

## Improving mathematics learning outcomes using the problem-based learning model for class V students of UPTD SDN 192 BARRU

Muhammad Nurul Hidayatullah. S<sup>1</sup>, Haslinda<sup>2</sup>

Program Studi Pendidikan Guru Sekolah Dasar, Fakultas Keguruan Dan Ilmu Pendidikan, Universitas Muhammadiyah Makassar

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### Abstract

*This study aims to improve mathematics learning outcomes among fifth-grade students at UPTD SDN 192 Barru by implementing the Problem-Based Learning (PBL) model. The focus of the study is on students' ability to understand and solve decimal multiplication problems. The research employed a classroom action research (CAR) method consisting of three stages: pre-action, Cycle I, and Cycle II. The results indicate that implementing the PBL model significantly enhances students' comprehension of the material. The percentage of students who accurately understood the problems increased from 23% during the pre-action stage to 46% in Cycle I, and finally to 85% in Cycle II. Therefore, it can be concluded that the Problem-Based Learning model is effective in improving students' mathematics learning outcomes, particularly in decimal multiplication topics.*

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### Corresponding Author:

Muhammad Nurul Hidayatullah. S

Universitas Muhammadiyah Makassar

Email: [muh.nurulhidayatullaspasa2018@gmail.com](mailto:muh.nurulhidayatullaspasa2018@gmail.com)

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## 1. INTRODUCTION

Education is the foundation which is recognized as important by every nation. The level of quality of education in a society is a crucial factor that determines the progress of that nation. Therefore, a country's progress can be measured by the quality of the system Nur's education and Kurniawati (2022). According to Pratiwi (2022) Learning is a process that aims to help students adapt to their environment optimally. This process encourages transformation within students, awakening the desire to play an active role in community life.

Mathematics subjects in elementary schools are learning programs designed to equip students with the ability to face the ever-evolving dynamics of life. This learning provides training to think logically, rationally, critically, thoroughly, honestly and efficiently. Apart from that, learning mathematics aims to instill hope and positive change in children, as well as preparing them to utilize mathematics and mathematical thinking patterns in daily activities and in studying various scientific disciplines. Lasmanah (2016)

The problem is that mathematics textbooks for elementary school students often do not provide clear guidance on how to improve students' mathematical thinking abilities. As a result, although some educators assume that problem-solving skills will develop naturally through mastery of numeracy skills, this assumption is not entirely accurate. The main goal of learning mathematics should be to develop students' capacity in problem solving. Therefore, problem solving needs to be emphasized throughout the mathematics curriculum. Yasin, (2022)

The 2013 curriculum recommends implementing a learning model that can encourage students to participate actively in the learning process. One model recommended is problem-based learning, which uses problems as a starting point for learning. The problems used must be relevant to real life and familiar to students, so that they are more effective as a learning resource. This approach is student-centered, where they learn a topic through solving real problems, which has proven to be very effective in improving the mathematics learning outcomes of elementary school students. According to Rabiah's research, problem-based learning has several goals, namely helping students develop thinking abilities and problem-solving skills, providing learning experiences that reflect the authentic role of adults, and encouraging students to become independent learners. Marlina (2024).

Problem-based learning model (*problem-based learning*) is a learning approach that is based on providing problems that require authentic investigation, namely investigations that require real solutions to real problems. In problem-based learning, a problem presented to students must be able to encourage students' understanding of the problem, increase awareness of knowledge gaps, generate motivation to solve the problem, and provide confidence that they are able to solve the problem. Model *problem-based learning* This provides opportunities for the growth and development of problem-solving skills by relying on rational, analytical, reasoning patterns. synthesis, and reflective. Santika et al. (2020)

According to Kartini et al. (2022) The PBL (Problem-Based Learning) learning model is an approach that involves applying concrete problems to students, training them to solve problems effectively. Through this process, students are expected to not only be able to find solutions, but also gain insight from solving these problems, which can later become an illustration or reference in future learning. Through PBL, students learn to solve a problem by applying the knowledge they have or seeking new knowledge needed to solve the problem. Learning becomes more meaningful and relevant when students face real situations where the concepts learned can be directly applied. Apart from that, PBL can also foster initiative in work, increase internal motivation to learn, and develop interpersonal skills in group work. Islahiyah, et al. (2021).

The learning process begins with defining the problem, followed by student discussions to equalize perceptions about the topic being discussed and designing goals and targets to be achieved. The next step involves searching for materials from various sources, such as library books, the internet, and observations. Assessment by teachers includes not only learning outcomes, but also the process taken by students. In this case, the teacher's role is to monitor learning progress, direct students in solving problems, and ensure they remain on the right track to achieve learning goals. Fauzia (2018)

The PBL model has the following basic characteristics: (1) asking questions or problems, (2) emphasizing interconnectedness interdisciplinary, (3) involves authentic inquiry, (4) produces products or works that can be exhibited, and (5) encourages collaboration. Masrinah, et al. (2019)

Based on the Learning Process Profile and Learning Outcomes, the problem formulation is "How to improve learning outcomes Mathematics "Multiplication of decimal numbers material through a problem-based learning model for fifth grade students at SDN 192 Barru"? The form of action taken in problem solving in accordance with the problems in Classroom Action Research (PTK) is learning using a problem-based learning model in Class 5 Students of UPTD SDN 192 Barru. So, it is hoped that it can improve Mathematics learning outcomes

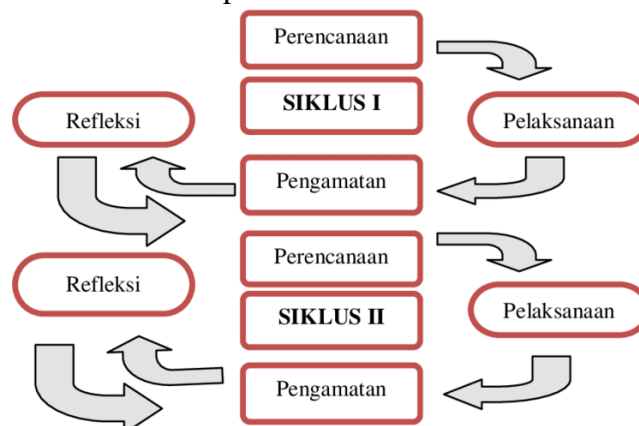
## 2. RESEARCH METHOD

This research was carried out at UPTD SDN 192 BARRU, in the odd semester of the 2024/2025 academic year for 2 (two) months, starting from 15 August to 15 October 2024. The research subjects were grade 5 students of UPTD SDN 192 BARRU, who were registered in the academic year 2024/2025 as many as 13 students, each consisting of 5 women and 8 men.

Classroom Action Research (PTK) is carried out through activities consisting of four stages, namely planning (*planning*), action (*acting*), observation (*observing*), and reflection (*reflecting*). Overall, the four stages are in a spiral form to address a problem that may require more than one cycle. These cycles are interrelated and continuous. The first cycle was carried out to determine the level of students' abilities. The second cycle is carried out if the author did something less successful in the first cycle. The third cycle is carried out if the previous cycle has not been able to overcome the problem, and the same goes for the next cycle.

After compiling the teaching module, the teaching and learning process can begin. Implementation of the teaching module includes learning objectives, learning model, learning process including initial activities, core activities, and closing. The evaluation is given in the form of multiple-choice questions.

The first step is to view and examine the Syllabus, the second step is to prepare teaching modules according to the learning strategy that will be implemented, and formulate evaluation tools. The next step can be seen from the flowchart below:



**Figure 1.** Implementation design Study Class Action (PTK)

### 3. RESEARCH RESULTS AND DISCUSSION

In this section, the research results are explained and a comprehensive discussion is provided. Results can be presented in the form of pictures, graphs, tables and others which make it easy for readers to understand [2, 5]. Discussion can be carried out in several sub-chapters.

#### 3.1. Research result

##### 1. Pre-Action Cycle

Before carrying out the learning process, the researcher made observations on the ability to understand multiplication of decimal fractions of students in class 5 of UPTD SDN 192 Barru. Observation results show that teachers still use monotonous learning strategies, which causes students' ability to understand multiplication and division to be incomplete. When delivering the lesson, when students were asked to do multiplication questions, there were some students who couldn't operate multiplication of numbers dozens or hundreds, and prefers to make noise which causes students' ability to understand lessons to not be optimal. The results of implementing activities in the initial conditions show the results as explained in the table below.

No.	No	P/L	Cycle 1 evaluation value	MOH	Information
1.	Andi Asraf	L	46	75	NOT COMPLETE
2.	Busran	L	30	75	NOT COMPLETE
3.	Rahman	L	40	75	NOT COMPLETE
4.	Rahmansyah	L	80	75	COMPLETE
5.	Sabir	L	60	75	NOT COMPLETE
6.	Akbar	L	30	75	NOT COMPLETE
7.	Syamsul Alam	L	50	75	NOT COMPLETE
8.	Arya	L	30	75	NOT COMPLETE
9.	Naurah qholilah	P	60	75	NOT COMPLETE
10.	Nurhasanah	P	85	75	COMPLETE
11.	Nurlina	P	73	75	NOT COMPLETE
12.	Munawwarah	P	46	75	NOT COMPLETE
13.	Hasrah Talita	L	75	75	COMPLETE

**Table 4.1**

**Pre-Action Data on students' acquisition of completeness in understanding Multiplication of Decimal Numbers class 5**

Information:

- a. Students who already understand Multiplication number The number of decimals properly and correctly is 3 students.
- b. There were 1 student who could understand the questions correctly and precisely. Everyone was able to answer the questions and understood the questions given.
- c. Students who can already use the model Learning problem-based media assisted There are 2 students taught by the teacher.

From the data above, it shows that the ability of class 5 students at UPTD SDN 192 BARRU is in understanding multiplication. Number decimals are not yet optimal; therefore, it is necessary to develop an understanding of multiplication Number Decimals using a problem-based learning model.

**2. Cycle I**

**a. Planning (Planning)**

Based on the results of observations from the pre-action cycle, this classroom action research (PTK) was carried out as an effort by the teacher to improve students' abilities in understanding Multiplication of Decimal Numbers with a problem-based learning model. To improve students' ability to understand, the first thing the teacher does is apply an interesting learning model in every learning process.

Before the learning process takes place, the teacher prepares a teaching module based on classroom action research. Next, prepare learning resources, teaching materials and also tools used in learning activities, prepare assessment instruments that will be used to measure competency achievement, prepare minimum completeness criteria for competency achievement and prepare instrument benchmark for the success of the action.

**b. action**

After the planning is complete, the researcher as well as the teacher or lecturer carries out the action or learning process directly in accordance with the teaching module that has been provided previously. Each learning cycle is divided into 3 implementation stages, namely, opening, core, and closing.

**c. Observation**

This observation was carried out to see whether all the plans carried out had been implemented well, there was nothing that would make the results of the research less than optimal in improving the ability to understand multiplication of decimal numbers for class 5 students by giving grades on the observation sheet. The following is data on improving the ability of grade 5 students at UPTD SDN 192 BARRU in multiplying decimal numbers.

**Table 4. 2 Cycle I  
Data on students' ability to understand multiplication of decimal numbers for class 5 objects**

No.	No	P/L	Cycle 1 evaluation value	MOH	Information
1.	Andi Asraf	L	50	75	NOT COMPLETE
2.	Busran	L	70	75	NOT COMPLETE
3.	Rahman	L	50	75	NOT COMPLETE
4.	Rahmansyah	L	75	75	COMPLETE
5.	Sabir	L	75	75	COMPLETE
6.	Akbar	L	50	75	NOT COMPLETE
7.	Syamsul Alam	L	80	75	COMPLETE
8.	Arya	L	50	75	NOT COMPLETE
9.	Naurah qholilah	P	80	75	COMPLETE
10.	Nurhasanah	P	80	75	COMPLETE
11.	Nurlina	P	70	75	NOT COMPLETE
12.	Munawwarah	P	70	75	NOT COMPLETE
13.	Hasrah Talita	L	75	75	COMPLETE
Lowest value			45		
The highest score			90		
Sum of all values			875		

Average value	67,3	
Number of completed participants		6 People
Number of incomplete participants		7 People
Percentage learning completeness	46%	
Percentage classic incomplete	54%	

Based on the source of the calculation results of the completeness of students' learning outcomes, it was found that the completeness of students' training results in cycle 1 was 46%. Based on the results of cycle 1 learning completion, students' learning outcomes were obtained with an average score of 67.3, which can be seen in the following table:

**Table 4.3**  
**Percentage of Learning Completeness for Cycle 1 Students**

No	Mark	Number of Students	Percentage of Learning Completeness	Learning Completeness Category
1	≥75	6	46%	Complete
2	≤75	7	54%	Not Completed

**d. Reflection**

Based on data obtained from the results of Classroom Action Research (PTK) through the application of a problem-based learning model. The researcher concluded that the learning activities in cycle I had not achieved maximum results because There are some students who are not yet able to understand and differentiate changes in the form of objects, so in the second cycle the teacher plans to reorganize the teaching modules to get maximum results. An overview of cycle I above can be seen in table 4.4 below.

**Table 4. 4 Descriptions of Cycle I**

Planning	Action	Observation	Reflection
a. Develop teaching modules based on classroom action research. b. Prepare sources, materials, tools used in learning activities	<ul style="list-style-type: none"> <li>The teacher opens the lesson by giving examples of real situations,</li> <li>The teacher motivates students to ask questions</li> </ul>	1. Observing how students learn in following the learning process 2. Observe students' abilities in	1. Record the results of observations 2. Evaluation of observation results 3. Fixed weaknesses for the next cycle

<p>c. assessment instruments that will be used to measure achievement competence  d. Prepare minimum completeness criteria for competency achievement and prepare instrument benchmark for the success of the action</p>	<ul style="list-style-type: none"> <li>• Students are divided into 3 groups heterogeneously</li> <li>• The teacher gives a worksheet containing other similar problems</li> <li>• Students are given the opportunity to understand the problem with their group</li> <li>• Students discuss in groups to determine steps to solve problems and carry out calculations manually</li> <li>• The teacher monitors group activities and provides guidance if necessary</li> <li>• The group records the results of their problem solving</li> <li>• Each group presents the results of their problem solving in front of the class.</li> <li>• Other groups are asked to provide responses or questions</li> <li>• The teacher provides clarification or additional explanations if necessary</li> </ul>	<p>follow learning process  3. Record the value of students' learning outcomes</p>	
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### 3. Cycle II

Learning to increase the ability to understand changes in the shape of objects uses a problem-based learning model so that students are able to understand multiplication of decimal numbers which includes:

- a. Students can understand the concept of multiplying decimal numbers through solving problems.
- b. Students can apply strategies to calculate the results of multiplying decimal numbers in the context of everyday life.
- c. Students can work together in groups to solve problems.
- d. Students are able to convey the results of solving problems confidently.

#### 1) Planning (Planning)

Based on the results of the implementation of the Cycle I learning process, Classroom Action Research (PTK) Cycle II was carried out as an effort by the teacher to further improve students' problem-solving abilities in Multiplication. number decimal. To improve students' ability to solve problems, the first thing the teacher does is apply an interesting learning model in every learning process. Before the learning process takes place, the teacher prepares a teaching module based on classroom action research. Next, prepare learning resources, teaching materials and also tools used in learning activities, prepare assessment instruments that will be used to measure competency achievement, prepare minimum completeness criteria for competency achievement and prepare instrument benchmark for the success of the action. In Cycle II, the teacher emphasizes understanding the concept of changes in the form of objects and makes the class more conducive.

#### 2) Action

Actions here include all learning process activities regarding the application of the model learning problem based to improve the ability to understand and recognize changes in the form of objects through learning media for grade 5 students. In this case, there are three activities, namely initial activities, core activities, and final activities.

#### 3) Observation (Observation)

This observation is carried out continuously and in detail in the learning process and results. This evaluation was carried out to observe the impact of implementing the problem-based learning model during the learning activities the students' ability to understand multiplication of decimal numbers

The following is data on increasing students' ability to understand multiplication number decimals through a problem-based learning model can be seen in table 4.5 below.

**Table 4. 5**  
**Cycle II Earned Value**

No.	No	P/L	Cycle 1 evaluation value	MOH	Information
1.	Andi Asraf	L	70	75	NOT COMPLETE
2.	Busran	L	75	75	COMPLETE
3.	Rahman	L	80	75	COMPLETE
4.	Rahmansyah	L	100	75	COMPLETE
5.	Sabir	L	90	75	COMPLETE
6.	Akbar	L	75	75	COMPLETE
7.	Syamsul	L	80	75	COMPLETE



	Alam				
8.	Arya	L	70	75	NOT COMPLETE
9.	Naurah qholilah	P	85	75	COMPLETE
10.	Nurhasanah	P	100	75	COMPLETE
11.	Nurlina	P	90	75	COMPLETE
12.	Munawwarah	P	85	75	COMPLETE
13.	Hasrah Talita	L	90	75	COMPLETE
Lowest value			70		
The highest score			100		
Sum of all values			1.090		
Average value			83,8		
Number of completed participants					11 People
Number of incomplete participants					2 People
Percentage learning completeness			85%		
Percentage classic incomplete			15%		

Based on the source of the calculation results of the completeness of students' learning outcomes, it was found that the completeness of students' training results in cycle 2 was 85%. Based on the results of cycle 2 learning completion, students' learning outcomes were obtained with an average score of 83 which can be seen in table 5.0 below:

**Table 4.6**  
**Percentage of Learning Completeness for Cycle 1 Students**

No	Mark	Number of Students	Percentage of Learning Completeness	Learning Completeness Category
1	≥75	11	85%	Complete
2	≤75	2	15%	Not Completed

**Table 4.7**  
**Cycle II Overview**

Planning	Action	Observation	Reflection
a. Prepare a learning implementation plan (RPP) based classroom action research. b. Prepare sources,	a. The teacher opens the lesson by giving examples of real situations, b. The teacher motivates students to ask questions c. The teacher explains the purpose of learning and the steps to be taken.	a. Observing how students count in solving problems.	1. Record the results of observations and checklists (√) 2. Evaluate

materials, tools used in learning activities	d. Students observe and listen to the teacher's explanation of the material		
c. Prepare assessment instruments that will be used to measure competency achievement	and. The teacher gives LKPD containing other similar problems		
Prepare minimum completeness criteria for achieving competency and prepare instruments for measuring the success of actions	f. Students are given the opportunity to understand the problem g. Students discuss how to determine problem solving steps and carry out calculations manually h. Teachers monitor activities and provide guidance if necessary i. Record the results of their problem solving j. Students collect the results of their LKPD work k. The teacher provides clarification or additional explanations if necessary		

**3.2. Discussion**

The research results show that the use of the problem-based learning model in learning multiplication of decimal fractions provides good and satisfactory results. This finding is in line with teacher expectations, because the model is able to increase student understanding effectively. Experts also argue that the Problem approach Based learning, which involves students actively in the process of exploration and discovery, can increase in-depth understanding of concepts and make learning more meaningful and interesting for students. Comparative data in these 2 cycles can be seen in table 4.8 below:

**Table 4.8**  
**Comparison of the ability to understand Multiplication of Decimal Fractions of grade 5 students**  
**UPTD SDN 192 Barru**

Information	Pre-Cycle Action		Cycle I		Cycle II	
	F	%	F	%	F	%
Complete	3	23%	6	46%	11	85%

<b>Not Complete</b>	10	77%	7	54%	2	15%
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Classroom Action Research (PTK) Cycle I conducted on grade 5 students at UPTD SDN 192 Barru showed that the use of the problem-based learning model could improve students' ability to understand multiplication. Number Decimal. This happens because it is easier for students to understand the concepts presented by the teacher, especially when explanations are given repeatedly and supported by making things summary use their own sentences. However, the improvement in Cycle I still did not fully satisfy the researchers, because there were several students who did not understand Multiplication Number decimals well and difficulty in carrying out the given experiment. Therefore, in Cycle II, researchers plan to reorganize the teaching modules so that students can fully understand the material being taught.

Improvements occurred in cycle II in the ability to understand multiplication number decimals using the problem-based learning model can be followed by students well, so that their learning outcomes are maximized compared to previous learning. In this research, researchers also conducted a review at the end of each lesson to measure the improvement in students' abilities. The review is carried out by randomly appointing students to come forward and describe the results of their own decimal multiplication calculations on the blackboard.

From the results of the implementation of Classroom Action Research (PTK), there has been an improvement in each cycle, it can be concluded that with problem-based learning can improve the ability to understand multiplication of decimal numbers for grade 5 students at UPTD SDN 192 BARRU.

#### 4. CONCLUSION

Based on the research results starting from the pre-action cycle, Cycle I, and Cycle II, it can be concluded that:

The problem-based learning model (PBL) can improve students' ability to understand multiplication of decimal numbers with increasing values from the pre-action cycle to cycle II. This is shown in the pre-action details, namely 23% understanding the questions correctly, 46% in cycle I, and 85% in cycle II.

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