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Implementation of the *Kurikulum Merdeka* in Mathematics Learning at Elementary Schools

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Abstract: Implementation of the *Kurikulum Merdeka* in Mathematics Learning at Elementary Schools. Objectives: This study aims to examine the implementation of the *Kurikulum Merdeka* in enhancing the potential of mathematics learning in elementary schools in Kebumen Regency. **Methods:** The research was conducted using a qualitative approach with phenomenological methods. Participants of this study were teachers and principals in 5 elementary schools recruited through purposive sampling techniques. Data were garnered through observation, interviews, and documentary studies. Interviews were conducted with educators and school principals. The data analysis technique consists of data collection, data reduction, data presentation, and drawing conclusions. **Findings:** The results of the study indicate that: The planning of mathematics learning in *Kurikulum Merdeka* is prepared by teachers through informal learning and collaboration with peers, the implementation of mathematics learning in *Kurikulum Merdeka* is still in the stage of adapting various teaching experiences of teachers, the evaluation of mathematics learning in *Kurikulum Merdeka* already uses diverse evaluation tools and types of questions. **Conclusion:** This study concludes that the implementation of the mathematics learning involves planning with informal learning methods, adapting the implementation of learning, and various evaluation methods.

Keywords: *kurikulum merdeka*, mathematics, elementary school, qualitative phenomenology.

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INTRODUCTION

Indonesia's national education, as mandated by the 1945 Constitution, is designated as the right and obligation of every citizen. Governed by Law Number 20 of 2003, the national education system aims to cultivate quality, morally upright, and globally competitive Indonesian individuals. Through standardized and sustainable curricula, the national education system endeavors to achieve the development goals of intelligent, creative, and environmentally conscious individuals. The implementation of this law serves as the foundation for the development of Indonesia's human resources, fostering potential and contributions towards national advancement (Ellitan & Mulia, 2019; Marjuni, 2021; Suherman et al., 2019; Wulan, 2014).

With twelve curriculum changes since Indonesia's independence in 1947, ranging from rudimentary to the *Kurikulum Merdeka* (Wisnu & Naomi, 2023), ongoing curriculum enhancements seek to ensure the accuracy of

subject matter substance and alignment with learners' developmental stages. Simultaneously, the national education system underscores the importance of deliberate efforts to foster a conducive learning environment where students actively develop their potential, leading to the acquisition of intelligence, morality, self-control, and skills beneficial to themselves, society, and the nation (Daimah & Suparni, 2023; Dian, 2022).

The *Kurikulum Merdeka* is characterized by diverse intracurricular learning, allowing for optimal content coverage to provide students with sufficient time to understand and delve into concepts while strengthening competencies. Granting educators flexibility in teaching aims to create an engaging, enjoyable, varied, and tailored learning atmosphere, integrating games as appropriate to students' needs and environment. The anticipated learning outcomes of *Kurikulum Merdeka* implementation for mathematics education include being engaging, meaningful, challenging, and applicable (Fianingrum et al., 2023; Malikah et al., 2022; Panginan & Susianti, 2022). The implementation of the *Kurikulum Merdeka* for educational recovery is based on Ministerial Regulation No. 5 of 2022 concerning Graduation Competency Standards in Early Childhood Education, Elementary Education, and Secondary Education. These standards serve as minimum criteria regarding attitudes, skills, and knowledge demonstrating students' competency achievements at the end of each educational level. Graduation Competency Standards (SKL) serve as a reference for the 2013 Curriculum, Emergency Curriculum, and *Kurikulum Merdeka* (Pertiwi et al., 2023; Rosmiati et al., 2023).

Ministerial Decree No. 262/M/2022 concerning Amendments to Ministerial Decree No. 56/M/2022 regarding Guidelines for Implementing the Curriculum for Educational Recovery, starting from the academic year 2022/2023, educational units may choose to implement the curriculum based on their readiness, starting from pre-kindergarten to grade I, IV, VII, and X (Muna & Fathurrahman, 2023; Septiani et al., 2022). The government provides a questionnaire to assist schools in assessing their readiness stages for using the *Kurikulum Merdeka*. Three implementation options for schools choosing to use the *Kurikulum Merdeka* in the academic year 2023/2024 are: (1) *Mandiri Belajar*, that schools apply some *Kurikulum Merdeka* principles in teaching and assessment while still using their current curriculum; (2) *Mandiri Berubah*, that they use the Merdeka Curriculum in developing their curriculum and implementing it in teaching and assessment; and (3) *Mandiri Berbagi*, that they use the *Kurikulum Merdeka* in developing their educational unit and implementing it in teaching and assessment with a commitment to share best practices with other schools (Laila et al., 2022; Panginan & Susianti, 2022; Sari et al., 2023; Wisnu & Naomi, 2023).

Meanwhile, one of the fundamental subjects mandated in every school curriculum is Mathematics. Mathematics is not merely a collection of numbers and various formulas but also serves as a symbolic language and a universal language enabling humans to conceptualize, record, and communicate ideas (Apriliya et al., 2023; Muna & Fathurrahman, 2023). Unconsciously, mathematics plays a role in everyday life, sometimes in simple and routine forms, or in highly complex ones. For instance, in the simple act of conducting buying and selling transactions, sellers in markets proficiently and swiftly calculate purchase amounts and simultaneously return change to buyers (Arif et al., 2021; Tajudin et al., 2021).

Mathematics is a compulsory subject at every level of education in Indonesia, from elementary school to tertiary education. However, amidst the evolving times, Mathematics is also viewed as a foundational science essential for various disciplines needed to cope with advancing

developments. According to Arif et al. (2021), Mathematics is crucial because (1) through learning mathematics, humans can count and perform calculations; (2) Mathematics is a prerequisite for several other subjects; (3) Learning mathematics simplifies and streamlines calculations; (4) By learning Mathematics, individuals are expected to develop logical, critical, diligent, responsible thinking, and problem-solving abilities. Thus, Mathematics becomes an important subject to enhance learning potential.

However, facts indicate that students' learning potential, especially in Mathematics, is not optimally facilitated. Dominant mathematics teaching approaches remain conventional, such as lectures and exercises, which tend to lack in arousing student interest and motivation (Apriliya et al., 2023; Sadieda et al., 2022). Teacher-centered learning tends to deprive students of opportunities to actively engage and develop a deep understanding of mathematical concepts (Casmudi et al., 2023). Furthermore, mathematics education tends to focus primarily on the development of logical-mathematical intelligence, while neglecting other forms of intelligence (Lumbantoruan & Simorangkir, 2023). This is supported by the recent results of the Program for International Student Assessment (PISA) 2022 survey announced on December 5, 2023, where Indonesia ranked 68th out of 81 participating countries with scores in mathematics (379), science (398), and reading (371) (Muna & Fathurrahman, 2023; Panginan & Susianti, 2022).

Several studies have analyzed students' learning potential, particularly in mathematics (Daimah & Suparni, 2023; Dian, 2022; Fianingrum et al., 2023; Malikah et al., 2022; Wisnu & Naomi, 2023). Additionally, some studies have examined the implementation of the *Kurikulum Merdeka* in elementary schools (Daimah & Suparni, 2023; Fianingrum et al., 2023; Malikah et al., 2022; Muna & Fathurrahman, 2023; Panginan & Susianti, 2022; Pertiwi et al., 2023). However, there has been no study focusing on the implementation of the *Kurikulum Merdeka* aimed at enhancing students' mathematical potential in elementary schools. The findings of these studies provide a basis for formulating more effective policies and programs to support the development of the *Kurikulum Merdeka* in elementary schools. Based on the background presented above, this research aims to examine the implementation of the *Kurikulum Merdeka* in primary education units in Kebumen Regency.

METHOD

Research Design

This study employed a descriptive qualitative approach with phenomenological method. Qualitative research, according to Creswell (2014), involves closely listening to individual explanations and understanding of experiences during the study. This approach was chosen to delve deeper into the phenomena experienced by educators and school principals. The aim was to describe and analyze individual and group phenomena, events, social activities, attitudes, beliefs, perceptions, and ideas.

Participants

Participants of this study were teachers and principals from SD Negeri 2 Adikarso, SD Negeri 1 Pejagoan, SD Negeri 1 Karangkembang, SD Negeri Gowong, and SD Pius Bakti Utama. Purposive sampling technique was employed, ensuring geographical proximity of the elementary schools to Kebumen Regency center. The purposive sampling technique is employed in qualitative research to select participants having specific characteristics and relevant to the research objectives (Campbell et al., 2020). This technique enables the acquisition of deep and rich insights from the best individuals

providing essential information to answer the research questions (Suen et al., 2014). All schools utilized the *Kurikulum Merdeka*, and the teachers were graduates while two principals had completed postgraduate education (Master's degree).

Data Collection Techniques and Instrument

Data collection was conducted by (a) non-participatory observation, (b) in-depth interviews, and (c) documentation studies. The observation technique in this study involved the researcher observing the learning process in the classroom without being directly involved in the activity. This observation helped the researchers collect objective data about classroom dynamics and curriculum implementation directly without affecting the learning environment. Furthermore, in-depth interviews obtained more detailed and in-depth information from various parties regarding the implementation of Kurikulum Merdeka. The interviews were semi-structured or unstructured, allowing flexibility in exploring topics that arise during the conversation. Finally, documentation studies analysed various documents related to the implementation of the Kurikulum Merdeka. In this study, the analysed documents included lesson plans (RPP), syllabus, student evaluation reports, teacher meeting notes, curriculum policies from the education office, and teaching materials. The instrument was a non-test instrument. The instrument validity used the peer debriefing method and expert validation. The peer debriefing method involved discussions with peers or experts to evaluate the research findings and process. Peers provided external perspectives and constructive criticism improving the research validity. Expert validation is the process of evaluating research instruments by experts with in-depth knowledge and experience in fields that are relevant to the research topic. The validation aims to ensure that the instruments are appropriate, relevant, and can collect the data needed to answer the research questions (Zohrabi, 2013). Furthermore, the reliability of this research was conducted by auditing the entire research process. The audit was managed by an independent auditor or supervisor of research activities or participants, for example by reviewing the overall research results. The following table is the details of the aspects, indicators, and items of the research instrument.

Table 1. Details of research instruments

No.	Aspect	Indicator	Instrument	Number of Instrument Items
1.	Planning	The suitability of the lesson plan	Observation	15
			Interview	20
		Use of learning resources	Observation	10
			Interview	15
		Assessment strategy	Observation	5
			Interview	8
2.	Implementation	learning methods, techniques, models	Observation	15
			Interview	10
		Student involvement	Observation	10
			Interview	5
		Class management	Observation	10
			Interview	15
3.	Evaluation	Formative and summative assessment	Observation	15
			Interview	15
		Achievement of learning objectives	Observation	10
			Interview	10
		Reflection and enrichment	Observation	5
			Interview	5

Several efforts for examining the data validity were (a) increasing the time in collecting data, (b) conducting observation continuously and seriously, (c) managing triangulation, and (d) conducting discussions with peers. First, increasing the time in collecting data allowed the researcher to gain richer perspectives, explore wider variations, and capture nuances that were missed if the data collection time was limited. Second, conducting observation continuously and seriously required the researcher to monitor actively and record the observed situation regularly and carefully. By conducting observations thoroughly and continuously, researchers collected data, details, changes, and patterns completely and accurately on the phenomenon under study. Third, managing triangulation needed on data sources and data collection techniques. Triangulation of sources employed various data sources such as interviews, observations, and documentation studies to obtain diverse perspectives on the phenomenon under study. Triangulation of data collection techniques combined in-depth interview methods, direct observation, and document analysis to validate findings and gain a deeper understanding of the research context (Fusch et al., 2018). Fourth, conducting discussions with peers or experts in relevant fields was an effective way to examine the data validity. Peers provided feedback, constructive criticism, and different understandings to refine and strengthen data interpretation.

Data Analysis Technique

The qualitative data analysis technique used in this study was the data analysis technique outlined by Miles & Huberman (2014), that began with data collection through various methods such as interviews, observation, or document analysis. After data collection, the next step was data reduction, that data were filtered and organized to identify relevant patterns, themes, or categories such as **Mathematics Lesson Planning within the *Kurikulum Merdeka framework***, **Mathematics Learning Process within the *Kurikulum Merdeka framework* and Mathematics Learning Evaluation within the *Kurikulum Merdeka framework***. Subsequently, the reduced data were presented visually or narratively using techniques such as tables, diagrams, or direct quotes to facilitate understanding and interpretation. The final step was drawing conclusions, that the researcher integrated the findings from the analysis to formulate comprehensive conclusions and provide insights into the researched phenomenon. This technique provided a systematic and holistic approach in dealing with qualitative data, ensuring accuracy and reliability in the analysis.

■ RESULT AND DISCUSSION

The study aimed to obtain clear and detailed results regarding the implementation of Mathematics learning in fourth-grade classes at three elementary schools: SD Negeri 2 Adikarso, located in Kebumen Regency, SD Negeri 1 Pejagoan, also in Kebumen Regency, and SD Negeri 1 Karangkembang, situated on the outskirts of Kebumen Regency. The researcher directly visited these three schools to conduct interviews and observations.

Mathematics Lesson Planning within the *Kurikulum Merdeka framework*

Interviews with fourth-grade teachers revealed several insights regarding the *Kurikulum Merdeka*. Educators have not fully understood the *Kurikulum Merdeka*, both its essential content, the provision of more time for development, the flexibility of learning outcomes, and the emphasis on collaboration. This was supported by interviews with the school principal, who stated,

"Knowledge about the *Kurikulum Merdeka* is self-taught, and there has been no upgrading about the curriculum, so educators interpret it differently, meaning each educator has

a different perception. In my opinion, teachers' perceptions are influential because their backgrounds differ, such as teaching experience, educational background, attended teacher training, teaching experience, and educational background of the teacher. This greatly affects educators adaptation in understanding the curriculum."

Based on observations, on the designated days, the teacher's room became a place for informal discussions among several subject teachers involved in the Teacher Working Group. Teachers gathered in the teacher's room in a relaxed atmosphere, bringing notes, textbooks, and laptops to facilitate discussions. They exchanged experiences and ideas about teaching approaches suitable for the *Kurikulum Merdeka*. Teachers also shared strategies they had previously applied in teaching and provided feedback and suggestions to their colleagues. They also discussed potential challenges and ways to overcome problems that may arise during the implementation. Furthermore, some teachers took the initiative to invite a few influential teachers who had just completed intensive training to start discussions by sharing their newly acquired knowledge regarding *Kurikulum Merdeka* lesson planning.

The findings of this study highlight the importance of collaboration among teachers in facing curriculum changes and preparing relevant and meaningful learning for students. These informal discussions not only enhance teachers' understanding of the *Kurikulum Merdeka* but also provide opportunities for mutual learning and development. This practice has long been in existence and unconsciously has become an integral part of efforts to enhance teacher co(Mariana et al., 2023; Wardani & Suharto, 2021). Informal learning, or informal education, is a learning process that occurs outside the formal education context, such as official classes or seminars (Kazim et al., 2021). Informal learning is crucial as it allows individuals to continuously develop skills and knowledge without being limited by time or place constraints (Rashid et al., 2016). One of the main advantages of informal learning for teachers is its flexibility. Teachers can learn anytime and anywhere according to their needs and interests. They can utilize various informal learning sources, such as discussions with colleagues, reading articles or books, attending webinars, or even observing best practices from other teachers (Abhijit Marawar & Kaur, 2024; Wijaya Mahardika et al., 2023). This flexibility enables teachers to access new knowledge and share experiences with fellow teachers without being constrained by busy schedules or resource limitations (Cai, 2019; Latifah & Zulaiha, 2023).

Figure 1. Teachers learn about lesson plan in *kurikulum merdeka* independently/ together with colleagues

Based on the documentation analysis results, out of the elementary schools, only one educator expressed a clear understanding of the *Kurikulum Merdeka*, while the others had varying levels of understanding, with one being fairly understanding and the other lacking understanding. Among the educators, only one understood how to create lesson plans, two understood the learning process, but the learning that educators need to undertake has not been effectively utilized. The connection to the main topics has not been directed towards developing students' mathematical potential. Thus, the needs of the students have not been effectively bridged and remain solely routine. These research findings are not in line with the Ministry of Education, Research, and Technology, which emphasizes that the *Kurikulum Merdeka* is a curriculum with diverse intracurricular learning that content is optimized to allow students enough time to delve into concepts and strengthen competencies (Solehah & Setiawan, 2023). Therefore, educators are expected to translate learning outcomes into a learning objective flow, design project-based learning, and develop an operational curriculum structure for the educational unit as it is something new (Arafu et al., 2023).

The research findings reveal that the implementation of the *Kurikulum Merdeka* in learning planning has not fully reached the desired standards. This indicates a gap between expectations and reality in the context of its application. Although efforts have been made to implement the principles of the *Kurikulum Merdeka*, the research findings indicate constraints in the implementation of the *Kurikulum Merdeka* in the learning planning process, hindering the achievement of the expected learning objectives. Effective learning planning in the context of the *Kurikulum Merdeka* in elementary schools involves a systematic process centered on students' needs (Apriliya et al., 2023). This includes identifying learning objectives relevant to child development, as well as selecting teaching methods and strategies suitable for students' characteristics and the taught material (Muna & Fathurrahman, 2023). Additionally, planning also entails the development of integrated and comprehensive sequences of activities, from introduction to the core of learning, to closure (Panginan & Susianti, 2022). In *Kurikulum Merdeka* lesson planning, it is crucial to provide space for students to actively participate in learning and encourage the development of 21st-century skills such as critical thinking, collaboration, and creativity (Fianingrum et al., 2023; Malikah et al., 2022).

Mathematics Learning Process within the *Kurikulum Merdeka framework*

This study highlights that the implementation of the *Kurikulum Merdeka* in mathematics teaching still faces challenges in using varied teaching models and methods. Based on interviews with one of the teachers, Teacher A, it was revealed that she leaned towards using lecture or demonstration methods as the primary approach in teaching mathematics. She explained that the approach had proven to be effective in delivering the material to students. The method allowed the students to better understand mathematical concepts due to systematic and direct explanations from the teacher.

On the other hand, Teacher B stated that she tried to use a more varied approach in teaching mathematics. Although she acknowledged that lecture methods were still frequently used, she also attempted to incorporate more interactive learning elements such as group discussions, mathematical games, or experiments in the classroom. She believed it was crucial to build students' interest and motivation in learning mathematics and broaden their perspectives on various ways to understand and apply mathematical concepts in everyday life.

Furthermore, Teacher C, who has broader teaching experience, shared her experience in facing challenges in implementing diverse teaching models. She stated that although she had knowledge of various teaching models, such as cooperative learning or inquiry-based learning, it was difficult to implement them in the classroom due to time constraints, a dense curriculum, or limited available resources.

The findings of this study indicate that teachers are aware of the importance of implementing innovative teaching models,

Figure 2. Teachers apply their teaching experience using cooperative learning model In mathematics

methods, approaches, and strategies. Along with various changes in education, engaging and student-centered approaches are increasingly recognized as key in enhancing students' interest and understanding this often-perceived difficult subject (Dian, 2022; Wisnu & Naomi, 2023). The role of teachers in improving the quality of mathematics education lies not only in delivering content but also in creating an engaging learning environment and providing opportunities for students to actively engage in the learning process (Daimah & Suparni, 2023; Malikah et al., 2022). By adopting diverse and creative approaches, linking mathematical concepts to real-life situations, fostering collaboration among students, and effectively utilizing technology, teachers can create an engaging, motivating, and supportive learning environment for students in learning mathematics (Pertiwi et al., 2023; Rosmiati et al., 2023). A teacher should be able to enhance students' interest and understanding in mathematics, thereby helping them achieve better performance in this subject (Muna & Fathurrahman, 2023).

Figure 3. Teachers apply their teaching experience using lecturing method

From these interviews, it can be concluded that classroom teachers face various challenges in implementing diverse teaching models in mathematics education. Some of these challenges include the habit of relying on lecture-based methods as the primary approach, lack of knowledge or understanding of alternative teaching models, and practical constraints such as a packed curriculum or resource limitations. Although some teachers strive to use more varied approaches, they often encounter challenges in consistently implementing them in the classroom. The observation results indicate that teachers are undergoing a gradual adaptation process toward implementing innovative teaching models in line with the *Kurikulum Merdeka*. Additionally, it is observed that these teachers have naturally been implementing innovative teaching models but may lack a comprehensive understanding of the underlying theories of these approaches. Furthermore, these teachers are also actively empowering various alternative learning media around students to facilitate the learning process.

The research findings indicate that teachers are adapting their teaching experiences to support the implementation of the *Kurikulum Merdeka*. Adapting new teaching models, methods, or strategies has become essential since new curricula often emphasize skill-based, problem-solving, and creative learning requiring different teaching approaches than before (Anas & Alan, 2023; Collie & Martin, 2016; Ramdani et al., 2021). Additionally, the *Kurikulum Merdeka*, emphasizing school autonomy and freedom in designing learning, demands good adaptation from teachers (Baharuddin, 2021; Homsur & Ropu, 2024). Teachers need to be able to change their teaching practices according to the vision and goals of the new curriculum, as well as utilize various resources and available technologies to improve the quality of teaching. Good adaptation by teachers not only enables smooth implementation of the new curriculum but also ensures that the learning process remains relevant, engaging, and effective for students. (Homsur & Ropu, 2024; Wahyuddin, 2023). Good adaptation by teachers not only enables smooth implementation of the new curriculum but also ensures that the learning process remains relevant, engaging, and effective for students. (Chandran et al., 2021; Granziera et al., 2019).

Mathematics Learning Evaluation within the *Kurikulum Merdeka framework*

This study also analyzed the evaluation of mathematics learning in the context of implementing the *Kurikulum Merdeka*. The research findings indicate significant diversity in the use of evaluation tools, both test and non-test. Most teachers use a combination of both types of evaluation tools to assess students' progress in mathematics. Some teachers tend to use traditional written tests to measure conceptual understanding and calculation skills, while others choose non-test approaches such as projects, portfolios, or group discussions to evaluate conceptual understanding and application in broader contexts. These findings are supported by interviews with several teachers who stated,

"I tend to choose test techniques because I believe that tests can provide a clearer picture of students' understanding of the mathematical concepts taught. Tests give me concrete and measurable data about students' ability to solve mathematical problems and how far they can apply these concepts. In a highly structured environment like elementary school, I feel that tests provide an efficient way to assess students' progress consistently and objectively." On the other hand, some teachers expressed different views,

"I do find it easier to use test techniques because in terms of evaluation time efficiency, it is shorter. However, I often try to use non-test techniques such as projects or group discussions in assessing mathematics learning. With projects,

for example, students can apply mathematical concepts in concrete situations, such as building models or solving problems relevant to everyday life. I also find that using non-test techniques motivates more students and actively engages them in mathematics learning."

Learning utilizing diverse evaluation tools has advantages in enhancing student engagement and accommodating various learning styles. Various types of tasks and questions allow students to actively engage in learning while providing them with opportunities to express their understanding in ways that are most suitable for them (Abramenka-Lachheb & De Siqueira, 2022; O'Neill & Padden, 2022). Furthermore, the *Kurikulum Merdeka*, focusing on developing critical and creative thinking skills, requires diverse evaluation tools to comprehensively measure student achievement (Firdaus et al., 2022; Muliana et al., 2023; Siregar, 2023). Inclusive and student-centered learning approaches in the *Kurikulum Merdeka* require evaluation tools accommodating individual differences among students (Budiono & Hatip, 2023; Sugiri & Priatmoko, 2020). At the elementary school level, learning greatly benefits from both test and non-test evaluation tools since this is the initial stage in forming students' basic understanding in various subjects (Maut, 2022; Mujiburrahman et al., 2023). The use of diverse evaluation tools helps teachers evaluate students' progress comprehensively and design more adaptive and effective learning tailored to individual student needs (Demir et al., 2019; Monteiro et al., 2021).

Figure 4. Learning evaluations focusing on project presentation

The observation results indicate that teachers not only use multiple types of evaluation tools but also employ a variety of question types to facilitate different learning styles. Documentation studies reveal the presence of questions ranging from text-based, image-based, essay, multiple-choice, to practical and demonstrative questions. Based on the observation findings, teachers utilize various question types to assess students' understanding. For instance, for students preferring learning through reading, teachers present text-based questions detailing mathematical problems comprehensively. For students having more responsive to visuals, teachers include questions utilizing diagrams or graphs to represent mathematical situations. Meanwhile, students preferring hands-on learning can be assessed through practical or demonstrative questions requiring them to solve problems directly. Additionally, for students preferring expressing themselves through writing, teachers provide essay questions asking them to explain concepts or problem-solving in detail. Lastly, for students needing clear choices, there are multiple-choice offering several answer options to choose from.

Figure 5. Test-based evaluation

Various question types allow teachers to assess students' understanding comprehensively and provide opportunities for each student to express their understanding according to their learning styles (Hubbard et al., 2017). By using different types of questions, teachers can accommodate various learning styles among students. This is because every student has different learning preferences, such as auditory, visual, kinesthetic, or a combination of these. Various question types enable teachers to assess students' understanding from different perspectives (Abramenka-Lachheb & De Siqueira, 2022; O'Neill & Padden, 2022). Written tests can measure conceptual understanding and students' ability to formulate written responses, while projects or practical tasks can provide a more direct insight into students' ability to apply concepts in real-life situations, thus providing a more comprehensive picture of students' abilities (Demir et al., 2019; Murphy et al., 2023). Furthermore, various question types encourage more active student engagement in learning. Diverse questions, such as projects, group discussions, or practical experiments, encourage students to think critically, collaborate with classmates, and apply concepts in contexts relevant to everyday life (Hubbard et al., 2017; Monteiro et al., 2021).

CONCLUSION

Based on the results and discussion of the research above, it can be concluded that: (1) The planning of Mathematics learning in the *Kurikulum Merdeka* is prepared by teachers through informal learning and peer collaboration; (2) the implementation of Mathematics learning in the *Kurikulum Merdeka* is still in the stage of adapting various teaching experiences by teachers; (3) the evaluation of Mathematics learning in the *Kurikulum Merdeka* already utilizes diverse evaluation tools and types of questions. This study concludes that the implementation of the *Kurikulum Merdeka* in Mathematics learning involves planning with informal learning methods, adapting the implementation of learning, and varying learning evaluations. This study encourages Mathematics lesson planning in the *Kurikulum Merdeka* involving informal learning methods with peers to enhance the quality of learning and the use of diverse evaluation tools and question types in the evaluation aspect of the *Kurikulum Merdeka*.

The research findings cannot be directly applied to the context of Mathematics learning everywhere, considering the variability in factors such as teachers' backgrounds, resource availability, and policy support. Another limitation is that this research is constrained by the

limitations of available data, both in terms of the number of respondents and the scope of information collected, affecting the validity and generalizability of the findings. Based on the research conclusion, it is recommended for future researchers to delve into the effectiveness of informal learning strategies in planning Mathematics learning in the *Kurikulum Merdeka*, including its impact on students' academic achievement. For policymakers or education practitioners, it is recommended to provide broader training and development to teachers on adopting and implementing the principles of the *Kurikulum Merdeka* in Mathematics learning.

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