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IMPROVING MATHEMATICS LEARNING OUTCOMES USING THE PROBLEM-BASED LEARNING MODEL AT SMP NEGERI 7 BINAMU

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Abstract:
Mathematics learning is still centered on the conventional model where the teacher has high authority while the student is the object of learning. This study aims to apply the Problem-Based Learning (PBL) learning method to increase student mathematics learning activities and outcomes. The type of research carried out is Classroom Action Research (PTK), with data collection techniques through observation sheets of student activities and learning outcome tests. Data analysis techniques use descriptive techniques. The subjects in this study were grade VII A students of SMP Negeri 7 Binamu, Jeneponto Regency. The results of this study show that the increase in student learning activity can be seen from the increase in learning activity of 11 students or 50%. In cycle I, there are 16 students or 72.73%, and in cycle II, there are 20 students or 90.91%; this result is by the specified indicators, namely the active and active categories, which reached 85%. The above reality is also supported by an increase in the average learning outcomes from 61.36 to 73.18 and 85.00 in the second cycle, with the level of learning completeness that also increased in each cycle, namely 5 students or 22.73%, in the first cycle there were 12 students or 54.55%, and in the second cycle there were 19 students or 86.36%. It can be concluded that the indicators of learning success criteria have been achieved in the second cycle, so the implementation of learning improvements is declared complete and complete in the second cycle.

Keywords: *activities, learning outcomes, problem-based learning*

INTRODUCTION

Education is the gateway to a better future, where almost everyone strives from the small things to the biggest things. Education is also a conscious and structured effort to create a learning environment that allows students to develop their potential actively, including mastering self-control, shaping personality, increasing intelligence, strengthening morals, and honing skills. Therefore, education is one of the key pillars in human resource development, which must be carried out inclusively, fairly, and without discrimination, in accordance with democratic principles.

The subject of mathematics is one of the subjects that has an important role in education because of its widespread application in various aspects of human life. The purpose of teaching is for students to be able to develop logical, practical, critical, and creative thinking skills, as well as the ability to work together effectively. Despite this, the reality on the ground shows that many people still consider mathematics as something scary, boring and difficult to understand (Husain & Syaharuddin, 2020; Kusumawati, 2023a).

Mathematics is a subject taught at every level of education. Mathematics lessons have an abstract nature, so a correct understanding of concepts is very important to understand concepts from mathematics. In addition, it is also necessary to have a prerequisite understanding of the concept because concepts in mathematics are related to one another (Gunantara et al., 2014; Rahayu et al., 2023).

Mathematics learning in junior high school has been dominated by conventional learning where students are positioned as learning objects, they are considered ignorant or do not understand anything, while teachers position themselves as someone who has knowledge. So that the teacher seems patronizing and has the highest authority in the learning process (Paizaluddin & Ermalinda, 2013). So far, Mathematics learning provided in schools has been finished and student involvement in the teaching and learning process is still relatively low in trying to find their own concepts from the material taught.

Learning can be interpreted as a change in ability, attitude, or training. Changes in ability that only last a moment and then return to the original behavior show that there has not been a learning event, even though teaching has occurred. Because teachers who are always monotonous in delivering material cause the teaching and learning process to be less than optimal (Putra, 2013; Suprijono, 2010).

Teachers as educational professionals have an important role in the teaching and learning process. Teachers must be able to explain the knowledge they have to their students through learning management by applying approaches and teaching models that are in accordance with the subject matter and cognitive level of students. In addition, teachers must also pay attention that students must be actively involved in the teaching and learning process so that the material taught is more meaningful to students and the desired learning goals can be achieved (Kusumawati, 2023b).

The choice of approaches or learning strategies that will be used by teachers in the teaching and learning process can affect student interest and motivation to learn. In addition, it can also affect students' understanding of material or basic concepts which ultimately affect student activities and learning outcomes (Mulyanto et al., 2018; Susanti & Rustam, 2018).

Maths is often perceived by students as a very difficult and scary subject. Even though students want to get information about things around them in actual circumstances. Learning mathematics at this time is still considered boring. The passive attitude of students in learning and the monotonous teaching system have had an impact on student learning outcomes. Student learning outcomes are still lacking. The value between students with the ability to think well and those that are less noticeable is striking.

Based on the results of initial observations made by researchers, especially students of grade VII A SMPN 7 Binamu who are the subjects of the researcher's research. It was found that 77.27% of students or 17 students scored below the completeness standard of 75. The teaching model that occurs in the classroom in general still uses the lecture method whose activities involve more teachers so that students in the teaching and learning process are more likely to be passive. This condition shows that an improvement effort is needed in the mathematics teaching model that can stimulate students to learn actively in the teaching and learning process (Naini, n.d.; Nurlaily et al., 2019).

The process of learning mathematics must involve students' thinking processes and activities actively by developing the cognitive abilities of each student, because cognitive development as a determinant of children's intellectual intelligence, cognitive abilities continue to develop along with the educational process and are also influenced by physical development factors, especially the biological brain. The next development related to cognitive is how to manage or regulate these

cognitive abilities in responding to situations or problems. Obviously, the cognitive aspects cannot run alone in isolation but need to be controlled or regulated so that if a person is going to use his cognitive abilities then it needs the ability to determine and regulate what cognitive activity will be used.

One method of learning that can develop independent learning skills is the Problem-based learning (PBL) method. PBL has characteristics such as Sudjana (2010) Learning begins with the provision of "problems", usually "problems" have a context with the real world, learners in groups actively formulate problems and identify their knowledge gaps, study and search for themselves material related to "problems", and report solutions to "problems". In this method the teacher exposes students to a problem, then students find the cause of the problem, and analyze it to find new knowledge based on their own thoughts.

According to Arends (Trianto, 2011) in teaching teachers always require students to learn and rarely give lessons on how students to learn, teachers also require students to solve problems, but rarely teach how students should solve problems. To provide an understanding of the concepts of the material taught so that it can be used and can be remembered is also still a fundamental problem. How teachers can communicate well with their students, how teachers can open diverse thinking insights from all students, so that they can learn various concepts and how to relate them in real life. Boud and Margetson (Arikunto, 2012) say that Problem-Based Learning is the most significant innovation in education. PBM helps improve the development of learning skills in an open, reflective, critical, and active learning mindset.

Problem-based learning is a learning concept that uses problems as a context for students to learn about how to think critically, problem-solving skills, and to derive essential concepts from the subject matter. Medel learning Problem based learning is oriented to problems including learning. The task of the teacher here is as a motivator, facilitator and guide students who experience difficulties so that students become more active and creative so that they can improve learning outcomes (Husain & Syaharuddin, 2020; Sudjana, 2010).

Based on the background of the problems that have been explained, there are several problems in learning mathematics One Variable Linear Equation (PLSV) material at SMPN 7 Binamu. These include a lack of appeal to learning that relies solely on the lecture method, a lack of opportunities for students to think critically and solve problems, and a lack of variety in learning models that cause students to become passive and less creative. Therefore, the formulation of the problem in this study includes increasing student activity through the application of problem-based learning strategies and improving student mathematics learning outcomes using the learning model. The purpose of the study was to find out how to improve student activities and learning outcomes through the application of problem-based learning in PLSV material, especially in class VII A SMPN 7 Binamu. The benefits of this research include improving student learning outcomes, training students to be more active in mathematics learning, providing alternative learning strategies for teachers, as well as contributing to schools in improving the quality of mathematics learning and overall improving school quality.

RESEARCH METHODS

The research method used in this study is Classroom Action Research (PTK) with a focus on improving the mathematics learning process using the Problem Based Learning (PBL) method in class VII A SMPN 7 Binamu. The object of this study is grade VII A students of SMPN 7 Binamu in semester 1 of the 2021/2022 academic year, with a total population of 22 students, consisting of 16 male students and 6 female students. Data collection techniques used include observation sheets of student activities, learning outcomes tests, and documentation methods. Observations are made to observe student activities during the PBL learning process, while learning outcomes tests are used

to measure an increase in student understanding of the material taught. In addition, documentation methods are used to record events during the learning process. The data were then analyzed using descriptive analysis techniques, such as score ranges for student activity observation sheets and calculation of average scores for learning outcomes tests.

This research method is classroom *action research.* IGAK Wardhani, et al (2007) Classroom Action Research is a translation of Classroom *Action Research, which is an* Action *Research* conducted in class. Classroom action research is research to overcome problems related to teaching and learning activities that occur in a class. The research carried out is *classroom action research* which is carried out at least two cycles. Each cycle in action research consists of four stages, namely 1) Planning, 2) Implementation, 3) Observation, 4) Reflection. Clearly these steps can be described as follows:

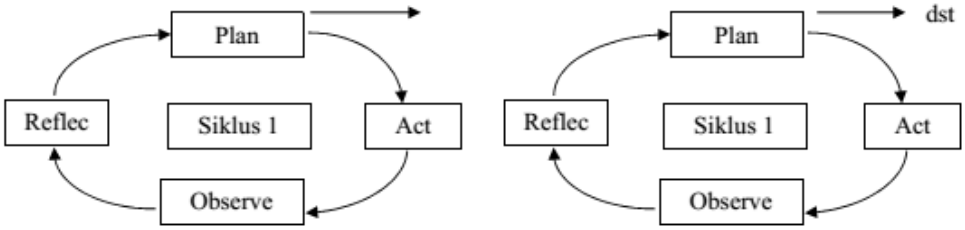

Figure 1. PTK model (development) (Sarwiji Suwardi, 2008)

The hypothesis in this study is based on the purpose of the study to improve student activity and learning outcomes through the application of the PBL method. The hypothesis is that by applying the PBL method, student learning activities will increase and student learning outcomes will be better than before. Therefore, this study aims to test and prove the hypothesis through analysis of data obtained from observation of student activities and learning outcome tests. Thus, this research method is designed to provide a comprehensive understanding of the effectiveness of PBL methods in improving mathematics learning in grade VII A SMPN 7 Binamu.

RESULTS AND DISCUSSION

Research Results

Based on the results of the evaluation test, it appears that there is an increase in students' problem-solving ability from cycle I to cycle II. This can be known from the average grade point obtained from cycle I and cycle II tests. The average percentage of students' test scores in cycle I to cycle II for each indicator of problem-solving ability also increased. This can be seen in the following table.

Table 1. Increasing Grades, and Completeness of Student Learning in Pre-Cycle, Cycle I and Cycle II

Cycle	Value	Ketuntasan				Ket
		Complete	%	Unfinished	%	
Beginning	61,36	5	22,73	17	77,27	
Cycle I	73,18	12	54,55	10	45,45	
Cycle II	85,00	19	86,36	3	13,64	

The percentage increase in student mathematics learning activities and outcomes from the initial condition, the first cycle to the second cycle if presented in the graph is as follows:

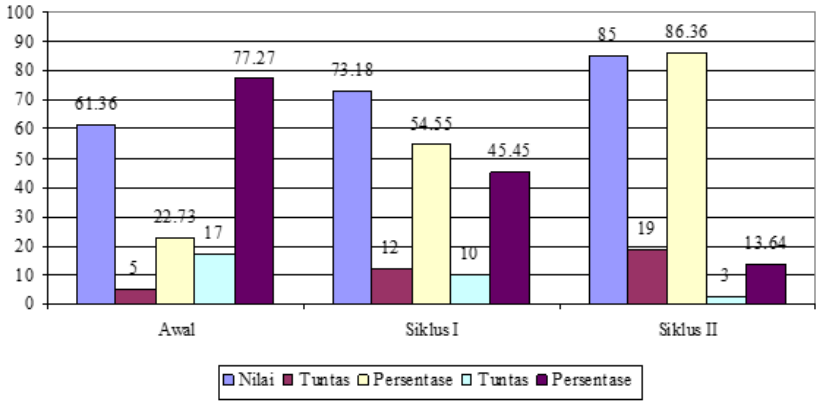

Figure 2. Increasing Grades, and Completeness of Student Learning in Pre-Cycle, Cycle I and Cycle II

From the graph and table above, it shows that the implementation of the *problem-based* learning model in mathematics learning in grade VII A of the 2021/2022 academic year can improve learning outcomes, this is shown by the increase in the completeness of learning outcomes per cycle, where in the initial conditions there are only 5 students or 22.73%, in cycle I there are 12 students or 54.55%, and in cycle II there are 19 students or 86.36%, This result is in accordance with the specified indicators, namely a minimum of 85% of all students. Average learning outcomes also increased from 61.36 to 73.18 and 85.00 in the second cycle. This shows that in the second cycle, the average learning outcomes have also met the completeness criteria, which are at least equal to the KKM of 75.00.

Student learning activities each cycle have increased, this is measured by the results of observations n collaborators related to student activities in paying attention to teacher information, student activities in group work can be seen in the following table:

Table 2. Increased Student Learning Activities in Pre-Cycle, Cycle I and Cycle II

Cycle	Ketuntasan			
	Tuntas	%	Unfinished	%
Beginning	11	50,00	11	50,00
Cycle I	16	72,73	6	27,27
Cycle II	20	90,91	2	9,09

To clarify the increase in student learning activity and the decrease in student learning activity can be seen in the bar chart below:

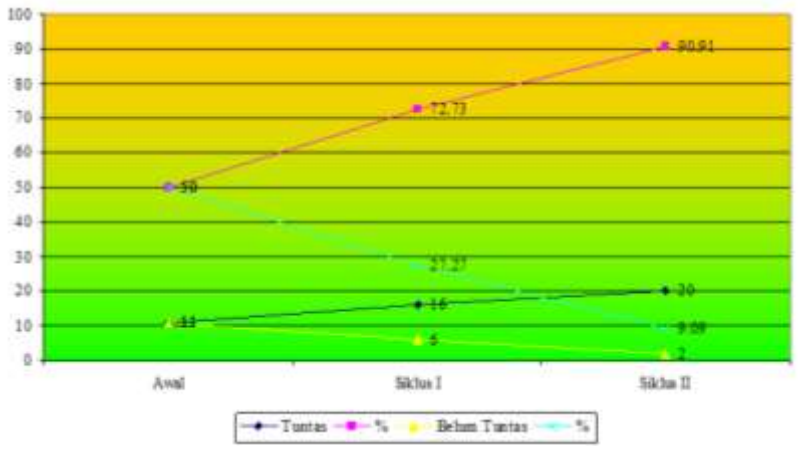

Figure 3. Increased Student Learning Activities in Pre-Cycle, Cycle I and Cycle II

From the graph and table above, it shows that the implementation of the *problem-based* learning model in mathematics learning in grade VII A of the 2021/2022 academic year can increase learning activities, this is shown by the increase in learning activities per cycle, where in the initial condition there are only 11 students or 50%, in cycle I there are 16 students or 72.73%, and in cycle II there are 20 students or 90.91%, This result is in accordance with the specified indicators, namely the active and active categories which reached 85%.

Based on the results above, it shows an increase from pre-cycle, cycle I and cycle II, in other words, the researcher's actions in implementing mathematics in class VII A of the 2021/2022 academic year in the learning process and guiding the desired learning completeness value and indicators are 85% achieved.

Discussion

This study aims to improve the mathematics learning ability of grade VII A students on PLSV material by using problem-based learning. The action given to students is to provide opportunities for students to solve problems in groups. In addition, it also provides LKS to help students be systematic in solving problems writing down what is known, asked, illustration, pictures and solutions. Another action is that researchers always give advice so that students follow learning well and always remind to solve problem solving problems in order.

To find out students' mathematical problem-solving abilities, four aspects are observed, namely understanding the problem, planning the solution, solving the problem, and re-checking the results. The four steps are interrelated and must be coherent in the process. Learning with PBL has been carried out with learning steps according to Ronis (2001), namely orienting students to problems, organizing students to learn, guiding individual and group investigations, developing and presenting works, and analyzing and evaluating the results of problem solving. In the first cycle, the implementation of PBL steps is still not optimal, but researchers always try to improve and apply learning in accordance with PBL steps. At the stage of orienting students to problems, researchers always convey the topic of learning material that will be achieved by students. The researcher presents a real problem related to the material to be studied and then orients students to the problem through questions and answers. This issue will then become a medium for student discussion.

This is in accordance with the opinion of Arikunto (2002)who states that PBL exposes students to real problems that can lead students in self-investigation and inquiry. Based on the results of observations on the implementation of learning, activities to orient students to problems have been carried out by researchers in each cycle. The next stage is to organize students to learn. At this stage, researchers develop the ability to cooperate and collaborate between students in accordance with one of the characteristics of PBL according to Purwanto (2009), namely collaboration. Yulinasari (2019) also revealed that one of the characteristics of PBL is to position students as self-directed problem solvers through collaborative activities so that students are expected to be able to become independent learners.

In this study, grouping students was carried out with the closest seatmates. Referring to the opinion of Sudirman (2012) which states that there are no standard rules regarding how to group students in PBL, the grouping consists of four people per group. This is because the task in the investigation requires the role and cooperation of group members. After students sit in their respective groups, researchers provide LKS containing problems as a follow-up to problems that have been oriented by researchers at the beginning of learning and ask students to be active in discussions with their groups. The next stage is to guide individual and group investigations. At this

stage students are expected to develop their thinking, solve problems, learn to act as adults and become independent learners.

In this study, the investigation was carried out in groups. However, each student is also required to be able to explore various alternative solutions to obtain a conclusion. In addition, students are also required to be able to work together in groups to get a solution. Researchers guide and provide direction to groups that are considered to be experiencing difficulties and have not yet been resolved. The next stage in PBL is to develop and present rich results.

Based on the results of learning observations, in every meeting researchers always provide opportunities for students to express the results of their discussions. In cycle I, only a few students dared to present the results of their discussion, even because of requests and a little coercion from the teacher. After the development and presentation of the work, students with the guidance of researchers analyze and evaluate the results of problem solving.

Based on the results of observations of the implementation of learning, in the first cycle no students dared to respond to the results of the presentation voluntarily. The courage of students to analyze and respond begins to appear in cycle II. In this stage, there were several questions and answers between students. The discussion took place with the guidance of the researcher. After the discussion is over, the researcher evaluates the results of each group's investigation and provokes the students to conclusions.

Based on the previous description, the actions taken on learning with PBL have been carried out according to PBL steps so that the actions taken have met the success indicators of the implementation of PBL learning. In accordance with the description of the implementation of research described earlier, it can be known how the application of mathematics learning through problem-based learning has been able to improve students' mathematical problem solving skills in PLSV material. This appears based on data obtained both through tests and observations.

From the description and explanation as mentioned above, it can be concluded that the learning improvement process carried out in two cycles has proven effective and successfully solves learning problems that occur in the classroom. This is evidenced by the increase in learning activities of 14 students or 43.75%, in cycle I there were 22 students or 72.73%, and in cycle II there were 30 students or 90.91% of the total number of students as many as 32 students. The above reality is also supported by the increase in student learning outcomes, where the average value of learning outcomes continues to increase from 55.00 in the initial condition, to 73.18 in the first cycle, and at the end of the second cycle to 85.00 with the level of learning completeness that also increases in each cycle, namely 10 students (22.73%) in the initial condition, to 53.46% or 17 students, and in the last cycle it became 86.36% or 28 students. From the explanation above, it can be concluded that the indicators of learning success criteria have been achieved in the second cycle, so that the implementation of learning improvements is declared complete and complete in the second cycle.

Based on the data from the implementation of the improvement of learning learning model problem based learning as described above in the form of data on the results of formative tests cycle I, formative tests cycle II and observation data cycle I and II, it can be concluded that the use of problem based learning learning models can improve students' mathematical problem solving skills in PLSV material, this is evidenced by the increase in results learning and student activity in learning mathematics PLSV material in class VII A SMPN 7 Binamu Semester 1Academic Year 2021/2022.

CONCLUSION

From the results of data analysis using the Problem Based Learning (PBL) model, it can be concluded that the application of this strategy is effective in improving student learning activities and their learning outcomes on the One Variable Linear Equation (PLSV) material in class VII A SMPN

7 Binamu. Through this method, students engage in the learning process by explaining problems, discussing in groups, and applying their knowledge in relevant problem solving. This is evidenced by the increase in student learning activity from cycle to cycle, as well as significant improvements in learning outcomes, with average learning outcomes and learning completeness levels increasing in each cycle. This conclusion shows that learning success indicators have been achieved in the second cycle, indicating that the implementation of learning improvements has been completed and successful in the cycle.

Based on observations during the application of the Problem Based Learning (PBL) model, it is recommended that teachers adopt this learning model as a variation in learning activities, so that students not only gain an understanding of the concept of the material but are also able to relate it to everyday life. Optimizing the use of this model is also important to ensure the benefits can be felt optimally. In addition, for students, it is emphasized that they are more active, independent, and responsible in the learning process, and dare to actively participate in discussions and ask questions that clarify the material. Schools are also expected to innovate learning by utilizing LKS and media and developing other learning models to improve the overall quality of learning.

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