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Innovative Strategies in Mathematics Lesson Planning to Increase Student Engagement in Grade IV State Elementary School Jajar 01

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Abstract. This study aims to analyze and evaluate the planning of mathematics learning in grade IV of State Elementary School Jajar 1 in the context of the application of the principles of the Independent Curriculum. The main focus of this research is to explore how teachers structure teaching modules and use various learning methods and media to increase student involvement in the mathematics learning process. This study uses a descriptive qualitative method, with data collection techniques through observation, interviews, and documentation. The research subjects are grade IV teachers and students at State Elementary School Jajar 1 in the 2024/2025 academic year. The results of the study show that the learning planning carried out by teachers has included various important components, including clear learning objectives, materials that are appropriate to the student's level of development, and the use of varied learning media and resources, such as teaching aids and digital media. Teachers also implement diverse learning methods, including project-based, problem-based, and differentiated learning, to accommodate students' diverse learning styles. In addition, formative assessments that include cognitive, affective, and high-level thinking skills aspects are also applied to monitor student development thoroughly. The implications of this study show that the implementation of flexible and technology-based learning planning can increase student engagement, deepen understanding of mathematical concepts, and optimize student learning outcomes. Further training is needed for teachers to enrich the variety of learning methods and the use of technology in the learning process.

Keywords: Innovative strategies; learning planning; mathematics.

1. INTRODUCTION

In education, a very important process is called learning, which aims to change one's behavior and covers all aspects of knowledge, attitudes, and skills (Vaszkun & Mihalkov Szakács, 2025; Le et al., 2024). Learning is designed to help students learn by involving mental and physical activity. This is achieved through student and teacher interaction, as well as relationships with the environment and various other learning resources (Xu et al., 2025; Luo & Derakhshan, 2024). Effective learning can increase creativity, critical thinking, analytical skills, and accuracy in understanding and applying lessons. Effective learning can also improve students' ability to work together in teams, improve their understanding of problems, and improve their ability to master the material (Alemneh & Gebrie, 2024; Yang et al., 2024).

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Learning mathematics in elementary school is very important to instill the ability of students to think logically, analytically, and solve problems. However, in practice, there are many problems faced in creating successful mathematics learning (Alibali et al., 2024). Students do not understand concepts well, there is no variety in learning methods, and there are not enough learning materials to cater to the different learning styles of students. These are some of the main problems that often arise (Pennings et al., 2024). These problems indicate that systematic and inventive lesson planning is needed to achieve optimal learning outcomes (Livotov, 2015).

Lesson planning is expected to accommodate student characters and differences and offer flexible and student-centered learning approaches when implementing Merdeka Curriculum (Novalia et al., 2025). The process that aims to achieve effective and efficient learning is known as lesson planning. Learning planning, according to Hendriarto et al., (2024), is a plan made by teachers and students to be the basis for the teaching and learning process and ensure that learning objectives can be achieved before class is implemented. This process includes various activities designed to achieve these goals by using various learning resources available (Yin et al., 2025). Therefore, lesson planning aims to help teachers design appropriate actions, help learners achieve desired behaviors, and ensure that learning objectives are achieved (Şahin et al., 2024).

Mathematics lesson planning in primary schools should be tailored to the existing learning activities in the school (Bosch et al., 2025). This includes the pedagogical approaches used, the use of technology in learning, and the role of teachers in changing learning strategies to meet students' needs. Lesson planning for the free curriculum, which emphasizes differentiated learning and character strengthening, should be adaptable to the times and the needs of students.

Previous studies have shown that lesson planning is critical to improving students' mathematics learning outcomes. For example, research by the National Council of Teachers of Mathematics found that problem solving and in-depth concept exploration can improve students' understanding of mathematics (Stigberg et al., 2024). In addition, research by Aslan et al.,(2025), also found that lesson planning focused on problem solving can improve students' math learning outcomes. Teachers can create innovative, effective, and needs-oriented lesson plans by understanding the characteristics and implementing learning that suits students' needs (Lim et al., 2025).

The discovery of this research is the incorporation of various innovative learning approaches, such as educational games, contextual approaches, and interactive learning media, into the mathematics lesson planning process. It is expected that these methods can increase student participation in a more enjoyable and rewarding learning process. Therefore, the purpose of this article is to look at and apply creative approaches to mathematics lesson planning in primary schools. These strategies can increase the engagement of grade IV

students at State Elementary School Jajar 01 and contribute to the development of learning that is more in line with students' needs.

2. METHOD

According to Opotamutale Ashipala et al., (2023), descriptive qualitative methods were used in this study to provide an in-depth understanding of mathematics lesson planning in grade IV at State Elementary School Jajar 1 through understanding the experiences and perspectives of teachers. By listening to and studying the experiences of the resource persons, in this case teachers who design and implement mathematics learning in grade IV.

This research was conducted at State Elementary School Jajar 1, located on Jl. Kelud, Rw 3, Jajar, Talun District, Blitar Regency. The study took place on March 14, 2025 and involved the teachers and fourth-grade students at State Elementary School Jajar 1 for the academic year 2024/2025. The focus of the research was to investigate how teachers plan mathematics instruction within the framework of the independent curriculum.

Observation and interview are the two main methods of data collection used in this study. The purpose of this observation is to see how teachers plan and implement mathematics learning strategies in class IV of State Elementary School Jajar 1. As an additional step, a direct interview was conducted with the fourth-grade homeroom teacher. The purpose of this interview was to learn more about the teacher's planning process, including the supporting elements and problems encountered when designing mathematics learning.

Data collected through observations and interviews were analyzed using qualitative descriptive data analysis methods. Data reduction is the process of selecting and simplifying the field data collected to clarify and focus the information relevant to the research objectives. This is the first step in the analysis process. Furthermore, the data that has been reduced is presented systematically in the form of descriptive narratives that describe the real situation in the field. In the final stage, data analysis is carried out to obtain conclusions and make conclusions regarding mathematics learning planning in class IV of State Elementary School Jajar 1.

3. RESULTS

The results of the investigation on mathematics learning planning in grade IV at State Elementary School Jajar 01 show that teachers have made teaching modules that are in accordance with the principles of the Merdeka Curriculum. This teaching module includes learning objectives, learning activities, and assessments that are in accordance with the learning outcomes (CP). The educational objectives set are not only clear and specific, but also reflect the development of students' cognitive, affective, and psychomotor phases. The materials provided have also been adapted to the abilities and development of

grade IV students. This includes understanding basic math concepts, critical thinking skills, and the ability to solve contextual problems. In addition, teachers use a variety of learning resources that suit students' learning needs. These include teaching aids, learner worksheets (LKPD), and digital media such as animations and visual impressions.

Teachers use various learning methods and models, such as project-based, problem-based and differentiated learning. The aim of these diverse approaches is to increase students' active participation during the learning process. These approaches recognize that students have different learning styles, which results in an inclusive learning atmosphere. The media and learning resources used help students explore what is presented. To make math lessons more interesting and interactive, teachers use a variety of visual media and technology.

For example, a teacher in grade IV told a homeroom teacher, "We utilize digital platforms such as Ruang GTK, which provides various teaching and assessment materials. This platform allows me to customize learning resources to the needs of the students. In class, I also combine the lecture method with the use of visual media, such as animations, and outdoor learning to strengthen students' understanding."

Learning activities are designed to meet students' learning needs and are flexible. The learning methods designed by teachers allow students to explore, talk and think actively. Teachers make formative assessments that cover cognitive, affective and higher order thinking skills. The results are used as the basis for structuring subsequent learning actions, which include providing reinforcement and remedial according to individual student needs. This ensures that all students receive attention appropriate to their level of understanding.

"The assessment I designed not only measures concept understanding, but also involves affective aspects and students' higher order thinking skills. The results of the assessment are used to determine the necessary follow-up, whether it is reinforcement or remedial," said the teacher during the interview".

Teachers also use active learning models such as Teams Games Tournament (TGT) and Think Pair Share (TPS). The TGT model involves students in groups working together to complete a task before participating in an academic tournament as a form of evaluation; Discovery Learning allows students to think independently, talk in pairs, and present their results to a large group.

Teachers provide extra guidance outside of class hours to address students' different abilities. Students who fail to reach the Minimum Completion Criteria (KKM) have the opportunity to attend extra lessons on Saturdays after the main lesson is over. This process begins by collaborating with parents through communication media such as WhatsApp to ensure that they can help at home. For the supplementary tutoring process to be effective and sustainable, teachers must also communicate with the principal and collaborate with other teachers. This applies even when the process is conducted at night at school. According to

the educator, "We make sure that students who need extra guidance have the opportunity to attend extra sessions, and we coordinate with parents and the school to support students' success.

The results show that teachers have successfully created and implemented innovative and inclusive math lesson plans that focus on improving students' ability to think critically and solve problems. Various strategies, the use of technology and active learning techniques have all been proven effective in increasing student engagement in math lessons.

4. DISCUSSION

The results showed that the mathematics lesson plan used in grade IV at State Elementary School Jajar 1 successfully included various important elements, in accordance with the principles of Merdeka Curriculum. Teachers create teaching modules with clear and specific learning objectives that reflect the development of students' cognitive, affective, and psychomotor phases. The material presented by the teacher has been adjusted to the students' abilities and level of understanding. Teachers have paid attention to how important it is to understand basic math concepts to build problem-solving and critical thinking skills. This is in line with learning theory which states that effective learning should consider students' development and needs so that students can understand concepts better (Lin & Wang, 2024). According to (Barnett et al., 2024), planning that considers students' needs can help them achieve better learning outcomes.

It has been proven that the use of various media and learning resources, such as teaching aids and learner worksheets (LKPD), as well as digital media such as animations and visual impressions, helps students learn what is being taught. The use of technology is in line with the research of (Utami et al., 2021), who found that incorporating technology into lesson planning can make math lessons more interesting and interactive. This research is also in line with Dong (2025),who said that the use of digital media in learning can increase students' motivation and understanding of the material being taught.

In addition, the implementation of various learning approaches and models, such as project-based, problem-based and differentiated learning, is essential to enhance students' active participation in the learning process. These models have helped to create an inclusive learning environment where students' different learning styles are recognized. Models such as Discovery Learning, Think Pair Share (TPS), and Teams Games Tournament (TGT) allow students to participate in group learning, critical thinking, speaking, and presenting results. This supports the theory that active learning such as independent exploration and group discussion can improve students' thinking and understanding (Eskiyurt & Özkan, 2024). According to (Buller et al., 2023), who emphasize the importance of collaborative learning to improve students' social skills, collaboration-based learning also supports the growth of students' communication and social skills.

As a result of interviews with educators, it is known that digital platforms such as Ruang GTK (previously known as Merdeka Mengajar) are the main reference for learning design. To meet students' needs, these platforms provide a variety of supporting resources, assessments and learning materials. While the lecture approach is still used to deliver basic math concepts, teachers use it to enhance students' learning experience by combining it with out-of-class learning and visual media. This shows the flexibility of lesson planning that can accommodate different learning styles of students. In this regard, research conducted by (Pan et al., 2024) emphasizes how important it is to use technology-based learning, which can help students learn more flexibly and adapt to the times.

Teachers have also created formative tests that cover affective, cognitive and higher order thinking skills. This analysis is not only used to measure how well one understands concepts, but also provides useful feedback on how one learns further. Teachers state that assessment results are used to determine whether students need reinforcement or remedial work, demonstrating an approach that is responsive to students' learning needs. Effective formative assessment can help students obtain useful feedback, according to (Pals et al., 2023). As a result, student learning outcomes can be improved.

In addition, teachers' efforts to address students' different abilities by offering additional tutoring outside of class hours are striking. To guarantee an effective tutoring process, teachers work closely with parents through communication media such as WhatsApp to ensure home support. They also work closely with the principal and other teachers. This method is crucial to ensure that all students can achieve the Minimum Completion Criteria (KKM), which is a commitment to providing equitable and fair learning for all students. This approach is in line with the idea that cooperation between schools and families is essential to support students' educational success (Rodrigues et al., 2015).

Overall, the mathematics learning program at State Elementary School Jajar 1 demonstrates excellent implementation of Merdeka Curriculum principles, where teachers concentrate on students' academic achievement as well as their character development and critical thinking skills. The use of supportive technology and diverse learning approaches has increased student engagement and an enjoyable learning atmosphere. Collaborative efforts between teachers, parents and schools have shown positive results, although there are some barriers, such as limitations in the variety of teaching materials and improving teachers' skills. This finding is in line with (Souza et al., 2024), who stated that good cooperation between teachers, parents and schools can improve learning outcomes and the quality of student learning.

5. CONCLUSION

The principles of Merdeka Curriculum are used in mathematics learning in grade IV at State Elementary School Jajar 01, and use methods such as Team

Match Tournament (TGT), Think Pair Share (TPS), discovery learning, and outdoor learning. Although there are issues such as limited learning resources and the need for better teacher training, this approach increases student engagement. In addition, teachers have used the differentiation approach by giving extra hours to students who have difficulties. This makes learning more inclusive and suited to individual needs. Schools should provide more learning resources, including the use of technology, to improve learning outcomes. To provide teachers with better training, they should be given better training. In addition, collaboration between schools, parents and teachers should be strengthened to achieve the best learning. It is expected that students will be more motivated and understand math concepts better with more systematic and innovative planning.

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