



Improving Student Mathematics Learning Outcomes Through the Implementation of PBL Models for Students of Class VII H SMPN 23 Pekanbaru

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ABSTRACT

This classroom action research aims to improve student's learning process and outcomes by applying problem-based learning models in the class. The subjects of this study were 39 class VII H students of SMP Negeri 23 Pekanbaru with different levels of academic ability. This research was divided into 2 cycles, each consisting of four stages: planning, implementing, observing, and reflecting. The data collected was obtained from researchers' observations of the learning activities of teachers and students during class and learning outcomes tests in the form of daily tests. The results obtained are an increase in a better direction. This can be seen in students who participate actively and are more responsible in the learning process, such as discussing, presenting, expressing opinions, and asking questions to provide learning conclusions. The number of students who achieved KKM on the basic value, daily test I (cycle 1), and daily test II (cycle II) was 51.2%, 58.9%, and 66.7%. KKM presentations that experienced an increase from before to after the action showed that student learning outcomes improved. The results of this study indicate that the learning process using a problem-based learning model can improve the quality of learning and learning outcomes of class VII H students of SMP Negeri 23 Pekanbaru.

INTRODUCTION

Mathematics is one of the disciplines studied in every academic unit. Mathematics is a universal science that benefits society, forms the basis for the development of modern technology, and has an important role in various disciplines. From an early age, mastery and understanding of mathematics are needed to master and create future technology. Mathematics lessons equip students to use the ability to think logically, analytically, systematically, critically, innovatively, and creatively. These competencies are needed so students can obtain, manage, and utilize all information in ever-changing and highly competitive circumstances [1]. Mathematics is a subject that must be given to all students at all levels of education. One of the benefits of mathematics is taught to students so that students can think logically, critically, systematically, and analytically both at school and in the community. Therefore, it is very important to study mathematics at every level of education taken[2]. Students generally see mathematics as a complex subject, and makes students afraid to learn [3]. This causes students not to understand the material that has been taught and has an impact on the inability of students to complete independent assignments or homework given by the teacher. So that students take unfavorable actions, namely copying or cheating on their classmates' answers. This makes the results obtained by students impure and cannot be used by the teacher as a benchmark for measuring students' understanding of the material. The purpose of learning mathematics is to train ways of

thinking in understanding concepts, using patterns as conjectures and making generalizations based on phenomena, using reasoning in solving problems, developing communication skills in conveying ideas, having an attitude of appreciating the usefulness of mathematics, having attitudes and behavior by mathematical values, carry out motor activities, and develop skills in using simple visual aids [1].

Learners can achieve the success of learning objectives by increasing understanding, mastery of the material, and learning achievement. A learner's success in learning can be seen from the learning outcomes he gets through an assessment. The learning outcomes obtained by students cannot be separated from the learning process provided by the teacher.

Based on observations of the mathematics learning process for class VII H (Sultan Syarif Kasim), SMP Negeri 23 Pekanbaru, it is known that the student's learning outcomes still have difficulty solving word problems.

Table 1. Student Learning Outcomes

No	KKM Value	Frequency	Percentage	Description
1	≥ 80	20	51%	Complete
2	< 80	19	49%	Not complete
Total			2550	
Maximum value			100	
Minimum value			0	
Average			65	

The situation in the class also affects student learning outcomes when answering practice questions in front of only highly capable or intelligent students who always come to the front of the class so that students with average or low abilities tend to be passive or just silent during class. This learning impacts the participants' learning outcomes assessed through daily tests, where many students still score below the KKM standard.

One of the teacher's efforts to improve learning is for the teacher to ensure and re-explain material that is the same, poorly understood, or looks difficult for students with average and low abilities. The teacher has also tried to guide students to understand the material being studied and hopes that these students understand and get satisfactory learning results. However, this does not have a good effect on student learning outcomes. Based on the problems students face, it is necessary to apply a learning model that can help teachers and students improve learning outcomes in student-centered classes. Learning outcomes are abilities possessed by students after receiving their learning experience. Learning outcomes include students' cognitive, psychomotor, and affective values, which increase after the teaching and learning process occurs [4]. States that the factor causing the low mathematics learning outcomes of students is the lack of interest of students in participating in mathematics lessons [5]. This is because mathematics is one of the most challenging and frightening subjects compared to other subjects. The success of education in schools can be monitored by the learning outcomes that students have achieved. At the end of each learning process, an evaluation is always carried out to determine the student's success level in the learning process that has been carried out for a certain time. Evaluation is a process of collecting data to determine to what extent, in what ways, and how educational goals have been achieved

One of the efforts in the learning process centered on students is the Problem-Based Learning Model (PBM). According to [1], problem-based learning is a learning process based on real life. Students are stimulated to study problems based on prior knowledge and experience (Prior

Knowledge). The problems given help raise students' curiosity in the learning process. According to [6], the problem-based learning model is a model that focuses on student activity in solving a problem. Another opinion is from [7] that students do not only receive material or learn in one direction in the learning process using problem-based learning. With this model, the learning process will occur naturally as well as students can strengthen problem-solving skills, find the right formula and solve the problem with free thinking.

One of the important aspects of the learning process is the evaluation of learning by means of the teacher providing solo exercises, which are done at the end of the lesson, or giving homework to students. From the evaluation given, it can be seen whether the teacher successfully conveys class material to students [9]. To realize the quality and advanced education, an increase is needed at the learning process stage, one of which is increasing quality evaluation because the results of learning evaluation can show the level of success or failure of a learning process [10]. To obtain good learning evaluation results, teachers need evaluation tools that are practical and valid to achieve specific goals.

Based on the characteristics and problems faced by students, the teacher is motivated to improve the learning process by applying the Problem-Based Learning model to enhance the mathematics learning outcomes of class VII H students (Sultan Syarif Kasim) SMP Negeri 23 Pekanbaru on the material Linear One Equations and Inequalities Variable.

METHODS

The form of research conducted is Classroom Action Research (CAR). Classroom Action Research (PTK) is carried out to improve the quality of classroom learning practices [7]. Classroom Action Research (CAR) examines activities that are deliberately raised and occur in a class [8].

The research was conducted in class VII H (Sultan Syarif Kasim) SMP Negeri 23 Pekanbaru, with the researchers as teachers and math teachers as observers during the learning process. The action taken by the teacher in the learning process in the classroom is the application of the Problem-Based Learning model to the material of One Variable Linear Equations and Inequalities to improve student learning outcomes in class VII H (Sultan Syarif Kasim) SMP Negeri 23 Pekanbaru. Classroom action research was carried out through four stages, namely (a) planning; (b) implementation; (c) observation/observation; and (d) reflection. The study's implementation of the learning process used two cycles consisting of eight meetings, six learning implementation meetings, and two daily repetition meetings. The learning process is done twice a week, namely Monday and Thursday, with three hours of lessons on Monday and two hours on Thursday.

RESULTS AND DISCUSSION

Result of research in each cycle:

1. Cycle I

In the initial / planning stage, before the researcher carried out cycle I, the researcher had made and produced learning tools that would help during the learning process in class. The learning tools created are in the form of (1) Teaching modules; (2) teaching materials; (3) LKPD; and (4) learning media, namely Powerpoint. In the learning process, the researcher has also prepared test questions in the form of formative tests to test the understanding abilities of students in class after the learning process. The results of this study follow the PTK stages, which consist of four steps, and the following is the exposure for each cycle

The first cycle lasts 4 meetings, namely: from the first meeting to the third meeting, students will follow the learning process by applying a problem-based learning model with 3 lesson plans, with

1 session using worksheets and 2 other meetings not using worksheets. At the fourth meeting held Daily Deuteronomy 1 (UH 1)

The First Meeting

This meeting lasted for 2 hours of lessons (80 minutes). Implementation involves three activities: initial activities/introduction, core activities, and closing activities. In initial activities, the class begins with preparing and praying before the lesson led by the class leader and checking student attendance. The teacher explains the material today. In Phase-1, students are taught about open and closed sentences and how to determine their value. The teacher also explains everyday problems so that students better understand the concept of open sentences.

Furthermore, they began understanding the story's problem at this meeting and changed it into an equation. In Phase-2, the teacher explains today's material on the blackboard. Students pay attention and record things that need to be noted. Students write down everything on the blackboard and pay attention to the teacher calmly explaining.

Furthermore, in Phase-3, the teacher gives practice questions to students and supervises student work by checking student desks. The students understood more at this meeting, but some still asked about minor things, such as positive and negative signs. In Phase-4, students collect answers to practice questions in the future, and the teacher checks and assesses students' responses.

Furthermore, in Phase 5, after the teacher examines and assesses the student practice questions, the teacher allows students to ask questions regarding today's material they do not understand. The students answered that they understood everything.

In closing activities, the teacher asks students to conclude today's learning material and have not carried out formative tests. The teacher gives homework to students and reminds the material to be studied at the next meeting. However, when instructed to do the exercises independently and not to make noise, the students understood the instructions and did their assignments quietly.

Second Meeting

Activities to prepare students for learning are the same as in the first meeting. Next, the teacher displays a video through Infocus and asks students to conclude the video. The teacher explains the content and relevance of the video to the material to be learned. The teacher explains the learning objectives and learning steps that will be carried out.

In core activities, Phase-1, the teacher divides students into several groups, and the teacher distributes LKPD to each student and asks students to understand the problems that exist in LKPD. Many students ask about how to write down what is known, asked from the existing problems.

After students understand what must be done in LKPD, then in Phase-2, the teacher asks students to analyze and transform what is known from the problem into an equation. Many students still ask about how to change the situation into an equation.

In Phase-3, the teacher supervises students' work by checking the progress of LKPD that students have worked on in each group. In working on LKPD problem 1, many students still ask questions directly because they have difficulty turning the problem into an equation. Students also experience difficulties filling out LKPD because they are not used to doing exercises using LKPD. Then the teacher asks the students to discuss with their group mates in working on the LKPD even though each student gets an LKPD. Then the teacher asks if you understand the steps to solve the problem. Students answered yes.

When entering Phase-4, several groups were already ready, and most had not finished working on the final problem on LKPD. The teacher gives another 5 minutes to the unfinished group to solve

the last problem. The time allotted was up, and the teacher asked 2 groups to present the results of their discussion.

Furthermore, in Phase 5, after the students presented the results of their discussion, the teacher allowed the other groups to ask questions or provide responses to the results of the group presentation. Students agree with the results of the presentation group and say that their answers are the same. The teacher appreciates the group that is presenting by applauding the group. After discussing the discussion results, the teacher asked one of the students to convey the conclusions obtained from working on LKPD. Then, the teacher asks students to return to their original sitting position.

In the closing activity, the teacher gives a formative test to students with as many as 2 questions, which is done independently. The teacher closes this heart lesson. Many students are still noisy and talking with their friends

Third Meeting

Activities to prepare students for learning are the same as in the first meeting. At the beginning of learning, the teacher asks students to collect homework from the previous session. After that, the teacher provides a pre-test to measure students' abilities in the previous meeting material. The teacher explains the material today. In Phase-1, students are given a problem likened to everyday life. The teacher asks to understand the problem and find its truth value.

Furthermore, they began understanding the story's problem at this meeting and changed it into an equation. In Phase-2, the teacher explains today's material on the blackboard. Students pay attention and record things that need to be noted. Many students still do not take notes and ignore the teacher in front.

Furthermore, in Phase-3, the teacher gives practice questions to students and supervises student work by checking student desks. The students understood more at this meeting, but some still asked about small things, such as positive and negative signs. In Phase-4, students collect answers to practice questions in the future, and the teacher checks and assesses students' responses.

Furthermore, in Phase 5, after the teacher examines and assesses the student practice questions, the teacher allows students to ask questions regarding today's material they do not understand. The students answered that they understood everything.

In closing activities, the teacher asks students to conclude today's learning material and have not carried out formative tests. The teacher informs the students that the Daily Deuteronomy (UH-1) material will be on One Variable Linear Equation at the next meeting. However, when instructed to do exercises independently and not to make noise, the students understood the instructions and did their assignments quietly.

Fourth Meeting

Implementation of the Daily Deuteronomy (UH-1) started with the teacher checking the presence of students, 2 students were not present, and 37 students were present to participate in the first daily test. Next, the teacher writes 10 equations on the blackboard and asks students to rewrite the questions on a piece of paper and answer them. The teacher reminds us that in doing tests individually for 80 minutes (2 hours of lessons).

Cycle Reflection

The shortcomings and weaknesses carried out by the teacher and students included: (1) In working on the LKPD at the second meeting, students were still confused about filling in the answers known and asked about the story problems provided; (2) The teacher lacks time management so that

in the final activities at the first and third meetings the teacher cannot carry out formative tests.

The follow-up that the teacher will do to improve the actions in the first cycle is as follows. (1) Manage time better so that each learning activity can be implemented according to plan. (2) Guiding students more, especially when explaining material and class and group discussions.

2. Cycle II

The second cycle takes place in 5 meetings: from the fifth to the seventh, students will participate in the learning process by applying a problem-based learning model with 3 lesson plans and not using worksheets. Daily Deuteronomy 2 (UH 2) was held at the eighth meeting, and the ninth meeting was a daily follow-up test for students who were absent during daily tests 1 and 2.

Fifth Meeting

The initial activity is the same as the preparation activity at the previous meeting. The core activity begins with Phase-1 of student orientation on the problem. The teacher explains new material to students. Submission of material is aligned with giving examples of issues in everyday life. In Phase-2, the teacher provides students with practice questions to measure students understanding abilities. However, there is still a lot of commotion and many walk-in classes.

Furthermore, in Phase-3, the teacher guides students in answering the exercise questions given, and many students come forward to ask the teacher. In Phase-4 and Phase-5, the teacher provides opportunities for students who want to come forward and answer the exercises on the blackboard. After finishing and answering the exercise, the teacher allows other students to ask questions regarding things that have not been understood. Some students asked questions, and the teacher explained the material that had not been understood.

In the closing activity, the teacher gives homework to students in math print books. When finished, the teacher tells what material will be learned at the next meeting. Based on observations, it was found that the teacher had carried out the learning process well at this meeting, even though there was still a bit of commotion in the class.

Sixth Meeting

Activities to prepare students for learning are the same as in the first meeting. At the beginning of learning, the teacher asks students to collect homework from the previous session. Afterward, the teacher gives a pre-test to measure students' abilities in the last meeting material. The teacher explains the material today. In Phase-1, students are given a problem likened to everyday life. The teacher asks them to understand the problem and find its truth value.

Furthermore, they began to understand the story's problem at this meeting and changed it into an equation. In Phase-2, the teacher explains today's material on the blackboard. Students pay attention and record things that need to be noted. Many students still do not take notes and ignore the teacher in front.

Furthermore, in Phase-3, the teacher gives practice questions to students and supervises student work by checking student desks. The students understood more at this meeting, but some still asked about small things, such as positive and negative signs. In Phase-4, students collect answers to practice questions in the future, and the teacher checks and assesses students' responses.

Furthermore, in Phase-5, after the teacher examines and assesses the students' practice questions, the teacher allows students to ask questions regarding today's material they do not understand. The students answered that they understood everything.

In closing activities, the teacher gives homework and tells the material at the next meeting. However, when instructed to do the exercise independently and not make noise, the students

understood the instructions and did their work quietly.

Seventh Meeting

Preparing for the lesson is the same as in the previous meeting. The teacher asks students to collect their homework on the teacher's desk. In Phase-1, the teacher explains today's material. The teacher also explains everyday problems so that students better understand the concept of open sentences.

Furthermore, they began to understand the story's problem at this meeting and changed it into an equation. In Phase-2, the teacher explains today's material on the blackboard. Students pay attention and record things that need to be noted. Students write down everything on the blackboard and pay attention to the teacher calmly explaining in front of them.

Furthermore, in Phase-3, the teacher gives practice questions to students and supervises student work by checking student desks. At this meeting, students understood more, but there were still those who asked about small things, such as signs of inequalities and how to write a set of solutions. In Phase-4, students collect answers to practice questions in the future, and the teacher checks and assesses students' responses.

Furthermore, in Phase 5, after the teacher examines and assesses the student practice questions, the teacher allows students to ask questions regarding today's material they do not understand. The students answered that they understood everything. In the closing activity, the teacher informs that there will be a Daily Deuteronomy 2 (UH-2) material at the next meeting on One Variable Linear Inequality. However, when instructed to do the exercises independently and not to make noise, the students understood the instructions and did their assignments quietly.

Eighth Meeting

Implementation of the Daily Deuteronomy (UH-2) started with the teacher checking the presence of students. Four students were absent, and 35 present students participated in the second daily test. Next, the teacher gives a test paper containing 10 inequality questions. The teacher asks students to answer the test paper that the teacher distributes immediately. The teacher reminds us that in doing tests individually for 80 minutes (2 hours of lessons).

Ninth Meeting

At this meeting, new material was included, namely the set, but the teacher would only discuss follow-up repeat activities for students who were not present. The teacher calls the names of those who have not repeated and places students in one place to make it easier to supervise them. The teacher gives a test question and asks students to work on it individually with 80 minutes of working time (2 hours of lessons).

Cycle II Reflection

In the second cycle, the implementation of the learning process has increased when compared to the first cycle, including: (1) Class discussions are going well, (2) Students are more orderly in answering practice questions and are not as noisy in the cycle I, (3) More and more participants, students who are confident and want to progress to answer practice questions without being forced, (4) students are also capable and accustomed to the learning activities used so that they can make better use of time than the first cycle. Thus overall, the activities of teachers and students are getting better.

3. Data Analysis of Students' Mathematics Learning Outcomes

Data analysis after carrying out cycle I activity using the Problem-Based Learning model. More details can be seen in Table 2.

Table 2. Distribution of Complete Mathematics Learning Outcomes the Cycle I

No	KKM Value	Frequency	Percentage	Description
1	≥ 80	23	59%	Complete
2	< 80	16	41%	Not complete
Total			2758	
Maximum value			100	
Minimum value			0	
Average			71	

Table 2 above shows the learning outcomes of 39 students who took part in the learning evaluation, where 23 students (59%) completed or were able to reach KKM 80, and 16 students (41%) did not complete or were still under KKM. The highest score achieved by students is 100 and the lowest score is 0, and the average class score is 71.

Based on data analysis after making improvements to cycle II learning, the learning outcomes obtained have increased when compared to the learning outcomes of cycle I. For more detail, see Table 3.

Table 3. The Distribution of Completeness of Mathematics Learning Outcomes Cycle II

No	KKM Value	Frequency	Percentage	Description
1	≥ 80	26	67%	Complete
2	< 80	13	33%	Not complete
Total			2962	
Maximum value			100	
Minimum value			5	
Average			76	

Table 3 above shows an increase in student learning outcomes. It is known that 26 students (67%) completed or were able to reach KKM 80, and 13 students (33%) did not complete or were still under KKM. The highest score achieved by students is 100, and the lowest score is 5, with the average class score being 76

Based on the analysis of daily test data for class VII H (Sultan Syarif Kasim) SMP Negeri 23 Pekanbaru, an increase was obtained in cycle II. There is an increase in students' daily repetition explained. Finding their learning becomes more meaningful and lasts a long time, and this learning makes students have critical logic in solving problems and makes students more confident with their answers because, in problem-based learning, students are freed to find their knowledge and solve problems from the material that has been.

The results of the analysis of student's answers on the results of the first and second cycles of daily test tests mistakes made by students, in general, include students often writing the wrong, positive and negative signs in working on the questions and students often distinguish the sign of inequality and write the wrong, set of solutions. Some students do not carry out all the steps taught. Students immediately write down answers without writing down the method. Teachers are advised to correct student mistakes in subsequent learning by increasing practice questions in the learning process.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the research that has been tested and its discussion, it can be concluded that using Problem-Based Learning can improve mathematics learning outcomes on one-variable linear equations and inequalities in students of class VII H (Sultan Syarif Kasim) SMP Negeri 23 Pekanbaru semester 1 2022 academic year/ 2023. This can be proven by acquiring students' mathematics learning outcomes after being given action. The success of improving mathematics learning outcomes can be seen from cycle I and II results. In cycle I, 23 students completed learning mathematics or 59%; in cycle II, it increased to 26 students who completed learning mathematics or 67%. With a comparison of the number of values that have increased between cycle I and cycle II, 2758 → 2962. Using the steps of the Problem-Based Learning model can improve the results of learning mathematics on one-variable linear equations and inequalities in students of class VII H (Sultan Syarif Kasim) SMP Negeri 23 Pekanbaru.

The advice that researchers can give based on the research that has been done is for teachers to use innovative learning models in learning. So that they can help students apply the knowledge they have acquired in real life.

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