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Learning Together: How Peer Tutoring Improves Students' Mathematics Learning Outcomes

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Abstract

Mathematics learning outcomes are changes in students' behavior, knowledge, attitudes, and skills after participating in the learning process. This study aims to improve the mathematics learning outcomes of fourth-grade students at SDIT Al Hikmah Islamic School, Depok. The research method used is classroom action research conducted in three cycles of planning, implementation, observation, and reflection. Data collection techniques used observation, interviews, tests, and documentation. The research instruments used were observation sheets, interview guidelines, and questions. The results showed continuous improvement, with mastery increasing from 29.1% in Cycle I to 62.5% in Cycle II and 87.5% in Cycle III, exceeding the KKTP. The Peer Guidance method encourages active and collaborative learning, increasing student engagement and understanding. Thus, it can be concluded that the Peer Guidance method is effective in improving students' mathematics learning outcomes.

Keywords: Learning Outcomes, Mathematics, Peer Tutoring Method

1 INTRODUCTION

Learning is one of the factors that influence and play an important role in shaping an individual's personality and behavior. According to Purwanto (2022), learning is a process within the individual that involves interaction with the environment in order to bring about changes in behavior. Such changes are obtained through effort (not merely maturation), are relatively permanent, and result from experience.

Furthermore, learning is always related to changes in behavior or performance, which may be demonstrated through various activities such as reading, observing, listening, imitating, and others. As stated by Sardiman (2018), learning is a process of acquiring knowledge and experience that results in relatively permanent changes in behavior and the ability to respond, due to the interaction between the individual and their environment. Learning is a process that can be carried out by certain types of living beings, mostly animals, including humans, but not plants. Learning is a process that enables these beings to change their behavior relatively quickly in similar ways, so that the same changes do not have to occur repeatedly in every new situation (Gagné, 2020).

It is a process that produces or modifies an activity through practice—whether in a laboratory or a natural environment—which is distinguished from changes caused by

factors not related to practice. For example, changes due to intoxication or drug consumption are not considered learning outcomes (Nasution, 2020).
Essentially, student learning outcomes are changes in behavior and serve as feedback in efforts to improve the teaching and learning process. Behavior as a result of learning, in its broadest sense, covers the cognitive, affective, and psychomotor domains. According to Gagné, there are five categories of learning outcomes: (a) verbal information, (b) intellectual skills, (c) cognitive strategies, (d) attitudes, and (e) motor skills (Nana Sudjana, 2025).

According to Bloom, learning outcomes consist of knowledge (cognitive), attitudes (affective), and skills (psychomotor); these three types of learning outcomes can be further elaborated into various abilities that need to be developed in every learning process. Sutratinah Tirtonegoro (2021) stated that learning outcomes are the assessment of the results of learning activities expressed in the form of symbols, numbers, letters, or sentences that reflect the achievements of each student within a certain period. Learning outcomes are related to measurement, which then leads to assessment and evaluation, either through tests or non-test instruments. Evaluation is preceded by assessment, while assessment is preceded by measurement (Zainal, 2020).

Based on the researcher's observations in Grade IV at SDIT Al Hikmah Islamic School in the 2024/2025 academic year, it was found that mathematics learning on the topic of the properties of flat shapes had not yet maximized the use of varied learning methods. During the learning process, students appeared unfocused, bored, and less active, which negatively affected their learning outcomes. This was evidenced by the results of the pre-cycle test on the properties of flat shapes, where many students scored below the Minimum Mastery Criteria (KKTP) of 75. Out of the total students, only 5 students (20.8%) achieved mastery, while 19 students (79.2%) did not.

Essentially, learning methods play an important role in enhancing students' enthusiasm and motivation in learning, alongside the use of learning media. An enjoyable learning method can foster students' spirit of learning and improve their understanding. The appropriate use of teaching methods not only facilitates teachers in delivering material but also helps students in understanding it, thereby improving learning outcomes in line with expectations.

The use of the tutoring method, where a tutor (teacher or supervisor) leads a study group in class, begins with an instructor guiding one or more learners. This method differs from a seminar, as the number of learners is usually smaller, and the instructor plays a more active role in helping them master the given topic. In short, a tutor can be defined as a person who provides tutorials or tutoring, while a tutorial or tutoring refers to guidance in the form of assistance, instructions, direction, or motivation, either individually or in groups, with the aim of enabling students to learn more efficiently and effectively so that the learning objectives can be achieved successfully (Simanjuntak & Pasaribu, 2023).

Based on the aspects described above, the implementation of the peer tutoring learning method is expected to help students participate more actively and improve their learning outcomes, particularly in mathematics on the topic of the properties of flat shapes. Therefore, the researcher intends to apply the peer tutoring method to enhance mathematics learning outcomes in Grade IV of SDIT Al Hikmah Islamic School. Consequently, the researcher is interested in examining this issue further through a study entitled: "Improving Mathematics Learning Outcomes on the Topic of Properties of Flat Shapes Through the Peer Tutoring Method in Grade IV of SDIT Al Hikmah Islamic School, Second Semester of the 2024/2025 Academic Year."

2 RESEARCH METHODS

This study employed Classroom Action Research (CAR) using the Kemmis and McTaggart model design, which was implemented in three cycles. Each cycle consisted of planning, implementation, observation, and reflection, aiming to continuously improve the quality of

learning (Batubara, dkk, 2026). The research design was collaborative between the researcher and the classroom teacher to examine the effectiveness of the peer tutoring method. A learning method, in this context, refers to the way in which an educator delivers learning material to facilitate the learning process for students in order to achieve the intended objectives.

The subjects of this study were 24 fourth-grade students of SDIT Al Hikmah Islamic School in Depok, consisting of 10 male students and 14 female students, conducted in the second semester of the 2024/2025 academic year. The research began with problem identification through pre-cycle test scores and initial observations. In Cycle I, the researcher designed peer tutoring–based learning materials, implemented the learning process, observed student activities, and administered a formative test. The reflection results from Cycle I were used for improvements in Cycle II. Cycle II followed a similar procedure to Cycle I, with further improvements based on the observations and reflections, which were then refined again in Cycle III.Data were collected through learning outcome tests, observation sheets, field notes, and documentation.

3 RESULT AND DISCUSSION

In the pre-cycle stage, it was observed that most students had not yet fully understood the basic concepts of the properties of flat shapes. This was evident from the pre-cycle test results, conducted before the implementation of the peer tutoring method, which showed that many students had not achieved the Minimum Mastery Criteria (KKTP). Only 5 out of 24 students achieved mastery. In Cycle I, after the implementation of the peer tutoring method, there was an improvement, with 7 out of 24 students achieving mastery. In Cycle II, following observations and reflections from the previous cycle, the number of students achieving mastery increased to 15 out of 24. Finally, in Cycle III, 21 out of 24 students successfully achieved mastery. These results demonstrate that the application of the peer tutoring learning method proved to be effective in the learning process and was able to significantly improve students' learning outcomes.

3.1 Analysis Of Learning Outcomes

The analysis of test results showed that most students had not yet fully understood the concepts of the properties of flat shapes. This lack of understanding was evident from the low achievement of students' learning outcomes, both in terms of knowledge and the application of concepts. One of the main factors suspected to contribute to this issue was the use of conventional teaching models or methods, such as lectures and assignments, which did not optimally involve active student participation. The learning methods applied tended to be one-directional, causing students to become passive recipients of information and limiting their opportunities to explore concepts in depth through discussions, experiments, or problem-solving activities.

The lack of variety in contextual and engaging learning strategies also contributed to students' low motivation and interest, making the learning process less meaningful. Therefore, innovation in the selection of more interactive, collaborative, and student-centered teaching methods is needed to improve conceptual understanding and overall learning outcomes. This forms the basis for the research action to be carried out, namely the use of peer tutoring as a method to capture students' attention and enhance their learning outcomes (Sanjaya, 2016).

3.2 Pre-Cycle

Based on the pre-cycle learning outcomes before the implementation of the peer tutoring method, it was evident that many students were still below the Minimum Mastery Criteria (KKTP), with only 5 out of 24 fourth-grade students achieving mastery. The use of conventional teaching methods did not show any improvement in students' learning outcomes. Students were not actively involved in the learning process; therefore,

improvements were required in Cycle I to make the learning process more innovative and interactive. The results of this reflection served as the basis for planning the actions in Cycle I.

3.3 Cycle 1

In Cycle I, students' learning outcomes showed improvement after the implementation of the peer tutoring method, with 7 out of 24 students achieving mastery and an average score of 71.25. However, this result had not yet reached the targeted mastery level. Some students still struggled to understand the properties of flat shapes and how to apply the peer tutoring method. During the implementation, many students appeared confused when answering questions and did not engage actively in peer communication. Therefore, the research continued to the next cycle.

3.4 Cycle 2

In Cycle II, learning outcomes improved further after making adjustments based on the reflections from the previous cycle. The use of learning media, group discussions, and ice-breaking activities made the learning process more effective and increased students' learning outcomes. A total of 15 out of 24 students achieved mastery, with an average score of 76.91. However, the mastery percentage had not yet reached the target, so the classroom action research was continued to Cycle III in order to achieve the desired goal.

3.5 Cycle 3

In Cycle III, students appeared more active and enthusiastic during the learning process with the implementation of the peer tutoring method. The learning outcomes achieved at this stage met the target, with 21 out of 24 students achieving mastery and an average score of 84.20. Based on these results, it can be concluded that the application of the peer tutoring method was successful in improving students' learning outcomes. Therefore, the research was concluded in Cycle III.

3.6 Mastery Scores

Based on the test results from the pre-cycle to Cycle III, there was a gradual and significant improvement in each cycle. The achievement of the Minimum Mastery Criteria (KKTP) in the final cycle exceeded the required standard, reaching an average score of 84.20. In the pre-cycle, only 5 out of 24 students (20.8%) achieved mastery. In Cycle I, 7 out of 24 students (29.1%) achieved mastery. In Cycle II, 15 out of 24 students (62.5%) achieved mastery, and in Cycle III, 21 out of 24 students (87.5%) achieved mastery. The low results in the pre-cycle occurred because the peer tutoring method had not yet been implemented. In Cycle I, although the peer tutoring method was applied, ice-breaking activities were not yet included. Improvements were made in Cycle II through the application of both peer tutoring and ice-breaking, which continued into Cycle III. These continuous improvements in each cycle proved to be very effective in enhancing students' learning outcomes until the expected target was achieved.

3.7 Learning Outcomes Variable

From the data obtained based on the observation guidelines to assess the activeness of teachers and students in learning through the peer tutoring model, it can be concluded that this approach helps improve the learning process, particularly in enhancing the learning outcomes of students whose performance is still below expectations. The type of research used was Classroom Action Research. The research sample consisted of 20 fourth-grade students. The results of this study showed that the students' average learning score in Cycle I was 64 with a completion percentage of 50%, in Cycle II the average learning score was 69.5 with a percentage of 75%, and in Cycle III the average

learning score was 73 with a percentage of 85%. Similarly, the research conducted by Nur Afifah in 2021 aimed to describe the effect of the peer tutoring learning model on the mathematics learning outcomes of 24 third-grade students. The model used was the peer tutoring model. The results of this study showed that the students' average score in Cycle I was 63, in Cycle II it increased to 75, and in Cycle III the average score reached 85. As can be seen in figure 1.

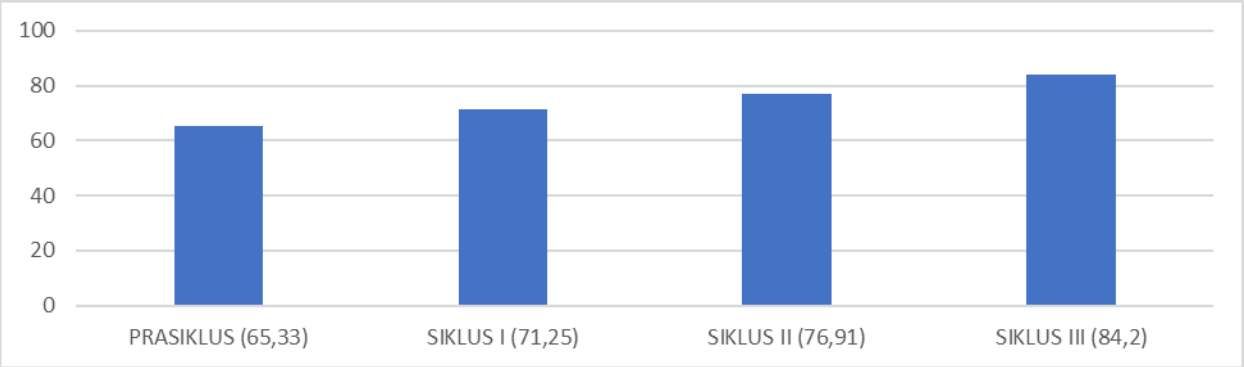

Figure 1. Recap of Average Learning Outcomes from Pre-Cycle to Cycle III

The figure 1 above shows the increase in students' average test scores in each cycle. The average learning outcome improved from 65.33 in the pre-cycle, to 71.25 in Cycle I, 76.91 in Cycle II, and 84.20 in Cycle III. A significant improvement can be seen in Cycle III. Thus, the revisions made in each cycle were able to gradually enhance students' learning outcome.

Tabel 2. Students' Learning Mastery

No	Cycle	Mastery	Not Achieving Mastery
1	Pre-cycle	5 Students	19 Students
2	Cycle I	7 Students	17 Students
3	Cycle II	15 Students	9 Students
4	Cycle III	21 Students	3 Students

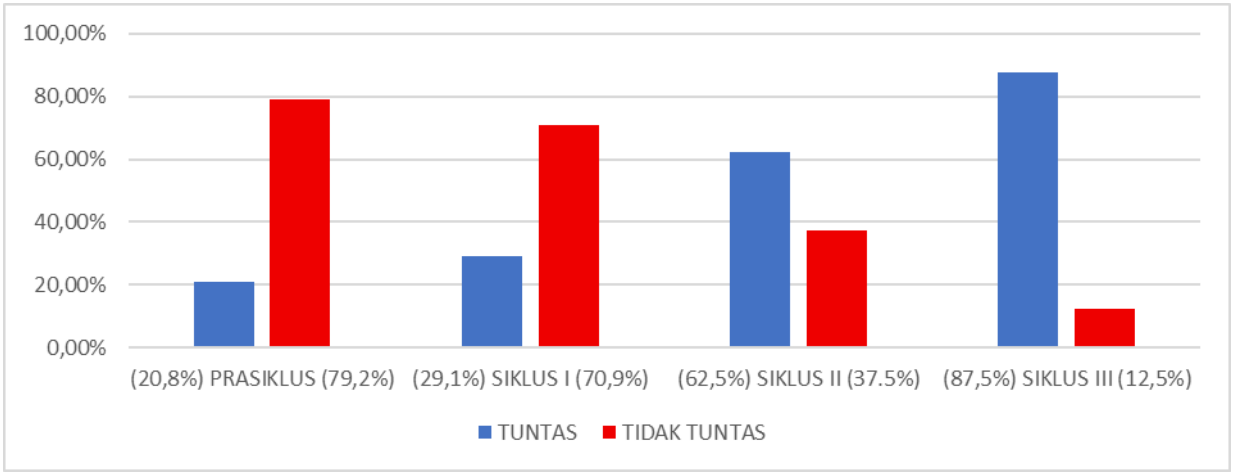

Figure 2. Percentage of Completion from Pre-Cycle to Cycle III

The figure 2 shows the mastery of students' learning outcomes from the pre-cycle to Cycle III. In the pre-cycle stage, only 5 students achieved mastery while 19 students did not, with a mastery percentage of 20.8%. In Cycle I, 7 students achieved mastery and 17

did not, with a mastery percentage of 29.1%. In Cycle II, 15 students achieved mastery and 9 did not, with a mastery percentage of 62.5%. Finally, in Cycle III, 21 students achieved mastery and 3 did not, resulting in a mastery percentage of 87.5%. These results indicate that the strategies designed and improved in each cycle were able to gradually enhance students' learning outcomes. The decrease in the number of students not achieving mastery demonstrates the effectiveness of applying the peer tutoring method in mathematics on the topic of the properties of flat shapes.

4. CONCLUSION

The application of the peer tutoring method in Grade IV of SDIT Al Hikmah Islamic School, Depok City, during the second semester of the 2024/2025 academic year, was able to improve students' learning outcomes. This is evident from the learning outcome scores in each cycle. The mastery level in the initial pre-test was 20.8%, which increased to 29.1% in Cycle I. The percentage continued to rise in Cycle II to 62.5%, and in Cycle III reached 87.5%, with the Minimum Mastery Criteria (KKTP) set at 75. Thus, it can be concluded that the implementation of the peer tutoring method was able to gradually improve the learning outcomes of Grade IV students at SDIT Al Hikmah Islamic School during the second semester of the 2024/2025 academic year. From the pre-cycle to Cycle III, a gradual increase was observed in each stage, which indicates that the peer tutoring method is effective in enhancing students' learning achievement.

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