ISSN: 3025-020X

# Application of the Problem Based Learning Model to

# **Improve Grade V Mathematics Learning Outcomes**

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### 1. Abstract

Learning will be more meaningful and memorable for students if the implementation involves students directly. The Problem Based Learning (PBL) model is a learning model that facilitates students to learn to think critically and have problem solving skills related to the context of life. The aims of this study were: (1) to describe the application of the Problem Based Learning (PBL) model, (2) to improve the mathematics learning outcomes of fifth grade students, and (3) to describe the constraints and solutions to the application of the Problem Based Learning (PBL) model. The type of approach used in this research is Collaborative Classroom Action Research (CCAR). This research was conducted in two cycles. Each cycle consists of 2 meetings which contain the stages of planning, implementing, observing, and reflecting. The data used is in the form of quantitative and qualitative data. Data collection techniques using observation, interviews, documents and tests. The results of this study are: (1) the application of the Problem Based Learning (PBL) model to improve mathematics learning outcomes in class V is carried out with the following steps: a) student orientation to problems, b) organizing students for learning, c) individual guidance or group, d) show the results of work, and e) evaluation; (2) the application of the Problem Based Learning (PBL) model can improve the learning outcomes of fifth grade Mathematics; (3) The obstacle in this study is that there are still students who are less active in asking questions and providing responses, while the solution to these obstacles is to provide motivation and habituation for students to dare to debate and ask questions.

Keywords: Problem Based Learning (PBL), Learning Outcomes, Mathematics

ISSN: 3025-020X

#### 2. Introduction

Education is one area that has a major influence on the progress of the nation and state. The transformation of science and technology can be done through the field of education. Increasing the quality of education is determined by learning outcomes so that national education goals can be achieved. Schools are the fulcrum for educating and preparing students so that they can develop optimally, based on their abilities and values. To create quality learning, the teacher's role is very important in determining and developing appropriate learning methods, media, strategies and tools.

Students as subjects need self-development to explore their abilities, skills and talents through the learning process. Children aged 9-11 years are in the stage of concrete operational development during elementary school. This stage includes the period of probing and trying which is driven by curiosity as well as the childhood to focus and save energy for exploring. like groups and organizations, earnestly complete assignments, and need guidance from parents (Sobur, 2013: 132). Learning will be more meaningful and memorable for students if the implementation involves students directly. This is in accordance with learning mathematics which involves understanding concepts, applying, analyzing, and solving problems in order to obtain a conclusion.

Based on the results of observations made in class V of one of the public elementary schools in Yogyakarta, information was obtained that learning activities were not optimal in involving students directly. The observation results show that the average student learning outcomes are low. The data obtained from the Mid Semester Assessment in grade V showed that 43% of students obtained grades

ISSN: 3025-020X

below standard. This means that there are 14 out of 32 students who got score below the KKM/standard determined by the school, namely 73.

Problem Based Learning is a learning model designed and developed in order to develop students' ability to solve problems (Alfianawati, 2019). Various studies have proven that the Problem Based Learning Model can improve: Mathematics learning outcomes, critical thinking skills, problem solving skills, motivation & selfefficacy, creative thinking skills & independent learning, metacognition abilities and mathematical connection abilities of students in Elementary Schools (Abidin, 2020; Andayani et al., 2019; Herzamzam, 2021; Lestari et al., 2019; Suprapto et al., 2020). The Problem Based Learning (PBL) model has been implemented by several researchers, but focuses on achieving the implementation of the Problem Based Learning Model itself. There are limited studies related to student learning outcomes, especially in grade V elementary school. Therefore, this study intends to further analyze its relationship with mathematics learning outcomes. In this study will be investigated through 2 cycles with each cycle consisting of two meetings. The purpose of this study was to describe the application of the Problem Based Learning (PBL) model in improving mathematics learning outcomes, to improve mathematics learning outcomes and to describe the constraints and solutions to applying the Problem Based Learning (PBL) model in improving mathematics learning outcomes for grade V elementary schools.

#### 3. Methods

The research was conducted at one of the public elementary schools in the city of Yogyakarta. The subjects of this study were 32 fifth grade students consisting of

ISSN: 3025-020X

18 male students and 14 female students. The focus of this research is to improve mathematics learning outcomes through the application of the Problem Based Learning (PBL) model.

This study uses a collaborative classroom action research approach. Sources of data in this study were students and teachers. Data collection techniques in the form of observation, interviews, documents and tests. Test the validity of the data using source triangulation techniques and technical triangulation. Data analysis used in this study includes quantitative analysis and qualitative analysis. Descriptive analysis is used to analyze data in the form of numbers presented in the form of tables/graphs. Qualitative data analysis includes data reduction, data presentation, and conclusion/data verification.

The indicator of the success of this research is the learning outcomes after applying the Problem Based Learning (PBL) model reaching the target of 85% measured by the number of students who score  $\geq$  KKM/standard in mathematics, namely 73 through a technical test. The research procedure was carried out in two cycles. Each cycle has 2 meetings, each consisting of planning, implementing, observing, and reflecting (Kemmis and Taggart in Wijaya, 2019).

#### 4. Results and Discussion

Problem Based Learning is a learning model based on student-centred social constructivist theory characterized by the construction of multiple perspectives of knowledge with multiple representations, to social activities, and focuses on discovery and collaborative learning, scaffolding, training, and authentic assessment (Grant & Tamim, 2019). Meanwhile, Suh & Seshaiyer (2019) state that Problem

Based Learning (PBL) is a process of inquiry that resolves questions, curiosity, doubts, and uncertainties about complex phenomena in life.

The application of the Problem Based Learning (PBL) model to improve mathematics learning outcomes in class V SD is carried out in two cycles and each cycle consists of 2 meetings. The learning process is carried out with the steps of (1) orientation to the problem, (2) organizing students to learn, (3) guiding individual and group investigations, (4) presenting the work, and 5) evaluation. The steps used by researchers refer to the steps proposed by Noviana et al (2014: 2), and Nasution (2011: 30).

The learning outcomes of students through the application of the Problem Based Learning (PBL) model have increased and decreased in each cycle described in the following table.

	Cycle 1		Cycle 2	
Description	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>
	meeting	meeting	meeting	meeting
Higest Score	90	100	100	100
Lowest Score	35	60	55	60
Average Score	73.93	79.64	83.66	87.5
Complete	21	22	26	28
Incomplete	11	10	6	4

Table 1. Analysis of Students' Mathematics Learning Outcomes in Cycles I and 2

Based on the table above, it can be seen that the completeness of students' mathematics learning outcomes tends to increase in each cycle. In cycle 1, the average percentage of students who achieved completeness at first meeting was

ISSN: 3025-020X

75%, at second meeting it increased to 81.25%. Meanwhile in cycle 2 the percentage of completeness at the first meeting reached 84.37%, at the second meeting it increased 87.5%. Thus the average completeness of student learning outcomes in the first cycle is 78.12% while the average mastery in the second cycle is 85.93%. The final results in cycle 2 have reached the specified target.

Thus, the application of the Problem Based Learning (PBL) model can improve the learning outcomes of class V mathematics as seen from the percentage of students who meet the target achievement from cycle 1 to cycle 2. The results of this study strengthen the research conducted by Herzamzam (2021) which shows that the application of the Problem Based Learning (PBL) model has a greater value of student learning outcomes than conventional learning models.

This increase in learning outcomes is due to the syntax of the Problem Based Learning (PBL) model which involves students directly in the implementation of learning. Students are more active in learning and thinking critically to solve a problem they face. Thus the level of understanding of students can increase and learning outcomes also increase. This is in accordance with his ideas related to the principle of Problem Based Learning (PBL). For example (Servant-Miklos et al., 2019): 1) The idea that the use of open problems becomes the starting point for learning problem solving and from the specific problems induced it becomes general; 2) Constructivist psychology which states that learning is accommodation or representation; 3) One must experience a deep and meaningful learning process. Therefore, the teacher does not act as a giver of knowledge but rather as a guide in the learning process.

Obstacles in applying the Problem Based Learning (PBL) model to improve

ISSN: 3025-020X

mathematics learning outcomes in class V SD, there are: (1) students have not focused their attention on learning activities because of the presence of researchers and observers in class; (2) students don't dare to ask and express their opinion when the picture is shown; (3) students are not confident when reading the results of their presentations in front of their friends; (4) during group discussions some students did not focus on their group work. The solutions to these constraints are: (1) explaining to students the aims and objectives of researchers and observers in the classroom; (2) providing motivation and habituation to students so they have the courage to express opinions and ask questions; (3) giving encouragement so that students are always confident in presentations; and (4) making an agreement for everyone to work in groups because it is not just assessing results but also assessing process skills.

#### 5. Conclusion

The application of the Problem Based Learning (PBL) model to improve Mathematics learning outcomes in grade V elementary schools is carried out in the following steps: (1) orientation to the problem, (2) organizing students to learn, (3) guiding individual and group investigations, (4) present the results of the work, and 5) evaluation.

The Problem Based Learning (PBL) model can improve mathematics learning outcomes for fifth grade elementary school students. This is evidenced by the average percentage of completeness of student learning outcomes in the first cycle was 78.12% and the average mastery in the second cycle increased to 85.93%. The final result has met the achievement of the research indicator target of 85%.

ISSN: 3025-020X

In connection with the research results that have been achieved, the researcher proposes the following suggestions: (1) the research should be carried out in 3 cycles to be able to find out more about the results and progress of the actions (2) students should be more active and focused when participating in learning so they can understand the material covered. submitted and obtain good learning outcomes, (3) The application of the Problem Based Learning (PBL) model should be used as a reference by teachers in choosing other subject learning models, (4) in the application of the Problem Based Learning (PBL) model can be further investigated related to the activeness of students during learning.

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ISSN: 3025-020X

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