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Application of the Problem Based Learning (PBL) Learning Model to Improve Mathematics Learning Outcomes Multiplication Material for Whole Numbers Class III UPTD SDN 192 Barru

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Abstract
This research is a type of Classroom Action Research (CAR) which aims to determine whether there is an increase in mathematics learning outcomes in the material of multiplication of whole numbers using the based learning (PBL) learning model. The sample in this study was 13 students of grade 3 of SD Negeri 192 Barru. The implementation of this classroom action research was designed in two cycles. Each cycle consists of four stages, namely planning, action, observation/evaluation and reflection. The data collection technique in this study used a test sheet. With the type of fill-in test. Data analysis used in this study is a descriptive statistical analysis method. Based on the results of the study, it was found that the application of the problem basic learning learning model can improve student learning outcomes where the results of the cycle I learning test with an average of 59.23 than in the second cycle after the problem-based learning model was applied, student learning outcomes increased with an average of 86.15.

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1. INTRODUCTION

Mathematics education in elementary schools plays an important role in developing students' critical thinking and problem-solving skills. One aspect that is often a challenge in learning mathematics is how to create active and meaningful learning experiences, so that students not only memorize formulas, but can also understand mathematical concepts in depth. However, the reality shows that many students find it difficult and are less interested in studying mathematics. One material that is often considered difficult is multiplication of whole numbers, especially at elementary school level.

Based on observations made at UPTD SDN 192 Barru, many students still have difficulty understanding the concept of multiplication of whole numbers. This is caused by a lack of student involvement in the learning process because learning is passive, that is, they only listen to explanations from the teacher without being actively involved in the learning process and sometimes some people are only asked to come to the front of the class to work on questions. This kind of learning tends not to provide meaningful experiences for students and only relies on memorization without deep understanding. Therefore, it is important to apply learning methods or models that can improve students' understanding and make them more interested in learning mathematics, especially in multiplication of whole numbers. Various research results reveal that one effective approach in improving student learning outcomes is the Problem Based Learning (PBL)

Learning Model. PBL is a learning approach that invites students to solve real problems through group collaboration, discussion, and application of mathematical concepts in situations that are relevant to their lives. With PBL, students not only learn about math concepts, but also develop critical thinking, creative, and problem-solving skills, which are critical for their future.

The PBL model provides students with the opportunity to be directly involved in the learning process through solving real problems that are relevant to their lives so that it can improve students' cognitive abilities, problem solving skills, communication of ideas, and character development (Andani et al., 2021). PBL has a significant positive impact on improving student learning outcomes in mathematics. The application of PBL helps students develop higher-order thinking skills, such as analysis, synthesis, and evaluation, which are needed in solving mathematical problems which leads to an increase in deeper understanding of concepts (Zainal, 2022). Meta-analysis research conducted by Hendra (2021) found that PBL had a significant impact on elementary school students' mathematics learning outcomes with increases varying between 0.40% to 43.00%. Apart from that, classroom action research by Sutrisno (2022) shows that PBL succeeded in increasing student learning outcomes from a pre-cycle average score of 62.92%, to 69.58% in cycle I, and an increase of 79.17 in cycle II. These findings indicate that implementing PBL in elementary schools can provide optimal results if implemented appropriately. This is increasingly important considering the objectives of the national education curriculum which emphasizes developing students' critical and creative thinking abilities. Along with the development of education, the use of more innovative methods in teaching mathematics in elementary schools has become very necessary.

The problem-based learning model is a learning model that exposes students to practical problems as a basis for learning. In other words, students learn through the problems they are given to find solutions to these problems. so that in the learning process students are directly involved in practical activities, such as making observations, collecting data, and analyzing it collaboratively with a group of friends or in class. Problem-based learning begins by providing a problem that is relevant to students' daily lives. Students work in groups to formulate problems and identify gaps in their knowledge. Next, they search for material related to the problem independently, and finally present a solution to the problem they have found. In the context of mathematics, students are trained to strengthen and enrich mathematical concepts by understanding the material provided carefully and then being able to solve the problems they face (Astuti, 2019; Arta, Japa, & Sudarma, 2020).

However, even though PBL has been widely implemented in various mathematics materials, effective implementation in whole number multiplication material in grade III elementary school is still limited. Whole number multiplication material, which is the basis for further mathematical concepts, is often a source of difficulty for students. Therefore, this research aims to explore the application of the PBL model in learning multiplication of whole numbers in grade III elementary school, with the hope of significantly improving student learning outcomes.

Although previous research results show that PBL can improve students' mathematics learning outcomes, its application to whole number multiplication material in grade III elementary school is still limited. In many existing studies, the application of PBL is focused more on materials that are more abstract or that require a higher level of understanding, such as fractions or geometry (Eka Eismawati, 2021; Edy Sutrisno, 2020). Meanwhile, the material on multiplication of whole numbers, which is the basis for further mathematical concepts, is often a source of difficulty for students. Therefore, there is a gap in the literature regarding the application of the PBL model specifically to whole number multiplication material in elementary school. Thus, this research offers a new perspective

in applying PBL to this more basic material and measuring its impact on student learning outcomes. The focus of the study in this research is related to the application of the PBL model to whole number multiplication material in class III elementary school. Apart from that, this research also uses a Classroom Action Research (PTK) approach which is carried out in two cycles, so that it can provide a more in-depth picture of the dynamics of learning and improving student learning outcomes at each stage of implementing PBL. This research aims to analyze the learning process that occurs during the PBL implementation cycle, as well as identifying factors that influence the success of this model in improving student learning outcomes.

2. RESEARCH METHOD

This research is a type of classroom action research (PTK) which is planned in two cycles, with each cycle consisting of four stages: action planning, action implementation, observation and evaluation, and reflection. The subjects in this research were 13 class III students at SD Negeri 192 Barru for the 2024/2025 academic year, consisting of 6 female students and 7 male students. This research focuses on one object, namely Mathematics learning outcomes after implementing the problem-based learning model. The implementation of this classroom action research was designed in two cycles. Each cycle consists of four stages, namely planning, action, observation/evaluation and reflection. The data collection technique in this research uses test sheets. The test used in this research aims to measure the mathematics learning outcomes of class III students by providing questions that are appropriate to the subject matter that has been taught. The type of test used in this research is a type of questionnaire consisting of 8 questions. Learning outcomes tests are given at the end of each cycle.

In data analysis, descriptive statistical and quantitative descriptive analysis methods were used. The descriptive statistical analysis method is the process of processing data using descriptive statistical formulas, such as calculating the average (mean). Meanwhile, the quantitative descriptive analysis method was applied to calculate the percentage level of student learning outcomes, which was then converted using PAP Scale 5 as shown in Table 1. The criteria for success in this research is if the percentage of student learning outcomes reaches 75%, which is classified as good. , and students obtain a minimum score of 70.

Table 2.1 PAP Scale 5

Percentage (%)	Criteria
90-100	Very good
75-89	Good
65-74	Enough
40-64	Not enough
0-39	Very less

3. RESEARCH RESULTS AND DISCUSSION

In the planning stage of Cycle I, researchers arrange and prepare learning tools and learning resources that will be used in the learning process. Some of these preparations include setting environmental conditions, mastering the material, and creating teaching modules and creating test sheets. Test sheets are given at the last meeting to measure student learning outcomes. Once everything is ready, the next step is implementing the learning.

Implementation of this action includes activities carried out during the learning process. Cycle I was carried out in three meetings, where at the first and second meetings the learning process was carried out, while the third meeting was used to carry out tests on the learning outcomes of Cycle I. In cycle I students were given a test sheet containing 8 questions to fill in. The results of cycle I acquisition values can be seen in the table below:

Table 3.1
Cycle I Earned Value

No.	No	P/L	Evaluation Value	MOH	Information
1.	Afifah	P	50	75	Not Completed
2.	Andi	L	80	75	Complete
3.	Award	L	60	75	Not Completed
4.	Asher	L	60	75	Not Completed
5.	Ikhsan	L	50	75	Not Completed
6.	Imran	L	50	75	Not Completed
7.	Nabil	L	60	75	Not Completed
8.	Nur Azizah	P	60	75	Not Completed
9.	Husna	P	60	75	Not Completed
10.	Action	P	60	75	Not Completed
11.	Risk	P	70	75	Not Completed
12.	Rina	P	50	75	Not Completed
13.	Zakir	L	60	75	Not Completed

Based on research data obtained through the results of learning tests in cycle I, the average student learning outcome only reached 59.23%, which is classified in the Poor category on a scale of 5, namely in the percentage (40-64). This shows that many students have not reached the expected level of understanding. There are several factors that influence student learning outcomes, including student involvement in the learning process is still not optimal, both in terms of asking questions, answering questions from the teacher, and interacting with their friends.

In the second cycle planning stage, it is the same as the first cycle planning. The researcher again arranges and prepares the learning tools and learning resources that will be used in the learning process. Implementation of actions includes activities carried out during the learning process using the Problem Based Learning model. At the last meeting students were given test sheets to measure student learning outcomes after implementing the Problem Based Learning model. The results of cycle II acquisition values can be seen in the table below:

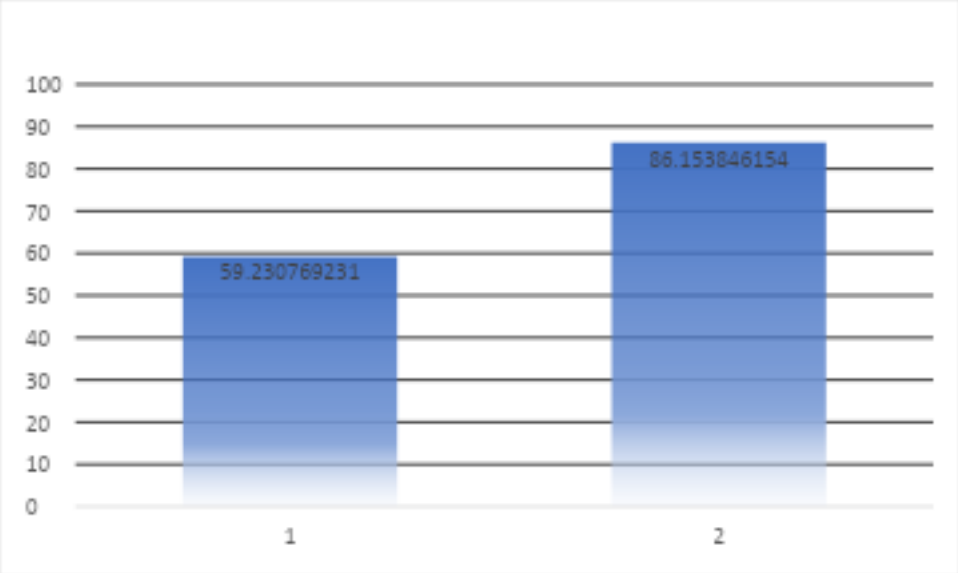
Table 3.2
Cycle II Earned Value

No.	No	P/L	Evaluation Value	MOH	Information
1.	Afifah	P	90	75	Complete
2.	Andi	L	100	75	Complete
3.	Award	L	80	75	Complete
4.	Asher	L	80	75	Complete
5.	Ikhsan	L	80	75	Complete
6.	Imran	L	85	75	Complete

7.	Nabil	L	85	75	Complete
8.	Nur azizah	P	90	75	Complete
9.	Husna	P	85	75	Complete
10.	Action	P	90	75	Complete
11.	Risk	P	95	75	Complete
12.	Rina	P	80	75	Complete
13.	Zakir	L	80	75	Complete

Based on data from research results in the second cycle, there was an increase in student learning outcomes after the implementation of the Problem Based Learning Model, namely that the average student learning outcomes increased by 26.92%. The average result from cycle II was 86.15% which was classified as sufficient on a scale of 5, namely in the percentage (75-89). This shows that the majority of students understand the material taught using the Problem Based Learning model, experience an increase in asking questions, answering questions from the teacher and students are active in the learning process.

The results of data analysis show that the application of the Problem Based Learning model has succeeded in improving mathematics learning outcomes for class III at SDN 192 Barru. Can be seen at:



Bar Diagram 3. Average of cycles I and II

In this research, the learning model is applied *problem basic learning* carried out two cycles. This research produced significant results, namely increasing learning outcomes for class III students at UPTD SDN 192 Barru. After carrying out two cycle tests, the number of students who completed individually in cycle I was 1 student, increasing to 13 students in cycle II. In the first cycle there were 12 students who had incomplete learning and in the second cycle all students had experienced very significant improvement.

DISCUSSION

Based on the results of research conducted in two cycles, it can be seen that the application of the Problem Based Learning (PBL) learning model has succeeded in improving students' mathematics learning outcomes. In cycle I, the average student learning outcomes only reached 59.23%, which was classified as poor on a scale of 5 (40-64). These results indicate that the majority of students have not achieved the expected understanding. This is caused by several factors, one of which is the lack of student

involvement in the learning process, both in terms of asking questions, answering questions from the teacher, and interacting with their friends. This minimal involvement affects the level of students' understanding of the material being taught.

In cycle II, after implementing the PBL model which focused more on student activity, there was a significant increase in student learning outcomes. The average student score in cycle II increased to 86.15%, which is classified as sufficient on a scale of 5 (75-89). This increase of 26.92% shows that the majority of students succeeded in understanding the material taught, especially in the topic of multiplication of whole numbers. The PBL model which provides opportunities for students to actively participate, discuss and work together in groups has proven to be effective in increasing their understanding of the material being studied.

Students' activeness in asking, answering questions, and interacting with their friends also experienced a significant increase in cycle II. In cycle I, student involvement in the learning process was still limited, but in cycle II, students were more active in the learning process. This can be seen from the increase in learning test results which show that students not only understand the material better, but are also able to apply the concepts they have learned in solving problems. With the PBL model, students are given problems that are relevant to their daily lives, which makes them more interested and motivated to learn.

The application of the PBL model in cycle II had a big positive impact on the learning process. Apart from improving student learning outcomes, this model also improves students' critical thinking skills and collaborative skills. Students not only learn individually, but also learn to work in groups, discuss with each other, and solve problems together. Thus, the PBL model not only improves learning outcomes in the cognitive domain, but also develops social skills and thinking skills that are important for student development. Analysis of this data shows that implementing PBL can improve the quality of learning and overall student academic achievement.

4. CONCLUSION

From the results of the classroom action research carried out, it can be concluded that the problem basic learning model is very effectively used to improve the learning outcomes of class III students at UPTD SDN 192 Barru. This is proven in the results of this research which show that there are significant differences in student learning outcomes when using the problem basic learning model.

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