ICT literacy skills. Technology literacy and communication media are crucial not only for educators and students but also for students' parents so that they are all ready to face future educational development challenges. With this literacy ability, it is hoped that every element in the educational environment can actively and effectively participate in facing the dynamics and changes that continue to take place in the modern world of education.

More than that, it is hoped that education can play an important role in preparing for the mastery of competencies in the 21st century, so that educators and students have these abilities to create quality resources that can contribute to building a sustainable social and economic order. This is realized through developing a curriculum that aligns with the demands of 21st-century competencies and applying innovative and technology-based

learning methods. Through the implementation and development of 21st-century education strategies, it is hoped that educators and students can master various important skills and competencies, including effective communication, good collaboration, critical thinking and problem-solving, creativity and innovation, and increasingly complex ICT literacy. This requires thinking at a higher level or Higher Order Thinking Skills (HOTS), so that an educated and adaptive society can be formed to change times. Thus, the young generation is expected to be able to face the challenges of increasingly fierce global competition and sustainably increase the nation's competitiveness at the international level. In addition, education is also expected to instill ethical and social values that support the creation of an inclusive and advanced nation development (Arifin & Mu'id, 2024; Dewi & Hamami, 2019; Yuni et al., 2016).

Research related to the implementation of 21st-century Islamic education in facing future challenges has been conducted by several researchers previously. One is research conducted by Muhali, which focuses on innovative learning in the 21st century, especially how to create human resources that are literate in information, data, and technology through innovative learning. Muhali's study highlights the importance of digital literacy skills and mastery of information technology as an answer to the demands and competition in the current and future global job market. This learning innovation involves integrating technology in every aspect of the teaching and learning process, developing critical thinking skills, communication, collaboration, and problem-solving among students to adapt and become competitive resources in the increasingly dynamic era of globalization. This approach also emphasizes the importance of teachers and students to continue to hone their technology skills and data literacy, so that Islamic education is genuinely relevant and able to answer the challenges of life and the world of work in the 21st century (Djamdjuri et al., 2021; Kalalo et al., 2023; Latifah & Kartika, 2023; Muhali, 2019).

Research by Muhali (2019) generally concludes that in implementing innovative learning for the 21st century, educators can design learning activities by selecting strategies that comprehensively accommodate all necessary competencies of 21st-century students. These competencies include critical thinking, creativity, communication, collaboration, and ICT literacy. Muhali emphasizes that 21st-century learning is interactive, holistic, integrative, scientific, contextual, thematic, practical, collaborative, and student-centered. Therefore, educators can choose learning methods or models that align with these characteristics, ensuring that all essential skills are practiced thoroughly in the learning process. This approach prepares students to meet the complex demands of the global era by developing higher-order thinking skills and adaptability in various contexts.

Then, Prayogi & Estetika (2019) a similar study examined 21st-century skills and their relationship with educator competence. The study results show that 21st-century skills require educators to develop their abilities to actively realize active learning. One of them is educators' digital competence, which is closely related to the ability of educators to use information and communication technology based on pedagogical rules by realizing its implications for educational methodology.

The previous studies mentioned above provide insight into the development of education in the 21st century from a particular perspective or aspect. However, these studies generally do not specifically address how 21st-century education can be developed and realized as part of efforts to prepare for future world challenges. Based on these observations, further research is needed, focusing on actualizing the concept of 21st-century education in preparing for future global challenges. Therefore, this article will discuss in more depth how 21st-century

education can be implemented as a key strategy in dealing with the various dynamics and challenges of the modern world. This research uses a literature study method, where the author searches and compiles. It analyzes various information from relevant sources to understand the actualization of 21st-century education as an important capital in building readiness to face a global era full of change and competition.

2. METHODS

As explained by Arikunto, the literature study method is a method or procedure researchers use to obtain data by studying various literature sources such as books, journals, research reports, and other documents relevant to the problem being studied. In his book, Arikunto states that literature study research utilizes data that is available and ready to be used, not through direct observation in the field or experiments. “Research method is the way used by researchers in collecting their research data” (Arikunto, 2019). Using this approach, researchers can obtain valid and reliable information for solving research problems.

According to Arikunto, the stages in the literature study method include identifying specific problems, tracing and collecting various references related to the research topic, assessing and critically analyzing the content of these sources, and preparing a synthesis of the literature review results obtained to be used as a theoretical basis for research. Researchers must record and compile information systematically to support their arguments and research results.

The main characteristic of literature study research is that the data used is secondary and ready-to-use, and the primary interaction of the researcher is with written materials. “Literature study means that researchers obtain data or information by conducting studies on various library materials” (Arikunto, 2019). Thus, literature studies are critical to strengthening the theoretical foundation and supporting the analysis of scientific research, especially when researchers cannot collect primary data directly in the field.

In practice, the data obtained through literature studies can be analyzed descriptively, as also suggested by Anggito & Setiawan (2018), Fadli (2021), Moleong (2014), Nugrahani & Hum, (2014). The findings are presented systematically, objectively, and adjusted to the research needs. This descriptive data analysis technique is one of the main approaches in qualitative research and literature. Hence, the research results are easy to understand and have an impact on the development of knowledge.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1 Characteristics of Education and Competency Demands in the 21st Century

21st century education brings significant changes in the learning paradigm, especially compared to the 20th century, emphasizing mastering lower-order thinking skills (LOTS). LOTS, which includes the ability to "remember, understand, and apply" so far, has only produced students who can memorize and understand, but has not encouraged the competence to create or innovate from the knowledge gained. The challenges of the modern world require students to be able to integrate knowledge, think critically, and solve complex problems.

As explained in Bloom's taxonomy, revised by Anderson and Krathwohl, LOTS include knowing, understanding, and applying, while Higher Order Thinking Skills (HOTS) include analyzing, evaluating, and creating (Anderson & Krathwohl, 2001). Students who only master

LOTS tend to be stuck in memory and understanding activities only, so they are less able to adapt and create new solutions in dealing with real-world problems (Jamaluddin et al., 2019).

The emphasis on HOTS is in line with the Partnership for 21st Century Learning's Framework for 21st Century Learning (P21), which states that mastering critical thinking, creativity, communication, and collaboration skills is the primary foundation (Binkley et al., 2014; Trilling & Fadel, 2009). In addition, the Ministry of Education and Culture also emphasized that "HOTS-based assessments aim to encourage students to develop high-level thinking skills that include analysis, synthesis, and evaluation skills" (Fanami, 2018). Thus, the transformation from LOTS to HOTS is a must in 21st-century education so that learning is not only oriented to mastering knowledge, but also equips students as problem solvers, innovators, and lifelong learners who are ready to face global challenges (Lusiana & Andari, 2020).

One of the most important parts of education in the 21st century is to increase LOTS to HOTS or higher-level thinking skills. These skills include "analysing and creating," which can be passed on by continuing the skills on LOTS. These three words should be practiced in the classroom by today's teachers. The analogy often used to describe the LOTS and HOTS process is that the child is given fish, and the child is hooked; then, which child can survive better, whether directly fished or hooked. So the answer is the second child. Children will learn more when they are given a hook, not only catching and eating fish, but also practicing how to solve problems about bait, about ponds, or other lessons as a lesson in life (Anderson & Krathwohl, 2001; Elder & Paul, 2020).

The demands of 21st-century competencies require education to adjust all aspects, including the curriculum. One of the demands of the development of the 21st-century curriculum in schools is to change the learning approach to be student-centered from the previous educator-centered learning (Mu'minah, 2021; Tarihoran, 2019). This is by the thinking and learning skills children must have, as the demands of the future world are contained in the 21st-century innovative learning framework initiated by the Partnership for 21st-century Learning (Dewi & Hamami, 2019). **Figure 1** below illustrates the 21st-century Learning Framework. This diagram demonstrates that successful modern education relies not only on mastering core subjects and 21st-century themes but also on strengthening three primary skill domains: life and career skills, learning and innovation skills (the 4Cs: critical thinking, communication, collaboration, and creativity), and information, media, and technology skills.

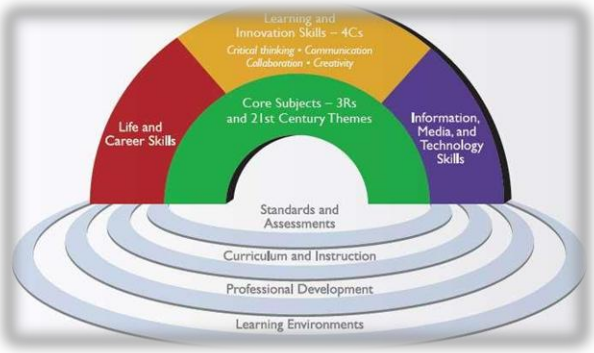

Figure 1. 21st Century Learning Framework

Through the drawing of the framework, it is shown that the competencies that must be mastered by students in the future are not enough in the aspect of knowledge alone, so they need to be equipped with the following skills (Sulthon, 2014):

1. Learning and innovation skills include critical thinking and problem-solving, creativity and innovation, and communication and collaboration.
2. Life and career skills include flexibility and adaptability, initiative and independence, social and cultural skills, productivity and accountability, and leadership and responsibility.
3. Information, media, and technology skills require students to be sensitive and capable of managing information, understanding media, and optimally utilizing information and communication technology (ICT).

In this regard, the government strives to improve the quality of education in Indonesia by utilizing a 21st-century learning framework as the primary foundation for developing the national education system. This effort includes developing national education standards, conducting periodic and ongoing curriculum reviews and revisions, enhancing the professional competence of human resources, and developing a learning environment that adheres to a 21st-century learning framework. An educator's ability to design a lesson plan is a key factor in determining students' achievement of comprehensive skills. Lesson plans should include activities that stimulate students to think critically in problem-solving and facilitate the development of collaboration and communication skills, as these aspects are essential elements that must be integrated into the learning process (Darmadi, 2019).

3.1.2 The Concept of 21st Century Education in Facing the Challenges of the Times in the Era of Disruption

In the 21st century, human resources are required to improve their quality continuously; one way is through professional management within relevant institutions. The challenges of this era require people to be able to make breakthroughs in their thinking and adapt concepts and actions to keep pace with current developments (Wijaya et al. 2016). Based on this, to solve educational problems and answer the challenges of the 21st century, it is necessary to study several possible educational concepts that can be applied in schools, especially related to developing what kind of learning is more suitable for the current and future eras.

Competency- and character-based curriculum

One of the keys to entering 21st-century education is to make the four pillars of education initiated by UNESCO establish the importance of lifelong learning as the foundation of *education*. The four pillars are (Sudin, 2014):

a. *Learning to know* (oriented towards logical and rational knowledge)

   This fundamental pillar is the key to *lifelong education* and learning. Learning to know means that it is important to master material or knowledge and foster a willingness to learn throughout life so that you are always ready to learn when facing new situations that require new skills.

b. *Learning to do* (oriented on how to solve a problem)

   This second pillar emphasizes a person's mastery to learn to work together in a team and live in various or unexpected circumstances.

c. *Learning to be* (oriented towards character formation)

   This third pillar emphasizes a person's mastery to be able to learn to actualize themselves as an independent individual with a personality who has personal responsibility to achieve common goals.

d. *Learning to live together*

   The fourth pillar is an understanding of the previous three pillars that allows the creation of an attitude of appreciation for others, history, traditions, and spiritual

values, then makes it the basis for a new spirit to be able to practice the conditions of mutual understanding and resolve conflicts of diversity and differences in a peaceful way.

Meanwhile, the draft of the 2013 curriculum, which in the national curriculum is known as a competency-based and character-based curriculum, has made the four pillars the primary reference in the development of learning models (Hidayat, 2013). Not only that, the learning process in the 2013 curriculum is carried out using a scientific approach by considering the development of knowledge, skills, and attitudes, as well as mastery of technology as an integrated part of 21st century education, including: problem-solving skills, critical thinking, collaboration, and communication skills as the foundation (Karim, 2017). The concept of 21st-century education needs to be grown through school culture by all those involved in the educational process, both in the family, school, and community, by considering the cultural roots of the community that upholds religious values, so elementary schools in Indonesia should be developed to help their students master the following competencies (Sudin, 2014). 21st-century education is closely linked to the development of competencies in Indonesian elementary schools, where an inclusive school culture is needed—one that involves families, schools, and the broader community while upholding religious and local cultural values. Indonesia's elementary education system has embraced these principles through various reforms, particularly under Kurikulum Merdeka, which emphasizes foundational skills and the systematic integration of 21st-century competencies such as collaboration, communication, critical thinking, creativity, digital literacy, and character education rooted in local culture and religious values (Fitriadi et al., 2024). The ability of humans to obtain meaningful religious experiences for life is related to carrying out their functions as creatures created by Allah.

Academic competence
The ability to follow the development of science and technology relevant to students' age and level of development is related to the concept of lifelong learning or lifelong education.

Economic competence
The ability to meet economic needs so students can live a decent life. An important part of this competency includes a business attitude and work ethic that supports personal productivity.

Personal social competence
Self-management skills (intrapersonal) in a heterogeneous society are related to the ability to live adaptively as citizens and citizens of a democratic international community.

3.1.3 21st Century Learning Models

Regarding the main principles of 21st-century learning, it is important to actualize the four principles in the implementation of education and learning that have been formulated by Nichols, which are as follows Karim (2017):

1. *Education should be collaborative*
   Education must emphasize fostering the ability of students to collaborate with others in the diversity and differences of cultural backgrounds and values that each person embraces, appreciate everyone's strengths and weaknesses, and take roles and adapt appropriately to others.

Likewise, schools and teachers should be able to collaborate with educational institutions and other teachers in various parts of the world to share knowledge and experience about learning practices and methods, which can then be used as considerations for a better learning process.

2. *Learning should have context*
   The importance of associating learning materials with students' daily lives so that learning becomes meaningful, namely, impacting students' lives both at school and outside of school. Educators are expected to help students find the value, meaning, and belief in what they are learning so that they can be applied in their daily lives through various learning methods that allow students to connect with the real *world*.

3. *Instruction should be student-centered*
   The importance of using a student-centered learning approach in the learning process is to position students as learning subjects who have interests and potential to be actively developed. The focus of learning is no longer only on listening and memorizing the subject matter given. However, more than that, it is how to grow students' ability to construct their knowledge and skills according to their capacity and level of thinking development, while being invited to contribute to solving real problems that occur in society.
   In this case, it does not mean that the control of learning is left to the students altogether; students still need the role of teachers as facilitators and supervisors who try to help students when they experience obstacles in the learning process.

4. *Schools should be integrated with society*
   It is important to prepare students to become responsible citizens, have sensitivity and empathy, and be socially concerned by involving them in various activities in the social environment of the community, such as education, health, environmental programs, and so on. One example is the procurement of community service activities, where students can learn to take roles and arrange certain activities in the social environment.

At least two things must be mastered in realizing 21st-century competency-based learning, which has been contained in the framework of the 2013 curriculum (K-13), which is designed to answer the challenges of the 21st century so that students can be prepared to become Indonesia's golden generation 2045, including learning approaches and models. Among the approaches offered, two main approaches in K-13 learning are closely related to the needs of 21st-century education, namely the inquiry and scientific approach (Mubarak, 2019). The explanation is as follows:

1. Inquiry approach
   An inquiry approach emphasizes students not only being informed but also finding out. In addition to the concept of knowledge, this approach also considers students' attitudes or skills in gaining knowledge in the learning objectives.

2. Scientific Approach
   Scientists use a scientific approach to criticize or test a phenomenon to create a new entity or discovery. By applying this approach, it is hoped that students can create products or innovate like scientists.

Gradually, there are five steps in implementing the scientific approach, which in Indonesia is known as 5M, while in English it is known as 5-ing. The five steps are observing*, questioning, experimenting, associating, and* communicating (Andrian & Rusman, 2019). These five steps are very closely related to the design of science (IPA), which is very scientific and positivistic. However, it does not mean it cannot collaborate with social learning and humanities approaches in its implementation. The 5M can be modified to various subject characteristics while emphasizing how teachers foster student productivity.

Teachers' mastery of these two approaches will enable them to redesign education in Indonesia, which is already acute in a *content-based* approach, namely an expository approach where teachers feed students receptively. The learning model with an inquiry and scientific approach can be realized in at least four learning models, namely: (1) *inquiry discovery learning*, which is learning that provides opportunities for students to find out about the theme that has been determined independently, (2) *problem-based learning*, which is learning that focuses on the problem-solving process, (3) *project-based learning* namely learning that focuses on making a project, (4) *cooperative learning* which is learning that provides opportunities for students to be able to work together in a team (Abidin et al., 2016). The learning model is not rigid but is open and can be modified according to the needs of teachers, students, and the characteristics of the subject matter (Muhali, 2019).

3.1.4 Technology-Based Learning

In this information age, educators must keep up with technological developments to provide quality education to students. This means that it is important for educators in the 21st century to have the ability to adapt to being lifelong learners. This includes having the skills to utilize the power of related technology for effective teaching in order to be able to equip adaptive skills for students as an effort to anticipate various changes in the future, while still being aware of various possible adverse side effects that mark every innovation (Karim, 2017).

Learning using IT (multimedia) devices is hoped to improve students' self-regulation in learning, such as attitudes, initiative, and the ability to learn independently. The proper and wise use of ICT can develop creativity, expand freedom, and allow flexibility for teachers and students, and more importantly, change the dimensions of the teaching and learning process.

In this regard, three things must be realized to improve the quality of learning through the use of ICT, including: (1) ensuring the availability of access to digital technology and the internet for both educators and students (2) the availability of quality materials and (3) knowledge and skills are needed in using digital tools and resources that must be mastered by educators for the realization of effective learning.

4. CONCLUSION

Implementing quality education to face future challenges requires more than just focusing on knowledge, but also complementing it with other skills by the innovative 21st-century learning framework developed by the Partnership for 21st Century Learning. The main principles of 21st-century learning as preparation for facing global challenges for elementary school students include: collaborative learning, contextual learning, student-centered learning, and integration of schools with the surrounding community.

In line with this principle, educators' ability to design lesson plans is crucial for students' success in mastering 21st-century skills comprehensively. Learning activities that encourage critical thinking in problem-solving and foster collaboration and communication should be integral to lesson plans. This ensures students are optimally prepared to face real-world challenges in a complex and dynamic world. Therefore, educators must thoroughly grasp scientific competencies and learning methodologies to implement effective, meaningful, innovative learning.

5. AUTHORS' NOTE

The author declares that there is no conflict of interest in the publication of this article. Furthermore, the author confirms that this article is free from plagiarism.

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The Implementation of The Pancasila Student Profile Rahmatan Lil' Alamin Approach on The Religious Character of Elementary School

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ABSTRACT

This study aims to examine teachers' role in implementing the Strengthening of the Pancasila Student Profile with the Rahmatan Lil' Alamin (P5PPRA) approach for elementary school students, particularly at SD Islam Al-Chusaini. Implementing P5PPRA aims to develop students' character values so that positive behaviors can be formed through daily habits and routines. This study uses a qualitative method with a phenomenological approach. Data validity was tested using triangulation by analyzing the data based on the approach developed by Miles and Huberman. The research findings reveal that SD Islam Al-Chusaini has successfully implemented P5PPRA among students through habituation embedded in daily life, such as routine prayers, respectful behavior (adab), and being a good citizen. This success can serve as a best practice model for other educational institutions aiming to develop character education based on Pancasila values in a contextual, sustainable manner rooted in local wisdom and the principles of religious moderation.

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1. INTRODUCTION

Education as an effort to humanise humans is essentially an effort to develop the potential of each individual so that they can live optimally, both as individuals and as part of society, and have moral and social values as guidelines for their lives. Thus, education is viewed as a conscious, purposeful effort to nurture children (Juleha et al., 2025). Law No. 20 of 2003 on the National Education System states that education plays a significant role in shaping the character of the Indonesian nation (Mujib & Ulya, 2025). Education is not merely about transferring knowledge but also plays a crucial role in shaping intelligent and character-driven individuals, thereby creating a nation that excels in academic and non-academic achievements and interacts courteously by the nation's noble values (Malher et al., 2024).

Character education is crucial for developing students' sense of responsibility from an early age (Lestari & Mahrus, 2025). In the Merdeka Curriculum, character education is implemented through the Pancasila Student Profile, which portrays Indonesian students as lifelong learners with global skills and behavior aligned with Pancasila values (Mellyzar et al., 2025). These values encompass six dimensions: faith and devotion, noble character, global diversity, cooperation, independence, critical thinking, and creativity (Anisah et al., 2024). Pancasila-based character education, along with Islamic values of Rahmatan lil ‘Alamin, forms the foundation of madrasah education, fostering diversity within the framework of Bhinneka Tunggal Ika.

The implementation of character education in the Merdeka Curriculum includes four main activities, namely the integration of Pancasila values and Rahmatan Lil Alamin (PPRA) into both intraschool and extracurricular learning activities, tailored to students' interests and needs (Habibah & Nurhidin, 2023). The P5PPRA process promotes the development of national character, religious character, critical thinking, and the enhancement of literacy and 21st-century skills (Ariyanti et al., 2024). The character values of Rahmatan Lil Alamin serve as the primary reinforcers in shaping the Pancasila student profile at schools. Some factors that strengthen the Pancasila student profile in schools include the values of Ramatan Lil Alamin. Schools will be equipped with the values of Ramatan Lil Alamin, which consist of, 1) to become a person who possesses good manners, upholds noble character, preserves identity and honor, and practices honesty as the *Khairu Ummah* in humanit; 2) to become a role model means being an inspiration of goodness; 3) to be a good and patriotic citizen who respects the existence of differents or religion beliefs with a nationalist attitude and behavior; 4) walking the middle path in understanding and practicing religion following the Qur’an and Hadith; 5) practicing religion in a balanced (tawazun) manner; 6) steadfast and firm (I’tidal); 7) to be a society that understands and implements equality and non-discriminations; 8) able to use principles as considerations to overcome problems; 9) able to foster tolerance through the respect of differences; and 10) dynamic and innovative for the sake of their healthy being and advancement.

Efforts to advance and develop P5 and P2RA are carried out through all educational and training unit activities (Siregar et al., 2022). This is mainly done through intramural and extracurricular activities. In developing student profiles, extracurricular activities are integrated into the learning process of each subject. However, learning through

extracurricular activities is part of the Project to Strengthen the Pancasila Student Profile in Rahmatan Lil Alamin, commonly known as P5P2RA (Muthoharoh, 2024). Rahmatan Lil Alamin Education is a character education model based on human values, morality, and religiosity, designed to shape individuals with noble character and a positive impact on their environment. This approach emphasises compassion, kindness, and tolerance. P5-PPRA was developed from the official guidelines of the Indonesian Ministry of Education, Culture, Research, and Technology's Agency for Standards, Curriculum, and Assessment (Ramdhani, 2022). Implementing Rahmatan Lil Alamin education in schools aims to develop academic abilities with high moral standards, global insight, and create a harmonious life (Pratopo et al., 2021). Indonesian students are expected to become active democratic citizens who participate in sustainable development and can face various challenges. This research allows madrasahs and teachers to implement the Independent Curriculum. The Rahmatan Lil Alamin Student Profile Curriculum is designed to update the curriculum with more humanistic content to strengthen tolerance and moderation (Arifin & Umar, 2020).

Based on previous literature, several relevant studies were identified. Ishaac et al. (2024) explored Rahmatan Lil Alamin's character education, highlighting the internalization of the Pancasila Student Profile, combining six dimensions from P5 and ten from P2RA, with a strong religious character foundation. (Hakim & Febrianty, 2024) examined religious character education in elementary schools, focusing on tolerance, honesty, and discipline through thematic learning and teacher-led habituation, including implementation challenges. (Munawaroh et al. 2024) emphasized developing students' noble character (akhlaq karimah) and civility via habituation, integration, and good role models, implementing a P5 project through the BETAH waste-free program. These studies focus on Rahmatan Lil Alamin's religious character education and strengthening the Pancasila student profile, aligning with the present research. From the review of relevant research, no study has specifically and comprehensively examined the implementation of strengthening the Pancasila student profile in the context of a model for developing Rahmatan Lil Alamin religious and nationalist character education. This model offers an innovation in religious character education based on the Qur'an and Hadith, but within a dynamic nationalism context. This innovation is crucial because character education in Indonesia generally focuses only on patriotism and high nationalism, thus being less optimal in shaping a generation with Rahmatan Lil Alamin religious character based on Qur'an and Hadith guidance.

The urgency of this research lies in the importance of shaping a young generation with strong moral values and character. Character education plays a vital role in forming students' personalities. Through the Pancasila Rahmatan Lil Alamin Student Profile, students are taught noble values aligned with the culture and norms of society and guided by the Qur'an and Hadith. This research is essential to identify effective methods and strategies for implementing character education for SD Islam Al Chusaini students. It is expected to produce a generation that is not only intelligent but also of good character, under Pancasila values and the values of the Qur'an and Hadith.

2. METHODS

The methodology employed in this study uses a qualitative method with a phenomenological approach. This qualitative research focuses on understanding problems within social life based on real situations and natural facts, employing an inductive approach to building theories and hypotheses through discovering facts. The approach used is a phenomenological research approach, which involves studying the relationships between people and events within specific ongoing situations (Sugiyono, 2022). This study was conducted at SD Islam Al Chusaini, Keloposepuluh, Sukodono. The location was chosen because the school implemented activities relevant to this research, namely the P5PPRA relationship. Furthermore, the school meets the research requirements, allowing for more optimal data collection.

The data collection techniques used to obtain valid and accurate data in this study consisted of Field observation, where the researcher conducted direct visits to the school to observe the implementation of the studied materials. Interviews were conducted to obtain more in-depth information, where the researcher gathered oral and recorded information from stakeholders such as the principal, teachers, and school staff. Documentation, where the researcher collected various supporting documents as evidence for the study, such as photos, student data, syllabi, the school's written vision and mission, and other relevant documents. Qualitative research is a process designed to ensure that data and research results have certain levels of credibility, dependability, transferability, and confirmability, ensuring that the research findings can be verified by others by tracing the research records and collected evidence. Meanwhile, data triangulation involving various sources of data, theories, methods, and researchers is used to test the validity of the data (Sugiyono, 2022).

The triangulation process is conducted through several stages as follows. Method triangulation is performed by using more than one data collection technique, such as interviews with teachers and principals, observation, and documentation, to ensure the consistency of the findings. Data analysis in this study uses the model developed by Miles and Huberman, which emphasizes three main elements: Data reduction, where the researcher selects, simplifies, and groups relevant data. Data display is where the researcher organizes the data into narratives or tables to facilitate understanding. Conclusion drawing and verification, where the researcher begins drawing conclusions based on the analyzed data and validates the research findings. This analytical model helps the researcher understand the data systematically and in an organized manner, thus producing conclusions consistent with the research objectives.

3. RESULTS AND DISCUSSION

Islamic elementary schools are formal educational institutions that are both complex and unique. Their complexity stems from the interrelated elements within the organization, while their uniqueness lies in specific characteristics not found in other institutions. These schools serve as centers of learning and cultural development, requiring a high level of coordination to function effectively (Astuti, 2019). The Pancasila Rahmatan Lil Alamin Student Profile (P5PPRA) is part of implementing the Merdeka Curriculum, which aims to shape Indonesian

students into lifelong learners with strong character and behaviour in line with the values of Pancasila. Through a student-centred learning approach, character development, comprehensive religious education, soft skills development, and involvement in social activities, P5PPRA provides a solid foundation for students to become successful individuals and make positive contributions to society.

In the *first* indicator, *Khairu Ummah* in Humanity, the research shows that 26 students consistently practiced the 5S culture (Smile, Greet, Salute, Politeness, and Courtesy) toward teachers and school members. This is in line with the efforts of teachers and the headmaster, who actively instill values of politeness through classroom rules and daily routines. Supporting documentation, such as interview recordings and class rules, confirms the validity of this value implementation. The 5S culture has become a fundamental aspect of character development, reflecting the noble moral traits expected of *Khairu Ummah* individuals.

Second, Exemplary Role Models as a Source of Inspiration for Goodness. Students regard exemplary figures as a source of motivation, whether it be their teachers or inspirational figures such as R.A. Kartini and the prophets. These values are instilled through storytelling activities led by teachers, especially during reading sessions after the second break. Visual media and the learning atmosphere captured in the documentation illustrate how schools successfully develop student awareness of role models as a motivator for doing good.

Third, Fostering a Sense of Nationalism and Patriotism. A total of 26 students actively and orderly participated in flag ceremonies and other national activities, demonstrating their engagement in cultivating a nationalist spirit. Teachers integrated these values through Civic Education lessons (PPKn), while the school head supported nationalism through activities like the daily playing regional songs. Learning modules and photo documentation reveal the school's success in fostering patriotism and introducing Indonesia's cultural diversity to the students.

Fourth, Routine Religious Practices and Daily Worship Activities. All students are accustomed to performing daily prayers before and after learning sessions and reciting short Surahs. Teachers and school leadership reinforce this routine as part of the school's vision. Documentation, such as displayed daily prayers and BTQ (Quran Literacy) assessment rubrics, indicates that these activities are structured and measurable. This demonstrates integrating religious values into students' daily routines at school.

Fifth, *Tawazun* or Balanced Religious Practice. All students maintain a communication journal documenting their religious and daily activities. Teachers monitor this development, and the headmaster supports it by providing communication booklets. Photos of liaison books and class schedules confirm close supervision of student activities. This reflects the school's commitment to embedding the principle of *tawazun* (balance) in students' overall life practices.

Sixth, *I'tidāl* or Consistency in Fulfilling Obligations. Most students demonstrated consistent prayer habits at school and home, although four admitted to occasionally skipping prayer at home. Teachers and the headmaster continuously guide students to fully understand the importance of fulfilling their religious obligations. Documentation of prayer and ablution

activities indicates that students are already disciplined in practicing religious practices at school.

Seventh, Equality and Anti-Discrimination. The majority of students showed acceptance of differences and maintained equal social relationships. Teachers integrated lessons on gender equality and boundaries into the curriculum. Anti-bullying bulletin boards and documentation of peer interaction illustrate that the value of tolerance has begun to take root. Although four students still require further habituation, the principle of non-discrimination is generally well-developed.

Eighth, Problem-Solving Through Discussion and Collaboration. Most students preferred solving problems through group discussion, while a few preferred to work independently. Teachers employed the Problem-Based Learning (PBL) method using creative media, such as a jellyfish board for questions and answers, to develop students' problem-solving skills. Learning activity photos demonstrate students' active engagement in critical and collaborative thinking, highlighting the school's success in developing students who can manage conflict and resolve issues wisely.

Ninth, Tolerance Through Respect for Differences. All students expressed mutual respect and support for one another, including a classmate with special needs. Teachers emphasized the importance of respecting diverse opinions and perspectives in the classroom. Documentation of students supporting each other during class activities and playing together shows that tolerance is well integrated into the school's daily life. This reflects the school's success in fostering an inclusive environment.

Tenth, Creativity and Innovation for Community Advancement. All students produced various creative works, including bracelets, traditional games (dakon), collages, and anti-bullying bulletin boards. Teachers and the school provided facilities and time to help students express their interests and talents. These works were showcased during the P5 event at the end of the semester, representing tangible forms of innovation and student enthusiasm. The documentation supports the school's role in nurturing students to become dynamic and productive individuals.

Data collection was conducted using interviews, observations, and documentation, while data validity testing was carried out using the triangulation method, which refers to the theory of Miles and Huberman. The implementation of the Pancasila Rahmatan Lil' Alamin student profile is an effort by the school to shape the religious character of students. The findings of the research conducted at SD Islam Al-Chusaini show that the implementation of the Project to Strengthen the Pancasila Rahmatan Lil Alamin Student Profile (P5PPRA) has been carried out consistently and integrated into the learning process as well as in the daily activities of students. Educators and school officials play an active role in internalising character values that align with the P5PPRA indicators. These internalisation efforts are not limited to intraschool activities. However, they are also carried out through daily routines, religious activities, flag ceremonies, parades, performing Hajj rituals, and other routines such as reciting prayers and singing local and national songs. The supporting indicators are as follows:

1. The research findings indicate that religious character education at SD Islam Al-Chusaini has been consistently and integratively implemented. It emphasizes noble behavior,

personal identity, and honesty in alignment with the principle of Khairu Ummah in humanity. Students are taught to uphold good manners through daily routines and classroom rules, which have become the foundation for character building.

2. Teachers play a central role in shaping students into role models. They consistently encourage good deeds, tell stories of exemplary figures, and motivate students to reflect these values in their daily lives. This approach supports the development of students as future leaders and moral exemplars.
3. The study also highlights the school's commitment to fostering nationalism and citizenship values. Students actively participate in national ceremonies, cultural events, and civic education, which help instill patriotism, respect for diversity, and awareness of civic responsibilities.
4. Religious education is implemented not only through theoretical lessons but also through daily practices. Prayers are recited before and after lessons, and short surahs are memorized and recited. This is supported by classroom visual aids and formal assessment rubrics in subjects such as BTQ, Aqidah, Qurdis, and Fiqh, ensuring structured and practical religious learning.
5. Students are also encouraged to practice balance in their religious and daily activities, embodying the principle of tawazun. Each student records their acts of worship in a monitoring book, which is reviewed by teachers and supported by the school administration to ensure continuity and discipline.
6. In line with the value of i'tidāl, students are guided to fulfill their rights and responsibilities appropriately. The research shows that most students consistently observe prayer times at school and home, and are regularly reminded by teachers to uphold their obligations.
7. Equality and non-discrimination are fostered through both curricular and extracurricular activities. Students are observed to interact and play inclusively, regardless of differences. Anti-bullying messages and gender equality are integrated into class discussions, reinforcing respect and acceptance of others.
8. Students are also trained in collaborative problem-solving. Most prefer to solve issues through group discussions, facilitated by teachers using creative and student-centered methods. This approach helps build communication, empathy, and critical thinking skills.
9. Tolerance is further reinforced through the school's vision and daily practices. Students demonstrate respect for differences in opinion, background, and ability, contributing to an inclusive and supportive learning environment.
10. Lastly, students can express their creativity through projects such as handmade crafts, traditional games, and wall magazines promoting anti-bullying messages. These activities support innovation and connect directly to character education, encouraging students to produce meaningful work that reflects the values taught in school.

This study significantly enhances the understanding of implementing *Profil Pelajar Pancasila Rahmatan Lil 'Alamin* (P5PPRA) in Islamic elementary schools, particularly in shaping students' religious, nationalistic, tolerant, social, and creative character. The findings indicate that successful implementation is strongly influenced by the involvement of teachers, principals, and the school environment. For future research, it is recommended that broader studies involving schools from diverse geographical and social backgrounds be conducted, and comparative studies to assess the effectiveness of the strategies used.

The research results reinforce that the habit of practising 5S (Smile, Greet, Say Hello, Be Polite, and Be Courteous) has become one of the main pillars in the character-building process of students at SD Islam Al-Chusaini. Teachers have consistently motivated students through verbal communication during morning activities and exemplary behaviour in daily interactions. This motivation serves as an encouragement and a reminder of the importance of etiquette in daily life, both within and outside the school environment. Teachers have established written class rules for fifth-grade students, emphasising the importance of polite behaviour, good manners, and mutual respect among peers. These rules are not merely administrative documents but are actively used as behavioural guidelines internalised through habit formation.

Observations in the classroom and school environment revealed that 26 students consistently applied the 5S practices. Students were accustomed to greeting teachers with a smile and a greeting, speaking politely, and showing a friendly attitude towards their peers and the entire school community, including cleaning staff and security personnel. Such behaviour does not arise spontaneously but results from habit formation and continuous guidance by teachers. Students understand the value of politeness as something normative and have internalised it as part of their identity as learners. This finding indicates that implementing moral values and etiquette through daily habit-forming approaches, direct interaction, and teacher role modelling is more effective than theoretical approaches alone. This strategy makes a tangible contribution to students' character's successful and sustainable development.

SD Islam Al-Chusaini demonstrates a strong commitment to shaping students into good citizens who are nationalistic, religious, and respectful of diversity. These values are implemented through various school activities, such as daily routines and reinforcement of learning materials, particularly in Pancasila and Civics Education (PPKn). According to research findings, all students regularly participate in the flag-raising ceremony every Monday and actively engage in other national holiday commemorations. Their participation is not merely formal but is accompanied by genuine enthusiasm and nationalism, which aligns with the findings of Mulyani et al. (2024), who emphasize that Civics Education in Islamic elementary schools fosters constitutional awareness and national identity through interactive and contextual learning models.

Student participation is also evident in other cultural and religious activities, such as parades commemorating Kartini Day and implementing the Hajj Pilgrimage Programme. These activities instill values of diversity and nationalistic spirit contextually and practically, as supported by Darojah (2023), who highlights the use of local cultural events and citizenship simulations to strengthen character education in elementary schools.

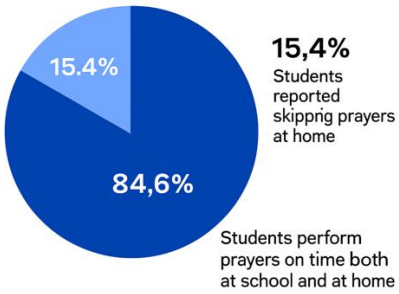

Figure 1. Percentage of students who pray on time.

A total of 84.6% of students perform their prayers on time both at school and at home. Meanwhile, 15.4% of other students reported skipping prayers at home, but did not skip them at school. These findings indicate the effectiveness of teachers' roles as reminders and mentors in encouraging students to perform their religious obligations consistently. Performing prayers in congregation, such as Dhuha, Zuhr, and Asr prayers in the classroom and Friday prayers at the school mosque, further strengthens a sense of unity and discipline in worship. Teachers and school principals consistently instill the importance of worship as an integral part of a student's character. This aligns with Adiyono et al. (2025), who argue that integrating Islamic teachings with Pancasila values through transdisciplinary approaches enhances students' spiritual discipline and collective responsibility.

Students regularly recite daily prayers and memorise short surahs with the support of teachers and the principal. Worship is monitored through communication books and journals. Congregational prayer has become a school culture, with active guidance to ensure students pray on time and are mindful. Learning uses the PBL method with jellyfish media to train critical thinking and cooperation. Teachers also incorporate materials on equality, anti-discrimination, and ethical interaction under religious norms as part of character development. This approach reflects the paradigm shift described by Ma'arif et al. (2020), who emphasize that character education in PPKn must integrate moral values and religious practices to foster responsible and ethical citizens.

SD Islam Al-Chusaini is committed to developing creative, innovative, and environmentally conscious students, which aligns with the spirit of becoming agents of change. In the P5 programme, 26 students actively created meaningful works such as handmade bracelets, traditional games, and anti-bullying wall magazines. These works reflect their skills, imagination, social awareness, spirit of collaboration, and understanding of cultural and moral values. Supporting factors in implementing character education through the *Profil Pelajar Pancasila Rahmatan Lil 'Alamin* include strong collaboration between teachers, parents, and the community. When all parties actively shape students' character, messages of justice, tolerance, and compassion can be consistently applied in various aspects of student life. Adequate resources—such as facilities, teacher training, and support from government and related institutions—also play a key role. This includes relevant learning materials, training on character-building teaching methods, and incentives for schools that successfully implement character education (Munawaroh et al., 2024).

Future research may also explore the long-term impact of P5PPRA implementation on students' behavior outside of school. This study presents a character education model based

on Islamic values integrated with the national curriculum, emphasizing the importance of role modeling, habituation, and active participation of all school members as a reference for developing more contextual and sustainable character education.

4. CONCLUSION

Based on the P5PPRA implementation study results at SD Islam Al-Chusaini, the programme has been consistently and integrally incorporated into educational activities and student life. The values of Pancasila are instilled through practical approaches such as regular worship, etiquette practices, Hajj rituals, creative projects, and anti-discrimination campaigns. Character development strategies based on direct practice, supported by the active role of teachers and transformative leadership, have proven effective. This success is a best practice example for the contextual and sustainable development of character education based on Pancasila.

5. AUTHORS' NOTE

This article is based on research conducted at SD Islam Al-Chusaini, aiming to support advancing educational approaches for fostering religious character in elementary schools. The authors would like to express their sincere appreciation for the valuable guidance and support provided during the observation and interview process. Gratitude is also extended to the students, whose active participation and insightful contributions were invaluable to completing this study on implementing the Pancasila Student Profile Rahmatan Lil' Alamin approach in developing students' religious character. The authors also declare that this article is free from plagiarism.

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Development of Math Learning Media: Math Fraction App in Elementary School

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ABSTRACT

This study aims to develop innovative learning media, namely a digital math fraction app. The research method used is Research and Development (R&D) with the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) development model. The subjects in this study are fourth-grade students at Muhammadiyah Sugio Lamongan Elementary School. This study utilized expert media and content validation sheets, along with student response questionnaires and student activity questionnaires. The results of this study indicate: (1) the content expert validation of the math fraction app achieved an average score of 3.94, deemed highly valid, and the media expert validation achieved an average score of 3.91, also deemed highly valid. (2) The student response questionnaire scored 3.81, categorized as very good, and the student activity questionnaire had an average total score of 3.8, also categorized as very good. Based on the above findings, it is concluded that the Math fraction app is valid for use in mathematics education. So that it has an impact on student motivation, student attention, as well as student focus on learning.

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1. INTRODUCTION

To improve the quality of education, ideally, a teacher should have the ability to use technology effectively to achieve the expected learning objectives.(Indartiwi et al., 2020). In the era of Society 5.0, technology utilization is a crucial aspect that supports teachers in developing innovative learning strategies. One form of such utilization is the use of digital-based learning media. Smartphone devices are one of the potential media to be used optimally in the learning process, considering that they are practical, easily accessible, and commonly used among the community. The use of digital learning media has been proven to increase students' motivation, enthusiasm, and interest in participating in learning activities in a more active and fun way (Rosiana et al., 2023). Therefore, there is a need for adjustment and adaptation in the use of technology in the field of education so that the learning process becomes more effective and efficient.

The development of technology in the field of education today makes learning media play an important role in learning activities in the current Merdeka curriculum (Susandi et al., 2025). The support of various advanced information and communication technology devices has strengthened this view. Learning media can be interpreted as a tool that conveys information or learning materials, which aims to support teaching and learning activities (Kinanti et al., 2024). The utilization of learning media not only functions as a tool in delivering material, but can also function as a source for learning (Pagarra & Syawaludin, 2022). Therefore, the use of learning media that is suitable for the situation, conditions, and characteristics of students will be very beneficial in the teaching and learning process to achieve the desired educational goals (Juhaeni et al., 2023). According to Turnip & Karyono (2021) the development of learning materials in various forms, including in digital format, aims to support the learning process independently and make it easier for students to understand the content presented. The utilization of digital media in learning has proven to make a positive contribution, including increasing learning motivation, fostering interest in subjects, encouraging active student involvement, and developing thinking skills. In today's digital era, learning requires media that is aligned with the needs of learners, the environmental context, and their stage of development. Therefore, the development of digital learning media is a must to meet the demands of learning at the elementary school level (Huda et al., 2025). Thus, innovative efforts in presenting learning media, both in digital and printed formats, need to be continuously developed so that the media used becomes more interesting and relevant to the needs of students. This is expected to support the improvement of students' understanding of the material learned during the learning process.

Digital learning is a form of learning activity conducted through computer networks, either using the internet or intranet. With internet access, the learning process is no longer entirely dependent on the role of educators, as various information and learning resources are widely available and easily accessible. This allows learners to carry out learning flexibly, anytime and anywhere (Tholkhah et al., 2022). Therefore, digital media in elementary schools has an important role in the age of technology, because it can provide encouragement, convey information, and provide instructions to students in understanding learning materials (Kusumadewi et al., 2022). In the learning process, especially in mathematics, it is necessary to use the right tools to support the improvement of students' analytical skills. One form of effective tool is digital media, because it is able to present learning in a more interesting way through audio-visual displays, sound, video, and material that is relevant to the topic of the lesson. This media is designed to facilitate students' understanding of the material, so that it

can support a more efficient and effective learning process (Nursyahira et al., 2024).

Fractions are one of the important materials in learning mathematics that must be mastered by students at the elementary school level. The concept of fractions is a fundamental part of mathematics that plays a role in helping students understand the meaning of parts of a whole, as well as strengthening their ability to perform arithmetic operations. A good understanding of fractions allows students to solve various problems related to the topic more precisely and logically. According to Farokhah et al., (2025) The utilization of technology in the field of education plays an important role in helping students understand mathematical concepts, including fraction material. One of the media that can be used in the math learning process is the Math Fraction App. This media is a form of utilization of information and communication technology developed in the form of Android or smartphone-based applications. This application contains various important components, such as learning outcomes, learning objectives, instructions for use, teaching materials, and evaluation in the form of questions designed to train and improve students' critical thinking skills. This media development was conducted using Smart App Creator, a platform that allows the creation of interactive digital applications without the need for programming skills. This makes it easy for users, especially educators, to create multimedia learning materials that are interesting, interactive, and rich in content, and can be accessed through Android devices (Suhartati, 2021).

Mobile-based learning applications created with Smart app creator can be exported in HTML5 or .exe format, and this platform has also been used for various types of application development, such as mobile learning, mobile quiz, mobile tourism, company profile, to city promotion and branding media (Azizah, 2020). As a software, Smart App Creator offers various advantages. First, users do not need programming skills, so the app can be operated by anyone, including educators. Secondly, the resulting product can be run on various platforms, especially Android-based devices. Thirdly, the platform supports the addition of animations that can be customized according to the developer's needs. In addition, Smart App Creator allows the integration of various media formats, interactivity, and web-based storage and services. These features support the optimization of the functions of the developed application, making it an effective digital learning media that is responsive to user needs (Budyastomo, 2020). The use of learning media based on Smart app creator is expected to make students more interested, active, and involved in the learning process, and able to develop critical thinking skills.

The use of technology-based digital learning media plays an important role in the world of education because it functions as a means for teachers to convey material to students so that the learning process becomes more effective and enjoyable (Saradiva et al., 2023). Based on the results of interviews and observations conducted, there is a lack of use of learning media at SD Muhammadiyah Lamongan, so there is a need for learning media that can attract and motivate students towards learning (Rahmawati et al., 2024). In previous research by Puspita et al. (2023), with the title “Fraction Board Design to Stimulate the Elementary School Students' Critical Thinking Ability Regarding Fraction”, it was found that validation by experts showed that this media was very valid, with an average percentage of 88.33%. This media is safe and attractive for use by elementary school students, and has a positive impact on improving students' critical thinking skills. In order to help students learn more easily, it is necessary to use digital-based visual learning media in grade IV, especially on material that is considered difficult by students. As a solution, a digital-based learning media called Math Fraction App was developed for math subjects with the topic of fractions in grade IV SD Muhammadiyah Sugio. The novelty of this research lies in integrating fraction concepts into

contextually designed interactive digital media, tailored to the characteristics and needs of elementary school students. The Math Fraction App media developed contains fraction materials with the same denominator, accompanied by interesting learning animations and a game-based learning approach, which until now has rarely been applied in fraction learning media. Therefore, this research provides a new contribution in the development of digital learning media that is adaptive, fun, and able to increase the effectiveness of mathematics learning at the elementary school level.

The method in this study, using the development method used in this study, is research and development (R&D), also known as "research and development", which is a research method used to make certain products and test their effectiveness (Sugiyono, 2021). So this research is expected to develop digital learning media and to test the validity and practicality of the media.

2. METHODS

The development method used in this research is Research and Development (R&D) or known as research and development (R&D). The focus of this research is development that refers to the ADDIE model with 20 fourth-grade students of SD Muhammadiyah Sugio Lamongan as research subjects. This study was conducted in the even semester of 2024/2025 in grade IV mathematics subjects. 10 students were involved in the small group trial, and 20 students were involved in the large group trial. This research was conducted using material expert and media expert validation sheets, as well as student response and activity questionnaires.

Table 1. Research Instruments

Aspects assessed	Instrument	Respondent
Validity	Validity Sheet	Material Expert and Media Expert
Practicality	Student Response Questionnaire and Student Activity	Class IV Students and Observers

In this data collection method, there are three components used: expert validation, student response questionnaire, and student activity questionnaire. Material experts and media experts conduct expert validation to evaluate the validity of the learning media through validation sheets. The student response questionnaire collects data on students' responses to the learning media, while the student activity questionnaire measures how engaged students are in the learning process. The data collected through these methods provides an overall picture of the validity of the math fraction app media and how they can improve learning effectiveness.

3. RESULTS AND DISCUSSION

This section presents the results of research on the development of math fraction app media for grade IV students in mathematics subjects in elementary schools. This research was conducted at SD Muhammadiyah Sugio Lamongan.

The analysis stage begins with identifying needs and problems in the learning process. The aim is to obtain information related to the obstacles faced in teaching and learning activities.

This information is obtained through direct observation of learning activities carried out by class IV teachers. Based on the observation, it is known that digital learning media has not been applied, and the lecture method is still used, which causes students to be less interested in learning. This is because learning is dominated by text, so students feel bored and are not able to maximise in understanding of the material. Furthermore, an analysis of important elements in learning is carried out, such as curriculum, learning objectives, learning outcomes, and teaching materials contained in mathematics subjects in the material "Fractions" for grade IV. These elements will be the basis for developing the learning process. In addition, the analysis was also conducted to determine the characteristics of grade IV students of Muhammadiyah Sugio, Lamongan, namely: 1) on average, 10 years old; and 2) have an interest in interactive and fun learning.

In the design stage, the researcher developed a draft of learning media equipped with icons and various menu options that students can access online. The menu includes learning outcomes, learning objectives, instructions for using the media, learning materials, and evaluation in the form of questions. The researcher also compiled the components of the math fraction app learning media, which included materials, images, background music, practice questions, and assessments. In addition, researchers compiled validation sheets that would be used by validators, namely, material experts and media experts, to evaluate the products that had been developed. The researcher also prepared a response questionnaire and student activity questionnaire, which were used to find out the responses and the level of student involvement after using the math fraction app learning media.

At the development stage, researchers carry out the process of making a learning media math fraction app on mathematics subjects with fractions with the same denominator in class IV elementary school students. The following are the results of the development of the math fraction app media.

a. The main display of the math fraction app media

The display that appears when opening the math fraction app media is the cover or main display of the math fraction app media, where, on that display, students can start using the media. Furthermore, students are asked to press the start button to enter the menu display of the media math fraction app, as shown in **Figure 1**.

Figure 1. Main View of Math Fraction App Media

b. Menu display of math fraction app media

The next display on the math fraction app media is the menu display, where students can see several options, namely CP, TP, ATP, instructions for use, materials, and games. In this display, students are given several choices to start the stages that will be carried out. The following is the menu display in **Figure 2**.

Figure 2. Menu Display of Math Fraction App Media

c. Display CP, TP, ATP media math fraction app

On this display is a display that contains learning outcomes, learning objectives, and flow of learning objectives related to fraction material with the same denominator, with the aim of being able to direct and facilitate the learning process to be more structured, measurable, and oriented to the development of overall student competence. So that students can know the learning objectives to be learned, as shown in **Figure 3,** as follows.

Figure 3. View CP, TP, ATP Media Math Fraction App

d. Display of instructions for using the math fraction app media

The next display is about the instructions for using the math fraction app media that can help students use the media. Namely, with various icons, students can find out the instructions for using the math fraction app media. Here are the instructions for use in **Figure 4**.

Figure 4. Display of Instructions for Using the Math Fraction App Media

e. Display of media material math fraction app

This display contains material on fractions with the same denominator, namely recognising fractions with the same denominator, comparing and sorting fractions with the same denominator, and calculating operations for addition and subtraction of fractions with the same denominator. In this material, students can learn material related to fractions with the same denominator. The material displayed on the media math fraction app in **Figure 5** is as follows:

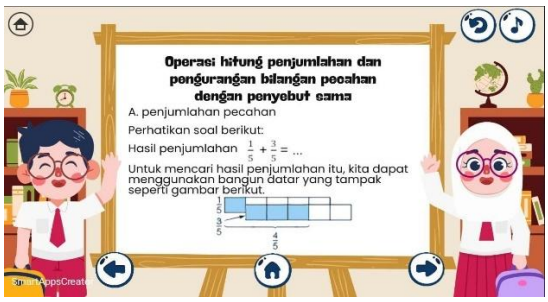

Figure 5. Display of media material math fraction app

f. Fraction math game app view

The last display on the media math fraction app is a game with story problems totaling 5 questions, and there is a score at the end of the problem. At the question stage, students can evaluate the results of the learning that has been done with the score display at the end of the work. The game is displayed on the Media Math fraction app as shown in **Figure 6**.

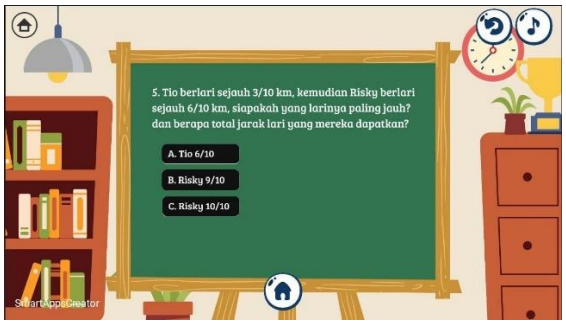

Figure 6. Fraction math game app view

In the implementation stage, the learning stage using the math fraction app media for fourth-grade students of SD Muhammadiyah Lamongan, with a total of 20 students. Then, at the final stage of evaluation, namely the stage of obtaining data where the data results in the validity and practicality of the math fraction app media for learning mathematics. The following are the results of the validity and practicality of the math fraction app medi. Results of Media Validity of Math fraction app.

a. Math fraction app Media Validation Results

Validation of the math fraction app media is a crucial step in the media development process, where several experts are involved to evaluate and assess the level of validity and quality of the media that has been made. This stage aims to obtain feedback to ensure that the learning media developed meet the eligibility standards, both in terms of material, appearance, ease of understanding, and ease of use by students. Therefore, the validation process not only serves to assess the quality of the media but also becomes an important step in improving and perfecting digital learning media to make it more innovative and effective in the learning process. Useful feedback to improve media quality and assess the extent to which the media meets predetermined standards. The following are the results of the validation that has been carried out by experts:

1) Material Expert Validation Results

Table 2. Material Expert Validation Results

Assessment aspect	Expert score		Total average	Category
	1	2		
Material	4.00	4.00	4.00	Very valid
Presentation techniques	3.83	3.83	3.83	Very valid
Language	4.00	4.00	4.00	Very valid
Total average			**3.94**	**Very valid**

Based on **Table 2** shows the results of validation conducted by material experts on the three aspects of the assessment, the math fraction app media obtained an average score of 3.94 from a maximum score of 4.00. The assessment given by two material experts shows that the math fraction app media is in a very valid category and is suitable for use as learning media.

2) Media Expert Validation Results

Table 2. Media Expert Validation Results

Assessment aspect	Expert score		Total average	Category
	1	2		
Media Suitability	4.00	4.00	4.00	Very valid
Effectiveness	4.00	4.00	4.00	Very valid
Ease of Use	4.00	4.00	4.00	Very valid
Attractiveness	3.67	3.67	3.67	Very valid
Total average			**3.91**	**Very valid**

Based on **Table 3** shows the results of validation conducted by media experts on the four aspects of the assessment, the math fraction app media obtained an average score of 3.91 from a maximum score of 4.00. The assessment given by two media experts shows that the math fraction app is in a very valid category and is suitable for use as learning media.

Practicality Results of Math fraction app Media

a. Small Group Trial Results (Trial 1)

The small group trial (trial 1) was conducted to assess the practicality of the math fraction app learning media. Data were collected through two instruments: the student response questionnaire and the student activity questionnaire. The student response questionnaire was filled in independently by students after the learning was completed, while the student activity questionnaire was filled in by observers or peers who observed student activities during the learning process.

1) Results of Student Response Questionnaire
   Based on the data obtained from the small group trial (trial 1), a total average score of 3.75 out of a maximum score of 4.00 was obtained. The score shows that students' response to the learning media math fraction app is in the very good category. This indicates that the media is very effective and well-received by students during the learning process.
2) Results of Student Activity Questionnaire
   At the small group trial stage (trial 1), observations were made of student activities to collect data on the level of student participation and involvement in various learning activities. Based on the data obtained from the small group trial (trial 1), a total average score of 3.5 out of a maximum score of 4.00 was obtained. This score indicates that students' responses to the math fraction app learning media are in the very good category. This indicates that the media is effective and well-received by students during the learning process.

b. Large Group Trial Results (Trial 2)

The large group trial (trial 2) was a continuation of the previous trial conducted in a larger class. The purpose of this trial was to explore the results of the limited trial and expand the scope of data by involving more students. During the large group trial, data were collected through student response questionnaires and student activity questionnaires. Student response questionnaires were filled out by students independently after the learning was completed, while student activity questionnaires were filled out by observers or peers who observed student activities during the learning process.

1) Results of Student Response Questionnaire
   Based on the data obtained, it shows that the acquisition of a total average score of 3.81 from a maximum score of 4.00, where the value indicates that the student's response to the media math fraction app is in the very good category.
2) Results of Student Activity Questionnaire
   Based on the data obtained from the large group trial (trial 2), a total average score of 3.8 out of a maximum score of 4.00 was obtained. This value shows that students' responses to the math fraction app learning media are in the very good category. This indicates that the media is very effective and well-received by students during the learning process. In addition, the results of the two trials showed a difference in total scores between the small group trial (trial 1) and the large group trial (trial 2).

This research develops an Android application-based learning media called the Math Fraction App. The app is designed using Smart App Creator (SAC), a platform that allows the creation of apps without the need for in-depth programming skills. Smart apps creator is a software that can be used to create mobile, desktop, and website-based multimedia features. SAC is also a desktop application that can be used to create Android and IOS mobile applications without programming code and can produce HTML, exe, and APK formats, making it easier for students to open learning resources on their smartphones (Helly et al., 2022). The development process follows the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which consists of five main stages: needs analysis, media design,

application development, classroom implementation, and evaluation of the effectiveness of media use. The development and implementation of a math fraction app based on the smart apps creator (SAC) is a very appropriate strategic step to improve the quality of learning in this digital era. This app not only provides interesting and interactive learning media, but also allows students to learn independently anytime and anywhere, by 21st-century learning principles that emphasise flexibility and accessibility.

The validity of the math fraction app media can be evaluated through a series of validation tests that have been carried out previously. Based on the results of validation testing, which includes material and media elements, the math fraction app is declared very valid for use. This can be seen from the scores given by the experts, where the material expert gave a score of 3. 94 with a very valid category, the media expert gave a score of 3.91 also in the very valid category, From this, it can be concluded that overall, the validity of the math fraction app media is included in the very valid category. After testing the validity of the material and media aspects, it can be concluded that the math fraction app media is very valid as a learning tool for math subjects about fractions with the same denominator for fourth-grade elementary school students. This is in line with the study conducted by Firdaus et al., (2024) which shows that the use of digital learning media supported by smart app creators is very feasible to be applied in learning mathematics in elementary schools. In addition, research conducted by Hussein et al., (2022) also stated that digital-based learning media is a valid medium used to assist understanding in learning.

The level of practicality of using the Math fraction app media can be known through the results of small group (trial 1) and large group (trial 2) trials. The purpose of this test is to find out students' responses and their activities during the learning process using the media. In the small group trial, the average student response to the use of the Math fraction app obtained a score of 3.75, which was included in the very good category. While the average score of student activities during learning using this media was 3.50, which was also classified as very good. Meanwhile, in the large group trial, the average student response to the media reached a score of 3.81, and the average student activity score was 3.80; both were in the very good category.

Based on these results, it can be concluded that learning using the Math fraction app is considered very valid, practical, and able to help students in understanding fraction material with the same denominator. This finding is in line with research conducted by Sirait et al., (2024) which states that interactive learning media is easy to use in the learning process, and that Smart app creator-based media is proven to be practical and effective in supporting learning. As a follow-up to the use of Math Fraction App media in learning mathematics material of fractions with the same denominator in grade IV elementary school students, it is recommended that this media can continue to be used and developed further. This media is proven to help improve students' understanding of the concept of fractions through an interactive and visual approach. In addition, teachers are expected to integrate the use of this application in a planned manner in the learning process in order to increase students' learning motivation and learning outcomes. Further research can also be conducted to evaluate the

effectiveness of this application in fraction materials with higher difficulty levels or at different grade levels.

4. CONCLUSION

The development of a learning media Math fraction app based on Android applications through the Smart app creator (SAC) platform is a strategic innovation in supporting the learning process of mathematics in the digital era, especially fraction material with the same denominator for grade IV elementary school students. This application is designed without the need for programming skills, but is able to produce interactive media in various formats (HTML, .exe, and .apk), which support flexible and independent learning by the demands of 21st-century learning.

The development process follows the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. The results of validation by experts show that the Math fraction app is classified as very valid, both from the material aspect (with a score of 3.94) and the media aspect, with a score of 3.91. Furthermore, based on the results of small and large group trials, this app also proved to be very practical, with the average score of student responses and activities in the excellent category. Thus, it can be concluded that the Math fraction app is a valid, practical, and effective learning medium in improving students' understanding of fraction materials. These results also strengthen previous findings that digital-based interactive media, especially those developed through Smart app creator, are able to support a more interesting, efficient learning process, and in accordance with the needs of today's students.

5. AUTHORS' NOTE

This article is based on research conducted at SD Muhammadiyah Sugio Lamongan, serving as a contribution to the development of math learning media for elementary school students. The authors would like to express their sincere appreciation for the valuable guidance and support provided during the observation and interview process. Gratitude is also extended to the students, whose active participation and insightful contributions were invaluable to the completion of this study on developing the Math Fraction App as a learning medium in mathematics. The authors also declare that this article is free from plagiarism.

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The Role of Discipline in Character Education for Elementary School Students in The Digital Era

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ABSTRACT

In the era of globalization, the decline of moral values among students has become a serious concern, highlighting the urgent need for character education. This article explores the importance of discipline as a foundational value in shaping the character of elementary school students. This study analyzes relevant literature through a qualitative library research approach, including academic journals, books, and expert perspectives. The findings indicate that discipline is crucial in fostering consistent behavior and moral responsibility in students across spiritual, social, and academic aspects. The article emphasizes the need for sustained reinforcement of disciplinary values through collaboration between schools and families. Strengthening discipline supports academic achievement and contributes to students' long-term integrity and character development. This study contributes to the discourse on moral education by highlighting practical strategies for character formation in digitally influenced educational settings.

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1. INTRODUCTION

Education focuses on academic achievement and plays a crucial role in shaping students' character. Amid the complexities of globalization and technological advancement, moral and social degradation has become a significant challenge for the younger generation. One of the most neglected character values is discipline, essential to building responsible and independent individuals. According to the Character Survey Report by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek, 2021), only about 52% of students consistently exhibit disciplined behavior in school and social environments. This data underlines the urgency to reevaluate character education practices in formal education settings. As Tilaar (2002) critiques, the current education system still leans too heavily on cognitive aspects, often overlooking moral and behavioral dimensions.

Discipline goes beyond mere rule compliance; it reflects an individual's ability to manage time, responsibility, and integrity. Lickona (1992) states that character education involves moral knowing, feeling, and moral action—where discipline integrates all three in shaping a holistic personality. Teachers are knowledge transmitters and moral agents who shape students' values through words and actions. In this context, Berkowitz (2021) emphasizes the need for intentionality in character education—the deliberate, conscious design of activities and environments that nurture character values such as discipline.

As a new educational paradigm in Indonesia, the Merdeka Curriculum offers significant opportunities to strengthen character education. Through the Pancasila Student Profile, values such as independence, responsibility, and discipline are embedded in meaningful and contextual learning. However, these values have not been optimally transformed into daily routines at school and home. Many schools struggle to reinforce character systemically, and family collaboration remains suboptimal.

As the primary educational institution, the family should serve as the foundation for instilling discipline. However, a lack of parental awareness in shaping disciplined behavior weakens continuity when children enter the school environment. On the other hand, teachers often prioritize academic outcomes, causing character development to be treated as secondary. The need for synergy between school and family is becoming more crucial in early education, where behavioral patterns begin to form and values become embedded.

Although recent efforts, such as those by Nuary (2024) and Yulianti (2023), have attempted to link character education with elementary contexts, the discussion on discipline as a distinct and central value remains limited. Meanwhile, classic frameworks like Lickona (1991) and Bandura (1977) still dominate the discourse, but require contextualization in light of digital-age challenges such as screen dependency, reduced attention spans, and weakened authority figures (Oktaviani & Prasetyo, 2024; Alrabaa et al., 2022).

Therefore, this study contributes to the discourse on moral education by focusing specifically on the urgency of discipline during the foundational years of schooling. It seeks to fill the gap by synthesizing literature on discipline-based character formation in early education and proposing a contextual framework that addresses traditional models and emerging challenges in the digital era. This study adds novelty by presenting practical strategies for collaboration between schools and families in nurturing discipline systematically and sustainably within the framework of the Merdeka Curriculum.

2. METHODS

This study employs a qualitative approach through library research, a method involving the analysis of relevant written sources to gain an in-depth understanding (Zed, 2004). It focuses on how discipline values can be effectively instilled through character education, particularly in elementary schools and within the family context. No empirical field data were collected; all information was derived from literature and academic documents.

The researchers reviewed 15 carefully selected sources: 7 national and international journal articles, five academic books on character education and discipline, and three official educational policy documents from the Ministry of Education and Culture of Indonesia, UNESCO, and the OECD. These sources were chosen based on the following criteria:

a. Credibility – such as peer-reviewed journals, scholarly books, or official reports;
b. Relevance – focusing directly on discipline, moral character, and elementary education;
c. Timeliness – published between 2013 and 2024 to ensure validity and relevance to current educational challenges (Zed, 2004; Patton, 2002).

The selection of these 20 references was based on their unique contributions to understanding discipline in education. For instance, journal articles by Berkowitz (2020), Lickona (2019), and Narvaez (2021) provide contemporary perspectives on moral and character education, while Indonesian books and articles offer insights on contextual application in national curricula. Official policy documents, such as the UNESCO Framework for Education 2030 (2022) and the OECD Learning Compass (2020), were included to highlight international benchmarks and priorities in 21st-century character formation.

The data analysis followed the interactive model by Miles, Huberman, and Saldaña (2014), consisting of three steps:

a. Data Reduction – identifying, summarizing, and selecting relevant content from the sources;
b. Data Display – organizing thematic data for comparison and pattern recognition;
c. Conclusion Drawing – interpreting the synthesized information in light of the research objectives.

To ensure data validity, source triangulation was applied by comparing concepts and findings across journal articles, books, and policy documents (Patton, 2002). Each reference was evaluated based on the author's credibility, the publishing institution's reputation, and the work's methodological rigor.

Although this research provides a theoretical foundation, it is limited by its exclusive reliance on secondary sources and the absence of empirical field data. Thus, findings are conceptual rather than predictive or generalizable. Future research should consider empirical classroom-based studies to test the effectiveness of proposed discipline frameworks.

Table 1. Summary Table of Analyzed Sources

No	Title	Author(s)	Focus	Reference
1	Educating for Character	Lickona, T.	Character education principles	Lickona (1991)

No	Title	Author(s)	Focus	Reference
2	The Science of Character Education	Berkowitz, M.	Practical approaches to character formation	Berkowitz (2002)
3	Moral Education for a Changing Society	Narvaez, D.	Moral development in modern contexts	Narvaez (2021)
4	Pendidikan Karakter di Era Digital	Yamin, M.	Digital-age challenges to moral education	Yamin (2023)
5	Building Discipline through Curriculum	Arifin, Z.	Classroom strategies for discipline	Arifin (2020)
6	OECD Learning Compass	OECD	Global competencies and character traits	OECD (2020)
7	Education 2030 Framework	UNESCO	Policy vision for global education	UNESCO (2022)
8	Etika Pendidikan Anak Usia Dini	Susanto, A.	Moral values in early education	Susanto (2019)
9	Implementing Discipline in the Classroom	Suryanto, B.	Practical tools for teachers	Suryanto (2021)
10	Character and Citizenship Education	Tan, C. & Deneen, C.	Character in multicultural settings	Tan & Deneen (2024)
11	The Psychology of Discipline	Ryan, R. & Deci, E.	Motivation and behavior	Ryan & Deci (2021)
12	Character Matters	Elias, M.	SEL and discipline integration	Elias (2023)
13	Disiplin Positif untuk Guru	Kemendikbud	Positive discipline strategies	Kemendikbud (2021)
14	Digital Literacy and Moral Formation	Halim, A.	Digital threats to moral education	Halim (2022)
15	Digital Behavior and Performance	Alrabaa et al.	Screen impact on academic performance	Alrabaa et al. (2022)
16	Family-Based Character Formation	Mulyani & Kurniawan	Discipline and family involvement	Mulyani & Kurniawan (2021)
17	School–Parent Collaboration	Syamsuddin et al.	Discipline alignment	Syamsuddin et al. (2023)
18	Modeling in Education	Bandura, A.	Social learning theory	Bandura (1977)
19	Role of Educators in Discipline	Ismiyati & Widodo	Teacher influence on student behavior	Ismiyati & Widodo (2022)
20	Tech Challenges in Indonesian Schools	Oktaviani & Prasetyo	Gadget use and discipline issues	Oktaviani & Prasetyo (2024)

This methodology ensures a well-grounded and up-to-date theoretical discussion on the urgency and implementation of discipline-based character education in elementary schools, especially within the context of 21st-century digital challenges.

3. RESULTS AND DISCUSSION

a. Discipline as a Foundation of Character Education

Discipline is a core pillar in student character formation, especially at the elementary level. It reflects self-regulation, adherence to rules, and personal responsibility. In the context of character education, discipline is taught formally and cultivated through a consistent school culture and daily behavior. Children are learning how to internalize values through repetition, modeling, and reinforcement at this developmental stage.

Presidential Regulation No. 87 of 2017 on Strengthening Character Education includes discipline as one of five national character values, alongside religiosity, nationalism, independence, and cooperation. These values are intended to be integrated across learning

activities, school management, and community interaction. Therefore, discipline must be reflected in classroom behavior and how schools shape their routines, expectations, and rules across all levels.

Discipline implementation in elementary schools can involve structured routines, consistent rule enforcement, and clear consequences. According to Ismiyati and Widodo (2022), children raised in disciplined environments tend to be more responsible, focused, and cooperative. Teachers are key figures in this effort, acting as rule enforcers and role models. This is especially important because elementary-aged children are in the imitation and identification stage, absorbing behavioral patterns from adults around them.

In comparison with countries like Finland and Singapore—both known for their strong character education systems—discipline in Indonesia still tends to rely more on reactive rather than proactive approaches. While Finland promotes student autonomy within structured guidelines and Singapore enforces values education integrated with digital citizenship, Indonesian schools often struggle with consistent implementation due to resource disparities. Therefore, this paper seeks to emphasize a model of discipline that is not only culturally grounded but also responsive to global trends in character education.

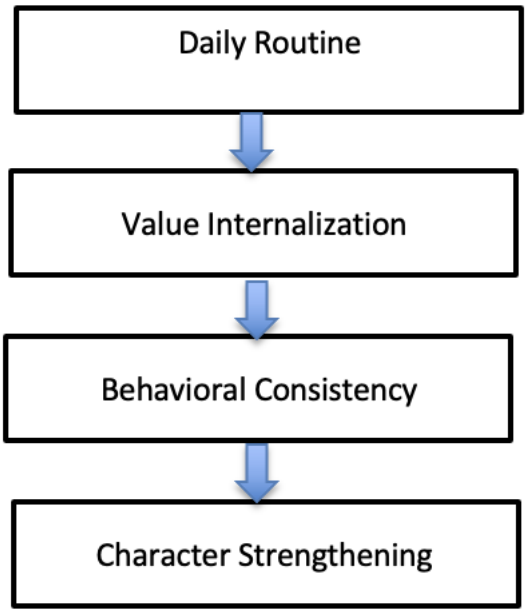

Figure 1. Flow of Character Development through Discipline

b. Challenges of Discipline in the Digital Era

Enforcing discipline faces increasingly complex challenges in the digital age. Elementary students today are immersed in technology—devices, internet access, and social media platforms—which can serve as both tools for learning and sources of distraction. Without proper guidance, technology use can undermine students' focus, attention span, and time management. This reality demands new strategies for nurturing discipline within digitally saturated environments.

Oktaviani and Prasetyo (2024) highlight that inadequate parental control at home and low digital literacy among teachers contribute significantly to declining student discipline. Many children go to bed late due to gadget use, resulting in fatigue, reduced motivation, and

disobedience in the classroom. The digital environment can weaken the authority of both parents and teachers if children are left unsupervised or without clear rules.

Research by Alrabaa et al. (2022) found a negative correlation between unregulated digital exposure and student academic performance and discipline. Children who excessively consume entertainment content are more prone to impulsive behavior, poor time management, and limited attention in academic tasks. This underscores the need to blend digital literacy with character education to help students navigate the digital world responsibly.

While several OECD countries like South Korea and Japan have integrated digital discipline through classroom device policies and structured screen-time education, Indonesian schools are only beginning to address this issue systematically. This paper contributes by proposing school-based programs that embed discipline and digital ethics simultaneously through engaging, humanistic methods.

Table 2. Strategies for Cultivating Discipline in Digital Contexts

Strategy	Description
Digital Literacy Curriculum	Teaching children to manage screen time
Classroom Tech Agreements	Co-created rules for device usage
Positive Reinforcement System	Rewarding focused, tech-responsible behavior
Teacher Training Programs	Enhancing digital competence among educators

c. School–Parent Collaboration in Cultivating Discipline

Discipline education cannot be the sole responsibility of schools. Parents play a critical role as the primary educators, especially in the early years of a child's life. Households that apply consistent, loving, and firm discipline tend to raise children who are orderly, emotionally stable, and socially responsible (Mulyani & Kurniawan, 2021). This balance between affection and firmness is key to building habits children carry into school.

Regular communication is necessary to ensure effective alignment between school and home. Behavior report cards, daily journals, and parent-teacher meetings can serve as instruments to inform parents of their child's progress and guide them in reinforcing similar values at home. Syamsuddin et al. (2023) found that collaborative strategies involving feedback loops between school and parents increase the consistency of discipline implementation and reduce behavioral problems.

Involving parents in school programs is also a valuable strategy. Parents can help develop school rules, contribute to designing reward systems for positive behavior, and participate in ceremonial or extracurricular activities. Their presence reinforces the seriousness of school expectations and sends a unified message to students about the importance of discipline in every setting.

Compared to practices in countries like Australia, where parent engagement is institutionalized via school councils, Indonesian schools often rely on ad-hoc involvement. This paper recommends formalizing school–parent collaboration models to address this gap and enhance consistency and accountability in disciplined education.

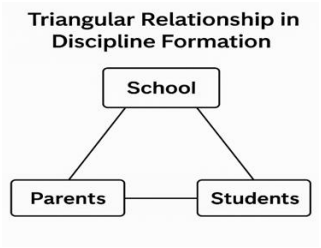

Figure 2. Triangular Relationship in Discipline Formation

4. CONCLUSION

Based on the literature review and discussion, it is concluded that discipline plays an essential role in shaping the character of elementary school students. It is a behavioral norm and a moral foundation that fosters responsibility, independence, and consistency in fulfilling academic and everyday obligations. Discipline integration into character education has been widely recognized to contribute to students' academic achievements, emotional maturity, and long-term positive habits beyond the classroom.

Although many educational institutions acknowledge the importance of discipline, current practices are often fragmented or overly reliant on punitive rather than holistic developmental approaches. The discussion highlights the importance of systematic and consistent efforts to cultivate discipline, which include intentional instructional design, exemplary teacher conduct, and the creation of a school climate that supports order and student accountability. Furthermore, family involvement remains crucial, underscoring the need for synergy between school and home in embedding disciplined behavior.

Given the evolving educational landscape and increasing behavioral challenges in the digital era, the study emphasizes the need for curriculum reform at the elementary level. Habituation programs should be designed to thematically incorporate discipline into daily activities, classroom interactions, and extracurricular settings. Discipline must be contextualized within local values while responsive to global demands for character-based education. School culture, with its rituals, routines, and reward systems, should be deliberately structured to reinforce values like punctuality, respect for rules, and social responsibility.

This study implies the need for a comprehensive policy framework integrating discipline-based character education across formal and informal learning settings. It calls for more substantial alignment between educational policies, school practices, and community values to create a unified approach to character development. Future researchers are encouraged to validate these findings through empirical studies, explore policy implications, and conduct cross-national comparisons to enrich the understanding of effective disciplinary practices in diverse educational contexts.

5. AUTHORS' NOTE

This article is part of the research conducted at SDN Jatimekar 6 to contribute to developing learning media at the elementary school level. The author thanks the fourth-grade teacher, F, for the opportunity and support during the observation and interview process. Thanks are also extended to all fourth-grade students who actively participated and contributed valuable data throughout the study.

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