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Improving Mathematics Learning Outcomes on Addition up to the Number 10 through the Implementation of the Problem-Based Learning Method Assisted by 'Jumping Rabbit' and 'Dakon' Learning Media in First Grade Students of SD Negeri 1 Sudimoro

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***Abstract*—** *This study aims to improve mathematics learning outcomes on the topic of addition up to the number 10 through the implementation of the Problem-Based Learning (PBL) method assisted by the educational games "Jumping Rabbit" and "Dakon" among first-grade students at SD Negeri 1 Sudimoro. The study employed a Classroom Action Research (CAR) design conducted in two cycles. Each cycle consisted of planning, action implementation, observation, and reflection. The results showed that in the pre-cycle, only 3 out of 15 students (20%) achieved the Minimum Mastery Criteria (MMC). In the first cycle, 9 students (60%) met the MMC, and in the second cycle, the number increased to 14 students (93.3%). The implementation of the PBL method assisted by the "Jumping Rabbit" and "Dakon" games proved effective in enhancing students' understanding of addition, increasing their engagement in the learning process, and improving their mathematics learning outcomes.*

***Keywords*—** *Problem-Based Learning, Educational Games, Addition, Dakon, Mathematics Learning Outcomes, Classroom Action Research*

I. INTRODUCTION

Mathematics is an essential subject at the elementary school level, as it plays a crucial role in developing students' logical, systematic, and analytical thinking skills. According to Ruseffendi (2016), mathematics does not merely teach numbers and arithmetic operations but also trains rational thinking and structured problem-solving. One of the basic competencies that first-grade students must master is addition up to the number 10, which serves as a foundational skill for further mathematical learning. However, in practice, mathematics is often perceived as difficult and boring by students. To overcome this challenge, a contextual and engaging learning approach is highly needed. Research by Nurhidayah et al. (2024) indicates that the Problem-Based Learning (PBL) method can enhance students' interest and achievement in mathematics through meaningful and challenging activities. Therefore, the implementation of the PBL method combined with educational games such as “Jumping Rabbit” and “Dakon” is expected to provide an effective solution for improving mathematics learning outcomes, particularly in the topic of addition up to the number 10 among first-grade students at SD Negeri 1 Sudimoro.

The mathematics learning outcomes of first-grade students at SD Negeri 1 Sudimoro show that out of 15 students, only 3 students (20%) met the Minimum Mastery Criteria (MMC) with scores ≥ 75, while 12 students (80%) had not yet adequately understood the concept of addition. This issue reflects a common challenge in lower-grade mathematics learning, where students often struggle to grasp fundamental concepts such as addition. Research by Mahardika and Setyawan (2020) revealed that first-grade students at SDN Banyuajuh 9 faced difficulties in understanding addition and subtraction, which negatively impacted their

mathematics achievement. To address this issue, an innovative and enjoyable learning approach is needed. The implementation of the Problem-Based Learning (PBL) model has been proven effective in improving students' mathematics learning outcomes. Surya (2017), in his research, demonstrated that the application of the PBL model significantly enhanced mathematics achievement among fourth-grade students at SDN 016 Langgini. Therefore, applying the PBL method in combination with educational games such as "Jumping Rabbit" and "Dakon" is expected to improve the understanding and mathematics learning outcomes of first-grade students at SD Negeri 1 Sudimoro.

The low mathematics learning outcomes among first-grade students at SD Negeri 1 Sudimoro, particularly in the topic of addition up to the number 10, are influenced by several interrelated factors. One of the main causes is the continued use of conventional teaching methods, in which the learning process is one-way and monotonous. Such methods tend to make students passive and disengaged from the learning process, ultimately reducing their understanding and motivation to learn (Fadillah, 2022). In addition, the instructional media used by teachers are often unappealing and not suited to the developmental characteristics of young children, causing students to become easily bored and uninterested in the lessons (Jonathan, Rezeki, & Widiastuti, 2021). This situation indicates the urgent need for innovation in teaching through more interactive and enjoyable methods and media. One relevant approach is the Problem-Based Learning (PBL) method supported by educational games such as "Jumping Rabbit" and "Dakon," which can enhance active student participation and improve learning outcomes.

Innovative and enjoyable learning is essential. One proposed solution is the implementation of the Problem-Based Learning (PBL) method, which emphasizes active student engagement in solving contextual problems, thereby fostering a deeper understanding of mathematical concepts. Research by Suciati (2021) shows that the application of the PBL model supported by educational games can enhance mathematics learning outcomes among elementary school students. Furthermore, the use of traditional games such as "Jumping Rabbit" and "Dakon" can make the learning process more engaging and enjoyable for students. According to Prasetyo (2017), traditional games can serve as effective learning media for young children, as they help increase motivation and active participation in the learning process. By integrating the PBL method with traditional game-based media, it is expected that a more interactive and enjoyable learning environment can be created, leading to improved mathematics learning outcomes for first-grade students at SD Negeri 1 Sudimoro.

Based on the background described above, the objectives of this study are: (1) to describe the implementation of the Problem-Based Learning (PBL) method assisted by the "Jumping Rabbit" and Dakon/Congklak games to improve mathematics learning outcomes on addition up to the number 10 among first-grade students at SD Negeri 1 Sudimoro; and (2) to identify the improvement in mathematics learning outcomes on addition up to the number 10 through the application of the PBL method supported by the "Jumping Rabbit" and Dakon/Congklak games among the same group of students. The implementation of the PBL method assisted by the educational games "Jumping Rabbit" and Dakon is expected to enhance the mathematics learning outcomes of first-grade students at SD Negeri 1 Sudimoro, particularly in the topic of addition up to the number 10. Through the PBL approach, students are encouraged to actively engage in the learning process by solving contextual problems, which can deepen their understanding of mathematical concepts and improve their learning performance.

Research by Lestari, Slameto, and Radia (2021) shows that the application of the PBL model assisted by concrete media can improve mathematics learning outcomes among fourth-grade students. Furthermore, the use of traditional games such as "Jumping Rabbit" and "Dakon" can make the learning process more engaging and enjoyable for students, thereby enhancing their motivation and active participation in the learning process. According to Khoir (2021), the use of traditional games in learning can boost students' motivation and improve their discipline. Therefore, the integration of the PBL method with traditional game-based media is expected to improve the achievement of the Minimum Mastery Criteria (MMC) in first-grade students at SD Negeri 1 Sudimoro.

II. METHOD

This study employs a descriptive qualitative approach with the type of Classroom Action Research (CAR), aimed at improving mathematics learning outcomes of first-grade students at SD Negeri 1 Sudimoro in the topic of addition up to the number 10. The research was conducted through two cycles, each consisting of four stages: planning, action implementation, observation, and reflection, as explained by Arikunto, Suharsimi (2010).

The subjects of this study were all 15 first-grade students at SD Negeri 1 Sudimoro. The data sources included primary data in the form of student activities and learning outcomes, as well as secondary data consisting of lesson plan documents, syllabi, and previous evaluation results.

The data collection instruments used in this study included: (1) Observation, to observe student and teacher activities during the learning process; (2) Learning outcome tests, in the form of addition questions with numbers 1–10, which were given at the end of each cycle; (3) Documentation, in the form of photos of activities, reflection notes, and learning evaluation results; and (4) Interviews, conducted informally to gather additional information from students and teachers.

The data collection technique was adjusted to the characteristics of classroom action, which involves continuous and collaborative interaction between the researcher and the teacher. The data analysis technique was conducted descriptively-comparatively to compare learning outcomes between cycles, as well as reflectively to evaluate the success of the actions.

The learning model used is Problem-Based Learning (PBL), which has been proven to enhance active student engagement and their learning outcomes, as stated by Mergendoller et al. (2016). In its implementation, PBL is carried out through five steps: (1) problem orientation, (2) organizing students, (3) guiding investigations, (4) developing and presenting results, and (5) analyzing and evaluating the problem-solving process, as detailed by Rusman (2022).

To support the implementation of PBL, educational game media “Jumping Rabbit” and Dakon/Congklak were used, designed to make learning more engaging and enjoyable. Game media has been proven to enhance students' concentration and understanding of mathematical concepts, as demonstrated in the research by Fitriyani, Dewi (2022).

III. RESULTS AND DISCUSSION

This study aims to improve mathematics learning outcomes on addition up to the number 10 for first-grade students at SD Negeri 1 Sudimoro through the implementation of the Problem-Based Learning (PBL) method, assisted by the educational games “Jumping Rabbit” and Dakon. The study was conducted in two cycles, each consisting of planning, action implementation, observation, and reflection.

Figure 1. "Jumping Rabbit" and Dakon/Congklak Media

In the pre-cycle stage, initial data was obtained through observation and learning outcome tests, which showed that only 3 out of 15 students (20%) achieved the Minimum Mastery Criteria (MMC) with a score of 75. The majority of students (80%) had not yet fully understood the concept of addition.

In Cycle I, learning was conducted using the PBL method assisted by the educational games “Jumping Rabbit” and Dakon. After Cycle I, the learning outcomes showed improvement, with 9 out of 15 students (60%) achieving scores above the Minimum Mastery Criteria (MMC). Based on the observation results, the majority of students were actively involved in the learning activities and solved addition problems using the games.

In Cycle II, the application of the same method with improvements based on the reflections from Cycle I resulted in a significant increase. Out of 15 students, 14 students (93.3%) achieved scores above the Minimum Mastery Criteria (MMC). The students demonstrated a better understanding of addition up to the number 10, and their involvement in the games greatly helped in understanding the material. Only one student did not meet the MMC, who is a student with special needs and requires a more intensive approach.

To provide a clearer picture of the improvement in student learning outcomes after the implementation of the Problem-Based Learning method assisted by the educational media "Jumping Rabbit" and Dakon, the following graph can be observed:

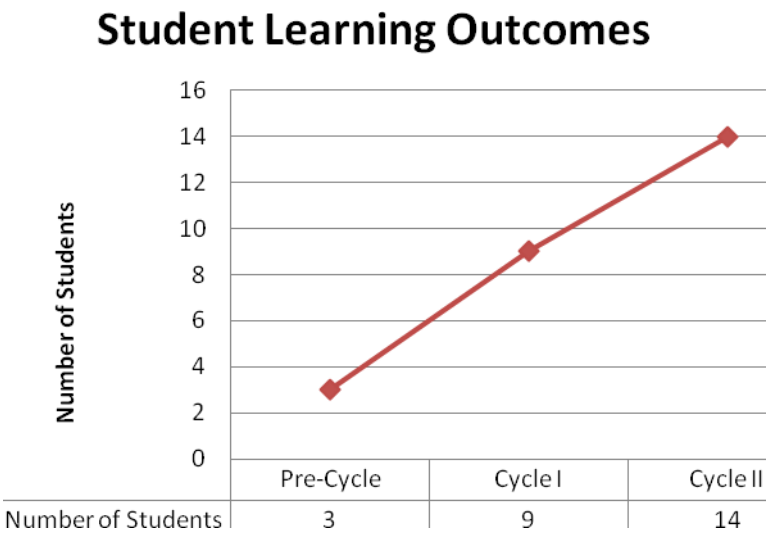

Figure 2. Student Learning Outcomes in Each Cycle

The improvement in learning outcomes in Cycles I and II demonstrates the effectiveness of the implementation of the Problem-Based Learning (PBL) method, complemented by the educational games “Jumping Rabbit” and Dakon, in enhancing students' understanding of addition up to the number 10. Based on the PBL syntax, problem-based learning provides an opportunity for students to actively participate and discover the concept of addition through direct exploration in the games.

In Cycle I, although improvement was observed, some students still struggled to understand the concept of addition. This was due to the lack of variation in teaching strategies and media used. However, in Cycle II, after reflection and improvements were made, the results were more satisfactory. The fun and interactive "Jumping Rabbit" game provided an opportunity for students to directly see the relationship between numbers and addition, which made them more motivated and engaged in the learning process. The Dakon media was also effective in helping students understand the concept of addition through physical activities that reinforced their mathematical concepts.

These results are in line with the research conducted by Sari (2017) in her study titled "The Implementation of the Problem-Based Learning Method to Improve Mathematics Learning Outcomes," which showed that PBL is effective in improving student learning outcomes by involving them in direct problem-solving (Sari, 2017). This study also shows that the use of engaging and enjoyable media, such as the "Jumping Rabbit" game and Dakon, can increase student motivation. This aligns with the findings of Pramuka (2019), who stated that engaging learning media can improve student attention and involvement, which in turn positively impacts learning outcomes (Pramuka, 2019).

Although a significant improvement in learning outcomes was observed in Cycle II, this success also depends on other factors, such as the teacher's ability to manage the classroom and present the material in an engaging way, while focusing on the individual needs of the students. Therefore, teachers need to continually reflect and make ongoing improvements to ensure that the learning process is effective.

From the results obtained, it can be concluded that the implementation of the Problem-Based Learning method assisted by the "Jumping Rabbit" and Dakon games successfully improved the mathematics learning outcomes of first-grade students at SD Negeri 1 Sudimoro on addition up to the number 10. Therefore, the PBL method supported by educational games has proven to be effective in increasing student engagement and their understanding of the material being taught.

IV. CONCLUSION

The conclusions of this study are as follows: (1) The implementation of the Problem-Based Learning method assisted by the "Jumping Rabbit" and Dakon/Congklak games to improve mathematics learning outcomes on addition up to the number 10 for first-grade students at SD Negeri 1 Sudimoro was carried out by following the following steps: (a) Orientation to the problem stage; (b) Organizing students for learning stage; (c) Guiding investigation stage; (d) Developing and presenting results stage; (e) Analyzing and evaluating the problem-solving process stage; (f) Closing; and (2) Based on the results of the evaluation test given to students at the end of each learning cycle, it can be seen that there was an improvement in mathematics learning outcomes on addition up to the number 10 through the implementation of the Problem-Based Learning method assisted by the "Jumping Rabbit" and Dakon/Congklak games for first-grade students at SD Negeri 1 Sudimoro, where: (a) The number of students who achieved ≥ Minimum Completion Criteria (KKTP) in the pre-cycle was 3 students (20.0%); (b) The number of students who achieved ≥ KKTP in Cycle I was 9 students (60.0%); (c) The number of students who achieved ≥ KKTP in Cycle II was 14 students (93.3%).

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