

**IMPROVING MATHEMATICS LEARNING OUTCOMES THROUGH
PROBLEM-BASED LEARNING MODEL IN 5TH GRADE OF SDN 235
PALEMBANG**

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<u>Article Info</u>	Abstract
Accepted September 2023 Revised Juni 2023 Approved Mei 2023	<p>This research was conducted due to the identified issue within the classroom: the low learning outcomes of students in mathematics and their lack of familiarity with critical thinking, resulting in passivity. This research aimed to improve mathematics learning outcomes through the Problem-Based Learning (PBL) model for 5th grade students in SD Negeri 235 Palembang. This research used the classroom action research (CAR) method, conducted over two learning cycles. The research subjects were 23 students in 5th grade. This research used a learning outcome test instrument as the data collection technique. This research demonstrated that the problem-based learning model could improve students' learning outcomes. In the pre-cycle stage, 43% of students achieved competence with an average score of 64.7. There was an improvement in cycle I, with 65.2% of students achieving competence with an average score of 70.4. Furthermore, in cycle II, the score improved to 87%, with an average score of 87.6.</p> <p>Keywords: Learning Outcomes; Mathematics; Problem-Based Learning</p>

A. Introduction

In the era of technological advancement 4.0 and society 5.0, education is considered a bridge to shape high-quality human resources; through education, individuals can improve their existing qualities (Putri, 2018). However, to achieve quality education, learning and teaching are necessary.

According to Bintari (2014), teaching directs the educational process to achieve a desired change target. On the other hand, the learning process is an activity conducted by teachers and students to achieve a learning objective (Wahid, 2018). Their learning activities determine students' success in achieving a learning objective. These activities significantly impact the learning process because learning involves a series of activities to change behaviour as a learning outcome (Hariati, 2022).

According to Windiyani et al. (2018), measuring the success of a teacher's teaching is achieved by assessing the grades obtained by students after participating in the learning process conducted by the teacher. The learning outcomes achieved by students' impact teachers, as they will estimate the extent of students' progress in understanding the subject material taught by the teacher. When students' learning outcomes are below the Minimum Mastery Criteria, the teacher must identify and improve the factors contributing to the low learning outcomes of those students.

Based on the observations conducted in 5th grade of SDN 235 Palembang during the mathematics learning process, it was found that many students need to be more attentive and active in the learning process. This situation occurs because the teaching approach is still teacher-centred and relies heavily on lecture-based methods. Moreover, there needs to be more variation in the teacher's teaching methods. This teaching approach leads to student passivity and a limited understanding of the learning material, eventually affecting the suboptimal learning outcomes of the students.

The suboptimal learning outcomes achieved by the students are noticeable from the mid-semester exam results in mathematics for the second semester of the academic year 2022/2023. The average scores of 5th grade students were below

the Minimum Mastery Criteria set by the school of 70. Based on the observations, out of the 23 students, only 10 students passed, while 13 did not. The learning outcome data showed an average score of 64.7, with a learning mastery percentage of 43%. Based on the issues identified in 5th grade, there is a need to improve the student's learning outcomes. In this consideration, the teacher needs to enhance the students' learning outcomes during the teaching process. Therefore, classroom action research must be implemented, involving teacher-initiated actions to improve the learning process.

According to Kuswati (cited in Maryani & Kusumawardani, 2022), mathematics is a scientific discipline that is highly essential in daily life. It aligns with the perspective of Muhsetyo et al. (2014), who states that mathematics is a universal science with a crucial role in various fields of knowledge. As such, mathematics should be taught to all students across all educational levels to equip them with critical, logical, and systematic thinking abilities, enabling them to solve challenges encountered in everyday life.

In this context, the need appears for a teaching model that can improve students' critical, logical, and systematic thinking abilities. It enables students to tackle real-life issues and improve their learning outcomes effectively.

A learning model that can help to improve students' thinking abilities while also focusing on the students themselves is the Problem-Based Learning (PBL) model. Suprihatiningrum (2014) states that problem-based learning is an approach where the students are presented with a problem from the beginning and then engage in student-centred information-seeking.

According to Fitrayadi & Rahman (2021), the problem-based learning model is an instructional approach that uses existing problems within the students' environment. Meanwhile, Rahmadani (2017) states that the problem-based learning model emphasises students' active engagement in problem-solving during the learning process, thereby sharpening students' thinking skills.

Fundamentally, the Problem-Based Learning (PBL) model leads students to think critically in collaboratively solving problems they encounter in their environment, making them active participants in the learning process. It is also in

line with Bilqis et al. (2016) that applying the problem-based learning model engage students actively in learning activities, as the problem-based learning approach can provide a strong understanding of the subject material for students. Hotimah (2020) mentions that the problem-based learning model consists of five stages: (1) orienting students to the problem, (2) organizing students, (3) guiding individual or group investigations, (4) developing and presenting outcomes, and (5) analyzing and evaluating the problem-solving process and outcomes.

Relevant research conducted by Nur Indah Syafiqoh et al. (2021) has shown that the problem-based learning model can improve students' learning outcomes. It is evident from the data analysis results, which indicate that in cycle I, 70.6% of students achieved mastery. In cycle II, there was an increase in learning outcomes to 82.3%. There was further improvement in cycle III, with 88.2%. Another research also confirmed the improvement of learning outcomes through the problem-based learning (PBL) model by Utomo et al. (2022). According to the research, the descriptive analysis of the learning motivation questionnaire revealed an improvement in learning outcomes by 38.72%, with the experimental class experiencing a 20.93% increase. Therefore, implementing the problem-based learning model has successfully improved students' learning outcomes.

Based on the above explanation, using the Problem-Based Learning model can improve students' learning outcomes. Therefore, based on the observations and previous research results, the researcher aims to research "improving mathematics learning outcomes through the problem-based learning model in 5th grade of SDN 235 Palembang".

B. Research Methodology

The type of research conducted is Classroom Action Research (CAR). According to Sanjaya (2016), Classroom Action Research (CAR) is one of the methods that teachers can use to enhance their roles and responsibilities in terms of instructional management.

Classroom Action Research (CAR) is carried out by identifying issues within the classroom, designing actions to manage these issues, and evaluating the

outcomes of the implemented actions (Sudjana, 2015).

According to Permatasari (2017), Classroom Action Research (CAR) is a research method carried out by teachers within their classrooms, involving stages of self-reflection, aiming to revise their practices to improve students' learning outcomes in their class.

As stated by Suryadi (2017), Classroom Action Research (CAR) holds benefits in improving the quality of teaching conducted by teachers within the classroom. CAR also improves students' learning motivation, as they directly participate in improving the teaching methods used by the teacher. Moreover, CAR is also beneficial for improving the teaching skills of educators in designing efficient and effective learning.

The subjects of this research were the 5th grade students of SD Negeri 235 Palembang, with 23 students consisting of 9 male and 14 female students. The research was conducted in the second semester of the academic year 2022/2023. The researcher used Classroom Action Research (CAR), consisting of two instructional cycles with four phases: planning, implementation, observation, and reflection.

The researcher designed the Lesson Plan and other teaching materials in the planning stage. The researcher carried out teaching activities during the implementation stage, including introduction, main content, and closing activities. The observation stage involved recording the learning outcomes obtained from students throughout the learning process. As the final stage, reflection was done to identify and review shortcomings or obstacles encountered during the teaching process, aiming to improve the following lessons.

The data collection technique used in this research involved a test instrument consisting of questions to assess students' cognitive aspects. The success criteria of this research can be measured by the percentage indicator of students' thematic learning outcomes fulfilling the Minimum Mastery Criteria (MMC), which is ≥ 75 , at 75%. If this success indicator is achieved, the cycle will be concluded, and there is no need for further cycles.

C. Results and Discussion

This research uses the Classroom Action Research (CAR) method. The research was conducted in the 5th grade of SD Negeri 235 Palembang and was carried out over two cycles. Each cycle consisted of 1 session with a time allocation of 3 x 35 minutes. This research aimed to determine the improvement of students' learning outcomes in data processing and presentation by implementing the problem-based learning model.

Based on the data obtained from the research, which includes students' learning outcomes before implementing the problem-based learning model (pre-cycle), only 10 students completed mathematics with an average score of 64.7. After implementing the problem-based learning model in cycle I and II, there was an improvement in students' learning outcomes. In cycle 1, 15 students have completed with an average score of 70.4. There was a further improvement in cycle II, with 20 students completed with an average score of 87.6. For a more detailed overview of the students' learning outcomes data, it is represented in the following graph.

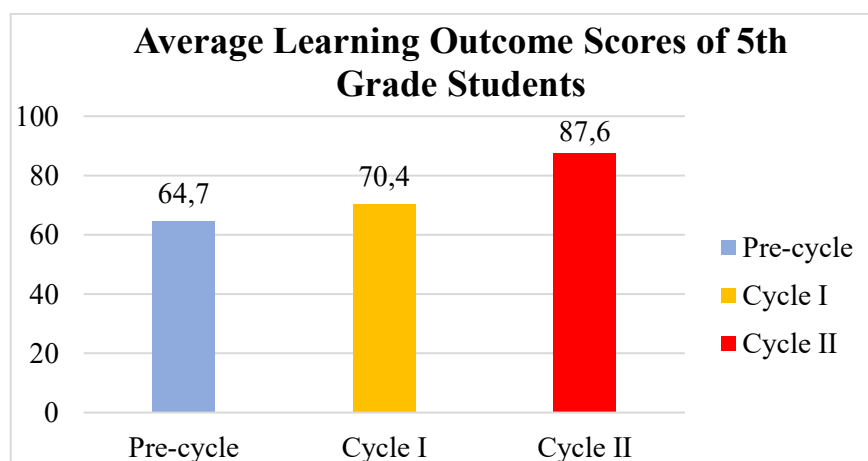


Figure 1. Comparison Diagram of Average Scores of 5th Grade Students in Pre-Cycle, Cycle I, and Cycle II

Based on the learning outcomes of 5th grade students in the pre-cycle, before implementing the problem-based learning model, the percentage of students learning mastery achieved 43%. In cycles I and II, after implementing the problem-based learning model, there was an increase in the percentage of student

learning mastery. In cycle I, the percentage increased to 65%; in cycle II, it increased to 87%. Thus, the improvement from the pre-cycle to cycle I showed a 22% increase; from cycle I to cycle II, it increased another 22%. For more detailed information about the improvement in the mastery percentage of 5th grade students, it can be observed through the diagram below.

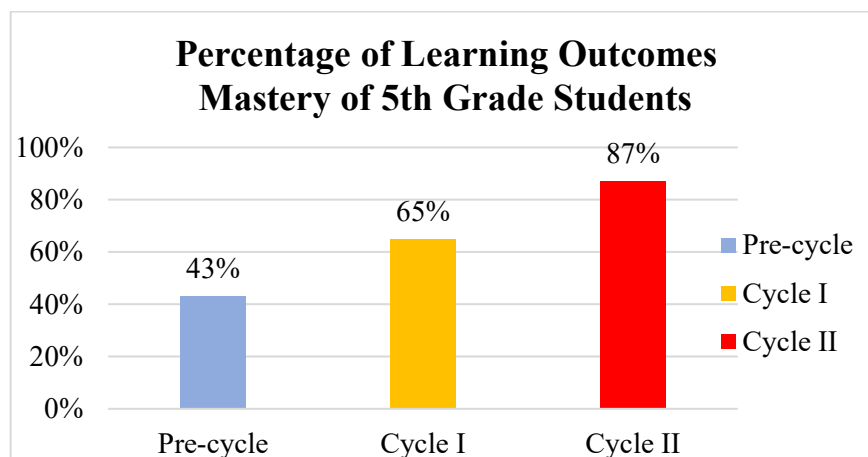


Figure 2. Comparison Diagram of Students' Mastery of Learning Outcomes in Pre-Cycle, Cycle I, and Cycle II

Before conducting the research, the researcher obtained permission from the school principal, field supervising lecturer, and mentor teacher regarding implementing Classroom Action Research (CAR) at SDN 235 Palembang. Additionally, the researcher collaborates with the mentor teacher and classroom teacher on the CAR project. The researcher, mentor teacher, and classroom teacher also discussed the research schedule and the classes to be observed. After discussions, a decision was reached that the researcher would conduct CAR in the 5th grade at SDN 235 Palembang, involving two cycles of learning in mathematics subject, specifically data processing and presentation.

The next stage is the observation. After coordinating with the school principal, field supervising lecturer, mentor teacher, and classroom teacher, the researcher conducted the research in the chosen classroom, which would serve as the observational subject for the CAR project.

In this observation stage, the researcher observed the number of students, midterm exam scores in mathematics, the content of the mathematics lessons,

lesson plans, and the seating arrangement in the classroom. It was done to facilitate group division and observe the students' characteristics during classroom instruction. The pre-cycle research was conducted by collecting data from the students' midterm exam results in mathematics. The data on the mastery of students' learning outcomes in the pre-cycle are presented below.

Table 1
Frequency of Pre-Cycle Learning Outcomes Data

No	Interval	F	P (%)	Mastery
1	≥ 70	10	43,5	Complete
2	< 70	13	56,5	Incomplete
Total		23	100	
Average			64,7	
Mastery Learning			43,5%	

Based on the data in table 1 of the frequency of students' learning outcomes from the mid-semester exam result, the researcher processed the data for analysis. After analysis, the percentage of students learning outcomes in mathematics obtained 43.5%. Therefore, an action cycle is needed to improve the achievement of student grades in mathematics.

Next is the action planning stage; in this stage, the researcher develops the research plan and techniques. Several activities to be carried out by the researcher include selecting a teaching model to improve student learning outcomes and preparing teaching materials (lesson plans, worksheets, evaluation questions, teaching materials, and teaching media). Once all preparations are complete, the researcher will implement the research in cycle I to improve student learning outcomes using the problem-based learning teaching model on data presentation and processing in the 5th grade of SDN 235 Palembang.

In the planning stage of cycle 1, the researcher plans the actions to improve student learning outcomes in mathematics, specifically focusing on data processing and presentation. The action carried out by the researcher involves utilizing the problem-based learning teaching model. Some steps in the planning phase conducted by the researcher include: 1) Analyzing the 2013 curriculum to determine learning indicators; 2) Creating the Lesson Implementation Plan for the

Data Processing topic; 3) Preparing teaching materials, instructional media, worksheets, and evaluation questions; 4) Developing the format for assessing student learning outcomes.

In the implementation stage of cycle 1, the researcher carried out learning activities according to the lesson plan that had been prepared using problem-based learning (PBL) as the teaching model. Cycle 1 was conducted in one session (3 x 35 minutes) in 5th grade with 23 students on May 20, 2023.

During the observation stage, the researcher gives an evaluation test of 10 questions for the students to answer. The following outcomes were obtained based on the observation results from the evaluation test instrument.

Table 2
Frequency of Cycle I Learning Outcomes Data

No	Interval	F	P (%)	Mastery
1	≥ 70	15	65,2	Complete
2	< 70	8	34,8	Incomplete
Total		23	100	
Average			70,4	
Mastery Learning			65,2%	

Based on the learning mastery data of the students in cycle 1 above, it can be concluded that 14 students have reached completed. In comparison, 8 students did not, resulting in a classical mastery percentage of 65.2%. Compared to the pre-cycle data (before implementing the problem-based learning model), the student's learning outcomes have increased by 22% in cycle 1. However, the research success indicator has yet to be reached, so further action in cycle II is necessary.

The final stage is reflection, which serves as a stage to identify challenges or obstacles during the learning process. These challenges could be encountered by the teacher or experienced by the students. Based on the identified obstacles and challenges, the researcher collaborates with the teacher to find solutions for the encountered issues, aiming to manage them in implementing cycle II.

The reflection identified several obstacles or challenges: (1) Time management, as in cycle 1, students needed to gather various data about their

classmates' shoe size, hobbies, weight, and math test scores, which required a significant amount of time. In cycle 2, students will focus on processing data for only one aspect to manage this; (2) Multiple-choice format for the evaluation test. During cycle 1, students were given multiple-choice questions and tended to guess the answers without analyzing the questions first. The evaluation test will consist of essay questions to encourage students to analyze the questions more thoroughly in the following cycles.

In the planning stage of cycle II, several improvements were made based on the experiences from cycle I. The improvements implemented in cycle II involved better time management to ensure an effective and efficient learning process. It was achieved by focusing on a single problem topic for students to gather data and designing the evaluation test in essay questions. These adjustments were made to manage the obstacles and challenges encountered in the learning process and improve cycle II student learning outcomes.

The next stage is the implementation stage. In cycle II, the implementation was carried out in one session (3x35 minutes) on May 26, 2023, in the 5th grade of SDN 235 Palembang. The topic was data presentation material, and 23 students participated. During the learning process, the students showed great enthusiasm. They sang songs related to data presentation, played games, and worked on problem-solving activities in groups using story problems. They also processed data from colourful candies to create data presentations in the worksheet. The students demonstrated high enthusiasm and actively sought and presented data collaboratively during the learning session.

In the implementation of cycle II, the time management was well-handled, and the students were focused on individually analyzing and working on the evaluation questions in essay format. It was observed that, on average, the students could answer the given questions.

During the observation stage in cycle II, the students were provided with a set of evaluation questions in essay format to assess the improvement of student learning outcomes in 5th grade during the learning process in cycle II. The data from the assessment of the evaluation test for the students in cycle II is presented

below.

Table 3
Frequency of Cycle II Learning Outcomes Data

No	Interval	F	P (%)	Mastery
1	≥ 70	20	87	Complete
2	< 70	3	13	Incomplete
Total			100	
Average			87,6	
Mastery Learning			87%	

Based on the learning mastery data from cycle II in the table above, it can be observed that the assessment results of the 5th grade students of SDN 235 Palembang for cycle II indicate that 20 students have completed and 3 students did not, with a classical percentage of 87%. Considering the classical percentage data from cycle II, it has already reached the predetermined research success indicator of 80%. Thus, the 5th grade students at SDN 235 Palembang in this cycle II have achieved the expected mastery target.

In the final reflection stage, there were no identified shortcomings or obstacles during cycle II learning. It is indicated by the improvement in students' learning outcomes, engagement, and enthusiasm in the learning process. Their active participation and enthusiasm occur from their problem-solving approach to story problems and data processing related to colourful candies, conducted in groups. Additionally, integrating a song related to data presentation in cycle II led to students' eagerness to sing, and the essay-format evaluation questions encouraged individual focus and analysis among the students. This classroom action research was conducted for only two cycles, as the desired mastery target of 87% had been achieved, so it will not be continued to cycle III.

D. Conclusion

Based on the research findings regarding the learning outcomes of students in mathematics, specifically in the data processing and presentation, using the problem-based learning model in the 5th grade of SDN 235 Palembang, students' cognitive learning outcomes showed an improvement of 22% in each cycle. In the pre-cycle, the average score of the students was 64.7, with a percentage learning

outcome of 43.5%. After implementing the problem-based learning model in cycle I and II, there was an improvement in learning outcomes. In cycle I, the average score of the students increased to 70.4, with a percentage learning outcome of 65.2%. In cycle II, the average score of the students increased to 87.6, with a percentage learning outcome of 87%. Based on the results of this research, implementing the problem-based learning model has successfully improved the learning outcomes of the 5th grade students in SDN 235 Palembang.

The researcher can provide the following suggestions: (1) teachers should consider using the problem-based learning model during classroom teaching, as this model can help students practice critical thinking to solve problems, making learning more meaningful for students; (2) students should possess the ability to collaborate and communicate effectively. By implementing PBL, students can develop critical, creative, and independent thinking skills, leading to improved learning outcomes; (3) the school should provide support by offering adequate facilities for PBL, such as discussion rooms, projectors, and a well-equipped library.

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