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IMPROVING LEARNING OUTCOMES ON PLANE AREA THROUGH HOTS-ORIENTED PROBLEM BASED LEARNING (PBL)

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Abstract: Students experience difficulty processing information provided by teachers, who typically use lectures. Students face challenges during the learning process due to varying levels of understanding. In mathematics, in particular, students struggle to understand and solve problems. This research aims to find out students' responses to learning using the HOTS-oriented PBL model, to find out the improvement in students' learning outcomes after implementing the HOTS-oriented PBL learning model, to find out the effectiveness of the PBL model on the HOTS-oriented area of flat shapes material. This research uses a Classroom Action Research (CAR) design which is carried out in two cycles and involves fifth grade students at one of the Lubuklinggau Elementary Schools. Data collected through observation, test results, interviews and documentation. The research findings indicate that the implementation of the PBL model can increase student participation during the learning process and improve the average value of student learning outcomes from the pre-cycle to the second cycle. These results indicate that the PBL learning model is effective in improving students' mathematics learning outcomes. The implication of this study is that the PBL model can be recommended as an alternative learning strategy for teachers to create a more interactive, enjoyable, and student-centered mathematics learning environment. Further research can explore the application of PBL combined with digital media or test its effectiveness in other subjects.

Keywords: *Problem Based Learning, Hots, Elementary School Student, Mathematics*

INTRODUCTION

Education is the primary means of improving the quality of human resources through a series of planned learning activities. According to Hafid et al. (2022:167), education is a primary need that must be met because it is a continuous process that helps people acquire knowledge, attitudes, and habits in accordance with prevailing societal norms. A good education will impact each individual cognitively, emotionally, and psychomotorically. An effective learning process will occur when there is a positive contribution between teachers and students. When learning mathematics, many students still experience difficulties in solving the problems posed.

According to Muslihah & Suryaningrat (2021:554), in mathematics learning, teachers not only convey and explain the material to students but also play a role in facilitating or streamlining mathematics learning in the students' learning environment, so they can accumulate knowledge through scientific discoveries in their environment. In this regard, teachers must create an information-rich learning environment for students. Teachers must always innovate by creating learning strategies that can guide students to better understand the material. Mathematics is a field of study that supports the development of science and technology. However, many students still find mathematics a difficult, unpleasant, and even intimidating subject. It can also be said that learning mathematics is extremely boring. This is because many students still experience difficulties in solving math problems (Oktavia Sukmana, 2024).

Mathematics is a complex subject that requires in-depth understanding. However, many students still struggle to grasp mathematical concepts. Therefore, a learning method is needed that can encourage students to be more active, participate in the learning process, and improve their Higher Order Thinking Skills (HOTS) (Nipaah, 2023). According to Husna et al. (2022:705), students' difficulties in mathematics are explained by their inability to understand mathematical explanations that are too abstract, thus preventing them from analyzing problem solutions. Mathematics problems are naturally designed to relate to previous material. The Problem Based Learning learning model is a learning model that focuses on solving problems by applying concepts according to real-world situations and requires students to be actively involved in critical thinking and have skills in solving problems (Febrian et al., 2024).

Based on observations conducted by researchers at SD Negeri 52 Lubuklinggau, researchers identified several obstacles experienced by students, particularly in mathematics. Students had difficulty processing information provided by teachers, who typically used lectures. Therefore, teachers need to use additional information tools in the form of learning media that will play a role in conveying material to students and making it easier for them to understand. Based on the results of interviews conducted by researchers on May 31, 2025 with the homeroom teacher of class V, namely Mrs. Rama Gusmalinny, S.Pd. It can be obtained information that currently class V at SD Negeri 53 Lubuklinggau still uses relatively old-fashioned learning methods such as still using the lecture method when explaining the material on the area of flat shapes. The Minimum Completion Criteria (KKM) in

mathematics is 70. The number of students in class V of SD Negeri 52 Lubuklinggau is 27 people consisting of 14 boys and 13 girls. Students' obstacles during the learning process are differences in the level of student understanding in understanding the learning material. Especially in mathematics, students will have difficulty in understanding and trying to solve problems. Thus, teachers need to repeat explanations and provide examples that are easy for students to understand.

Based on the description above, the researcher is interested in conducting a classroom action research. This research aims to improve students' mathematics learning outcomes at SD Negeri 52 Lubuklinggau. Therefore, the researcher chose the research title

"IMPROVING LEARNING OUTCOMES OF PLANE AREA THROUGH HOTS-ORIENTED PROBLEM-BASED LEARNING (PBL)".

METODOLOGI

Research Design

This study used the Classroom Action Research (CAR) method. According to Arikunto et al. (2020:3), Classroom Action Research (CAR) is an effort to observe student activities carried out by teachers to determine whether there is an improvement in student outcomes after the action is taken. Students undergo a series of teacher-guided learning activities during class. The teacher will provide learning activities for students, so that students can achieve significant improvements in learning outcomes. Rubiyati (2022:285) explains that each cycle will be implemented through four stages: **planning, implementation, observation, and reflection.**

Figure 3.1 PTK stages

Research Subject

This research was conducted in the even semester of the 2025 academic year.The subjects were fifth-grade students at Public Elementary School 52 Lubuklinggau. The fifth-grade students served as research subjects, the third-grade teacher as observer, one of the researchers as a documentation team member, and the author as the instructor. The sample used was a saturated sample because SD Negeri 52 Lubuklinggau only has one fifth grade class with 27 students consisting of 13 girls and 14 boys. Asari et al (2023:106) explains that a saturated sample is a sampling technique when all members of the population are used as samples.The population in this study were all fifth-grade students of SD Negeri 52 Lubuklinggau. The 27 students were divided into 13 female students and 14 male students.

Data Collecting

The data collection techniques in this research aim to obtain valid and reliable information regarding the process and results of the action implementation. In Classroom Action Research (CAR), the data collection techniques used are a combination of quantitative and qualitative methods to provide a comprehensive picture.

1. **Observation**

   According to Arikunto (2021: 272), observation is the collection of data through direct observation of the research object to obtain information systematically and objectively.

2. **Test**

   Tests are used to measure student learning outcomes before and after the learning activities are carried out. Tests can take the form of pretests and posttests, or final tests for each cycle. Arikunto (2021: 223) explains that a test is a series of questions or exercises used to measure a person's abilities, knowledge, skills, or attitudes. Tests are designed based on competency achievement indicators and the material taught in the research.Explain clear.

3. **Interviews**

   Interviews are conducted to gather information directly from respondents, both teachers and students. This technique is useful for determining students' responses, opinions, and feelings regarding the learning process. According to Arikunto (2021:7), an interview is a dialogue conducted by the interviewer to obtain information from the interviewee.

4. **Documentation**

Documentation is used to supplement data from observations and interviews, as well as to provide visual evidence of the implementation of actions. Documentation can take the form of photographs of learning activities, student work, field notes, and learning administration documents. Arikunto (2021:274) states that documentation is a data collection technique used to obtain data from documents, records, or archives relevant to the research problem.

Data Analysis

The data analysis techniques in this study used quantitative and qualitative descriptive analysis. According to Arikunto (2021:49), data analysis in CAR aims to determine the success of the actions taken and serve as a basis for determining actions in the next cycle.

1. **Quantitative Data Analysis**

Used to process student learning outcome data (pretest, posttest, or other assessment scores). The steps include:

a. Calculating the average (mean) student learning outcome score for each cycle.

b. Calculating the percentage of student learning completion.

c. Comparing results between cycles to see improvement.

Rumus rata-rata: $\sum X$

$$M = \frac{\sum x}{N}$$

Keterangan

M : Mean (nilai rata-rata)

$\sum x$: jumlah seluruh yang diperoleh siswa

N : jumlah semua data

2. **Teacher and Student Activity Data Analysis Techniques**

Teacher and student activity data analysis techniques are calculated using the following average and percentage formulas:

$$P = \frac{F}{N} \times 100\%$$

Keterangan :
P = Angka presentase yang dicari
F = Frekuensi
N = Jumlah seluruhnya
100% = Bilangan tetap

Tabel 3.1 Kriteria Penilaian Analisis Aktivitas Guru dan Siswa

No	Nilai %	Kategori Penilaian
1	80 – 100	Baik Sekali
2	66 – 79	Baik
3	56 – 65	Cukup
4	46 – 55	Kurang
5	0 – 45	Gagal

3. Indicators of Success

The indicators of success for this research are increased teacher and student activity and improved mathematics learning outcomes, as indicated by achieving the Minimum Completion Criteria (KKM) of 70%.

RESEARCH RESULT

Finding

This study aims to determine the improvement in Mathematics learning outcomes of fifth-grade students of SD Negeri 52 Lubuklinggau through the application of the Problem Based Learning (PBL) learning model oriented towards higher-order thinking skills (HOTS). The material taught is the area of flat shapes, including triangles, parallelograms, trapezoids, and rhombuses. Evaluation is carried out through learning outcome tests at each stage, namely pre-cycle, pre-test and post-test in each cycle, using multiple-choice and essay instruments.

Table 4.1
Percentage Summary of Mathematics Learning Outcomes in Cycle 1 and Cycle 2

No	Siklus	Treatment	Nilai Ratarata	Tidak Tuntas		Tuntas		Jumlah
				F	Persen (%)	F	Persen (%)	
1	Pra-Siklus	Pre-test (Esai)	58,15	16	59,26%	11	40,74%	27
2	Siklus I	Post-test (Esai)	65,19	10	37,04%	17	62,96%	27

3	Siklus II	Post-test (Esai)	80,74	4	14,81%	23	85,19%	27

Based on the table above, there appears to be an improvement in student learning outcomes from stage to stage. In the pre-cycle, students were given 15 multiple-choice questions to assess their prior knowledge of the area of plane figures. The average score obtained was 56.67, with 10 students (37.04%) completing the questions and 17 students (62.96%) failing to meet the Minimum Completion Criteria (KKM).

Entering Cycle I, the PBL model was implemented, focusing on understanding the concepts of the area of triangles and parallelograms. The pre-test, which included four essay questions, showed an average score of 58.15, with 11 students (40.74%) completing the test. After the learning process, the post-test score increased to 65.19, with 17 students (62.96%) achieving completion.

In Cycle II, the learning focused on trapezoids and rhombuses. The pre-test results showed an increase in the average score to 65.19, with 17 students (62.96%) achieving the Minimum Competency (KKM). Then, in the post-test, the average score increased significantly to 80.74, with 23 students (85.19%) achieving completion, and only 4 students (14.81%) remaining incomplete.The improvement from pre-cycle to Cycle II indicates that the implementation of the HOTS-oriented PBL model effectively improved student learning outcomes. Students were more active in solving contextual problems, discussing, and developing strategies for solving problems on the area of plane figures, both independently and in groups. The media and approaches used were proven to improve students' conceptual understanding and higher-order thinking skills. Thus, it can be concluded that the HOTS-oriented Problem-Based Learning (PBL) model is effective in mathematics learning on the area of plane figures to improve the learning outcomes of fifth-grade students at SD Negeri 52 Lubuklinggau.

Discussion

During the pre-cycle phase, fifth-grade mathematics instruction at SD Negeri 52 Lubuklinggau was still conducted conventionally without implementing the Problem-Based Learning (PBL) model. To determine students' initial abilities regarding the area of plane figures, a test consisting of 15 multiple-choice questions was administered. The results showed that the average student score was only 56.67. Of the 27 students who took the test,

only 10 (37.04%) met the Minimum Completion Criteria (KKM), while 17 students (62.96%) failed to complete the test. This low learning outcome reflects the inability of the previous learning method to optimally facilitate students' understanding of the concept.

During the first cycle, teachers began implementing the Problem-Based Learning (PBL) model, which focuses on higher-order thinking skills (HOTS). The topic covered the area of triangles and parallelograms. The learning process took the form of real-world problem-solving, group discussions, and presentations of students' thinking. To measure initial understanding, students were given a pre-test consisting of four essay questions, resulting in an average score of 58.15, with 11 students (40.74%) completing the test. After the lesson, a post-test was administered again with the same type of questions. The results showed an increase in the average score to 65.19, with 17 students (62.96%) successfully completing the task. This indicates that the PBL approach is beginning to have a positive impact on students' understanding of the concept of area of plane figures.

In Cycle II, learning focused on the area of trapezoids and rhombuses. Students appeared more engaged as they became accustomed to the PBL learning model, which encourages discussion, problem exploration, and critical thinking. A pre-test administered before the lesson showed an average score of 65.19, with 17 students (62.96%) completing the task. After the learning activities, students were given a post-test, which showed a significant improvement. The average score reached 80.74, with 23 students (85.19%) successfully achieving the Minimum Competency (KKM). Only 4 students (14.81%) failed to complete the task. These achievements demonstrate that PBL learning can significantly improve learning outcomes.

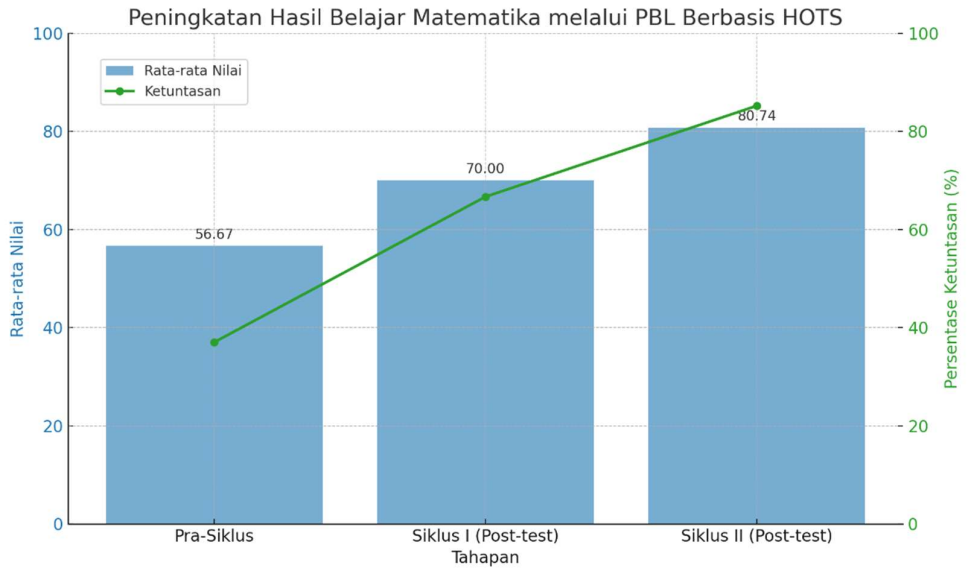

Figure 4.1 Diagram

Based on the results from the pre-cycle to the second cycle, there is a consistent improvement in student learning outcomes. The HOTS-oriented Problem-Based Learning (PBL) model has been proven to encourage students to think critically, solve problems, and better understand the concept of the area of plane figures. In addition to improving grades, students also demonstrated active engagement in the learning process. Therefore, the implementation of PBL is an appropriate solution for improving student mathematics learning outcomes, particularly in the area of plane figures topic in fifth grade at SD Negeri 52 Lubuklinggau.

CONCLUSION

Based on the results of classroom action research conducted over two cycles, it can be concluded that Improving Learning Outcomes of Flat Shape Area Through HOTS-Oriented Problem Based Learning (PBL) has proven effective in improving Mathematics learning outcomes of fifth-grade students of SD Negeri 52 Lubuklinggau on the material of flat shape area. The conclusions based on each research objective are as follows:

1. Student responses to learning using the HOTS-oriented PBL model showed positive changes. Students became more active in the learning process, particularly in group discussions, contextual problem-solving, and the open expression of opinions and ideas. The classroom atmosphere became livelier and more participatory. This

indicates that the PBL model is able to foster student motivation and direct student involvement in the learning process.

2. There was an improvement in student learning outcomes after implementing the HOTS-oriented PBL learning model. In the pre-cycle phase, the average student score was only 56.67, with a completion rate of 37.04% (10 out of 27 students). After implementing the PBL model, there was an increase in cycle I, with an average score of 65.19 and a completion rate of 62.96% (17 students). This then increased again in cycle II to an average score of 80.74, with a completion rate of 85.19% (23 students). These data indicate that PBL can gradually and significantly improve students' understanding of the concept of area of plane figures.
3. The PBL learning model has proven effective when applied to HOTS-oriented material on area of plane figures. This effectiveness is evident in students' success in answering HOTS-based essay questions that require analytical skills and conceptual understanding, and implementation in real-world contexts. The target indicator for success of the action, namely a minimum of 70% of students achieving the Minimum Competency (KKM) (≥70), was met in Cycle II. In addition to quantitative results, effectiveness was also evident in the more active, reflective, and meaningful learning process.

Thus, the application of the HOTS-oriented Problem Based Learning (PBL) model is worthy of being used as an alternative learning approach in an effort to improve students' learning outcomes and critical thinking skills, especially in Mathematics material in elementary schools.

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