

# Mean Learning with Problem Based Learning to Improve Problem Solving Ability of Junior High School Students

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**ARTICLE INFO****ABSTRACT**

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Problem-solving ability is a core competency in mathematics education that students must acquire to meet the demands of the 21st century. This study aims to evaluate the effectiveness of the Problem-Based Learning (PBL) model in improving students' mathematical problem-solving skills, focusing on the topic of statistics, specifically the concept of the mean. The research was conducted with 30 students in grade VIII F at SMP Negeri 3 Yogyakarta. A quantitative approach was employed using a one-group pretest-posttest design. Research instruments included problem-solving tests, observation sheets, and documentation. The findings reveal a significant improvement in students' problem-solving skills after the implementation of the PBL model, with the mean pretest score increasing from 68.33 to 78.30 in the posttest ( $p < 0.05$ ). These results demonstrate that PBL effectively enhances students' problem-solving abilities in mathematics.

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**KEYWORDS:** Mathematics, problem-Based Learning, problem-solving skills, statistics.

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## I. INTRODUCTION

This Mathematics plays a crucial role in developing students' critical, analytical, and logical thinking skills. These competencies are essential for solving real-life problems and advancing knowledge in science and technology (Sheppard & Wieman, 2020). Mathematics is a means of thinking clearly and logically, a means of solving problems in everyday life, a means of recognizing patterns of relationships, and generalizing experiences, a means of developing creativity, a means of increasing awareness of cultural development. In line with the above opinion, mathematics is one of the disciplines that can improve the ability to think, argue, and solve in everyday life (Wiryanto et al., 2021). Meaningfulness in learning mathematics is not only characterized by students' mastery of formulas or calculation procedures and techniques, but more than that, learning mathematics is said to be meaningful if students are able to understand the reasons why formulas or procedures are used and can connect prior knowledge with new concepts and relate mathematical concepts to real situations (Sheppard & Wieman, 2020). Many students find mathematics challenging, particularly when applying mathematical concepts to real-world problems.

The benefits of learning mathematics encourage students to develop critical, logical, and systematic thinking skills that are very useful in everyday life. However, achieving the goals of learning mathematics still encounters obstacles, one of which is that many students consider mathematics to be a difficult subject, resulting in a dislike of mathematics and even view mathematics as something to be avoided. (Komang Elik Mahayani et al., 2023). Mathematics is a

complex problem-solving activity, not just linear thinking. Problem solving has a significant impact on mathematical thinking. Teaching math through problem solving generally means that children solve problems to learn new math, not just to apply math once learned. The importance of problem solving in learning mathematics stems from the belief that mathematics is about reasoning, not memorization. Therefore, problem solving allows students to develop understanding and explain the process used to arrive at a solution, rather than remembering and applying a set of procedures (Szabo et al., 2020).

According to Mathematics (NCTM) there are mathematical abilities that must be possessed by students, namely communicating, reasoning, solving problems, linking ideas and also representing ideas (Syati & Priatna, 2021). Problem solving is a core component of mathematics education. Thus, in teaching practice problem solving is a powerful approach to expanding mathematical concepts and skills. problem solving skills cannot be separated from one another, problem solving must be incorporated into all aspects of mathematics learning (Szabo et al., 2020). It is essential to improve problem-solving skills in order to learn how complex choices can be made, formulate and share relevant arguments, and assess the arguments and opinions of others. In addition, these skills help students to construct diagrams, schemas, or maps of the problem, which form the basis for dynamic and collaborative discussions. The very ability of problem solving in today's increasingly advanced world, makes students required to have skills in problem solving ability. With problem solving students become skilled in completing relevant information, then analyzing it

and finally checking the results so that intellectual satisfaction will arise from within, and students' intellectual potential increases.

Problem solving encourages students and provides the widest possible opportunity to take the initiative and think systematically in dealing with a problem by applying prior knowledge. Problem solving is important in learning mathematics because it can train students in finding solutions to problems in everyday life (Harefa & La'ia, 2021). Problem solving should not be taken lightly, because problem solving is one of the basic principles of education. By using their problem-solving skills, students will be able to create real-life situations using mathematical models. In addition, if students' problem solving skills are weak, they will also have difficulty solving everyday problems (Khusna & Ulfah, 2021). Students who have good problem solving skills are characterized by the ability to solve problems using the right steps. These steps include understanding the problem, planning the problem, implementing the problem solving plan, and reviewing the results of problem solving. By completing these steps accurately, students will have more systematic problem solving skills (Harefa & La'ia, 2021). In this study, the problem solving steps used refer to (Polya, 2004), namely: 1) understand the problem; 2) Develop a plan; 3) implement the plan; and 4) review.

According to Tambychik & Meerah (2010, p.143), the problem solving process is divided into three phases consisting of: 1) reading and understanding the problem; 2) organizing strategies and solving problems; and 3) confirmation of answers and processes. Another opinion was also conveyed by (Alongkrontuksin & Saehaew, 2024) that the basic steps of problem solving that are commonly used consist of three steps, namely: 1) identify the problem; 2) list possible solutions; 3) implement the solution.

According to (Yuan et al., 2013), the problem solving process is: 1) problem initialization: knowing the basic information; 2) problem solving: from the initialization of the problem that has been done, students know the steps that are relevant to the information that has been obtained; 3) reflection on problem solving with expert guidance: after students implement steps on several similar problems, students can get comments from expert guidance regarding the steps that have been applied; 4) knowledge construction with expert guidance: students reflect and further learning.

According to Silver (1985, p.63), the modified model has two different but interconnected components, namely the cognitive component based on Polya's model and the metacognitive component based on Flavell and Wellman's variable class. The cognitive component has four categories of activities: orientation, organization, execution, and verification.

The success of students in learning activities, especially in problem solving skills, depends on how students overcome existing difficulties (Yustiana et al., 2021). This success comes from learning interactions between teachers and students through the development of students' knowledge, attitudes, and skills (Safi'i et al., 2021). Students are active individuals in teaching and learning activities in the classroom. Students are not passive individuals who only accept what is conveyed by the teacher without responding but students are active individuals who have gestures in responding and acting on what is taught by the teacher in the classroom.

Teachers are a key role in managing quality and quantity in student behavior. Teachers are encouraged to choose teaching and learning methods that are suitable for student conditions (Sumarwati et al., 2020). The appropriate method

in the learning process will create learning that takes place optimally. This can provide the success of an interaction between teachers and students (Kasuga et al., 2022).

At SMP Negeri 3 Yogyakarta, initial observations indicate that many students possess low problem-solving skills, as evidenced by their poor performance in statistics, particularly in understanding the concept of the mean. Teachers often rely on traditional lecture methods that emphasize memorization of formulas rather than contextual applications, further hindering students' problem-solving abilities.

Teaching and learning methods consist of various activities that include knowledge, skills, styles and varied learning content to enable students to understand what is conveyed by the teacher and improve academic achievement (Sumarwati et al., 2020). Without the right teaching and learning method, teachers will have difficulty in delivering subject matter optimally to students. This can also affect the growth of student achievement (Sumarwati et al., 2020). One method that can be used by a teacher is Problem Based Learning (PBL). The PBL method was first introduced in the late 1960s at McMaster University, Canada, as a step to reform medical education with the aim of improving student motivation and quality of learning (Wijnia et al., 2024). According to Arends & Kilcher (2010), PBL is a student-centered learning model, where the curriculum is designed based on real unstructured problem situations. This opinion is in line with Robert (1999), who states that PBL helps students face problems that resemble real-life situations, allowing them to acquire relevant new skills and knowledge.

Tan (2009) adds that PBL aims to prepare students to face the complex challenges of the future by solving real unstructured problems. Such problems are open-ended and require students to think critically, work collaboratively, and develop their problem-solving skills (Nurhayati et al., 2023). Complex problems require in-depth analysis and critical thinking to find the right solution (Moreno-Palma et al., 2024).

PBL is a learner-centered approach that facilitates learning by using problems as a starting point for learning. It is believed to be a powerful and effective approach compared to traditional teaching approaches in engaging students in learning. The problem-based learning (PBL) approach is one of the effective methods to improve students' analytical and collaboration skills. PBL has four main characteristics, namely focusing on complex real-world problems, involving group work, encouraging independent learning, and making the teacher a facilitator. In addition, PBL is often based on certain philosophical and epistemological foundations (Thorndahl & Stentoft, 2020).

PBL requires teachers to take responsibility for facilitating students' acquisition of skills to survive in today's world by emphasizing collaborative learning, critical thinking and problem-solving skills. Students work together and structure their own ways of gaining knowledge through questioning, searching and problem solving (Kasuga et al., 2022).

According to Polya's framework, PBL involves the following stages: 1) Orienting students to the problem : Introducing students to authentic, real-world problems relevant to the topic; 2) Organizing students for learning: Guiding students to define and plan their learning tasks related to the problem; 3) Facilitating inquiry: Supporting students as they gather information and seek solutions; 4) Developing and presenting results: Encouraging students to collaborate, create solutions, and present their findings; 5) Analyzing and evaluating the process: Reflecting on and

evaluating the problem-solving process (Febriana et al., 2020). The advantages of PBL include : 1) Motivating students to engage in active learning (Thorndahl & Stentoft, 2020); 2) Enhancing critical thinking and collaboration skills (Naja et al., 2022); 3) Helping students understand concepts in the context of real-life situations (Kasuga et al., 2022).

Meanwhile, according to Arends & Kilcher (2010, p.333) the steps of PBL are as follows : 1) Presenting the problem (presenting the problem) : At this stage, the teacher introduces the problem. This introduction must be done carefully in order to inspire students and arouse their curiosity. During this phase, students discuss what they already know about the problem, make a list of questions, and record their initial thoughts and hypotheses about the problem. The discussion can be done with the whole class or in small groups; 2) Planning the investigations : At this stage, students form groups and plan to solve the problem, including determining the resources needed. They may follow guidelines provided by the teacher, such as criteria or checklists. But in some situations, groups are given the freedom to design their own plans. Each group should make a division of tasks and member responsibilities. At this stage, the group must finalize the problem-solving plan before moving on to the next stage; 3) Conducting the investigations : At this stage, students follow the plan that has been made to find answers to the problems that have been identified. Each student conducts research individually and then reports their findings to group members. During this process, both teachers and students monitor the progress of the group through predetermined benchmarks. In addition, students are taught to monitor their own understanding and learning strategies; 4) Demonstrating learning : At this stage, students make presentations. This activity provides an opportunity for students to show what they have learned and discuss and debate with each other; 5) Reflecting and debriefing.

At this stage, students reflect on the knowledge and skills they have acquired, the learning strategies they have used and the contribution they have made to their learning group. This allows them to summarize the concepts and understanding they have gained.

The research presented is related to the variables of this study, namely Problem-Based Learning (PBL), Problem Solving, and Problem Problem Solving Ability. Research that is relevant to this study is as follows :

1. Research conducted by (Permatasari & Marlina, 2023), entitled “The Effect of Problem Based Learning Model on Mathematical Problem Solving Ability”. The relationship between the research conducted by Permatasari and the current research lies in the dependent variable, namely problem solving. Where this study aims to evaluate whether the Problem Based Learning (PBL) learning model has an influence on the mathematical problem solving ability of class X SMA Negeri 1 Betung students. This study used a True Experiment approach with a Posttest-Only Control design. The participants of this study were all students of class X SMA Negeri 1 Betung in the odd semester. Both participants came from the class used to measure the effectiveness of using the PBL learning paradigm in problem solving. As for the results of this study, mathematical problem solving skills in the context of rows and sequences were proven to improve under the pedagogical framework. Problem Based Learning (PBL) compared to the more traditional lecture-based approach. Students' problem solving skills on the material of rows and series were assessed through essay or description questions at the last meeting, and it was found that students who used the Problem Based Learning (PBL) learning model had better problem solving

skills. Thus, it can be said that the PBL approach has a significant impact on the math problem solving skills of tenth grade students. mathematical problem solving ability of tenth grade high school students high school students.

2. Research conducted by (Wachufyah & Sulistyaningrum, 2022), entitled “Implementation of Problem Based Learning with a Neuroscience Approach to Mathematics Problem Solving Ability of Junior High School Students”. The relationship between this research conducted by Wachufyah and the current research lies in the independent variable, namely Problem Based Learning (PBL).

While prior research has shown the effectiveness of PBL in improving problem-solving abilities (Andayani & Pratama, 2022; Permatasari & Marlina, 2023), limited studies have focused on its application in teaching statistics. This study aims to evaluate the impact of the PBL model on improving students' mathematical problem-solving skills in the context of learning about the mean at SMP Negeri 3 Yogyakarta.

Problem-solving involves identifying and understanding a problem, planning and implementing solutions, and evaluating the results (Polya, 1957). These skills are critical for mathematics education as they enable students to apply mathematical reasoning to real-world scenarios. Low problem-solving skills often stem from ineffective instructional approaches, such as over-reliance on memorization and lack of contextual learning opportunities (Maryati & Sriwahyuni, 2022)..

## II. METHOD

This research is quantitative research. The reason researchers choose this type of this study because the researcher wants to use a sample to determine the effect of math learning mathematics with a problem-based learning model in improving problem solving skills. The research design used in this study was a one-group pretest-posttest design. This research design can be seen in the following table :

Table 1.

<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
$O_1$	$X$	$O_2$

Description:

$X$  = treatment using PBL model

$O_1$  = pretest

$O_2$  = posttest

This research was conducted in class VIII F SMP Negeri 3 Yogyakarta in even semester for mathematics subject with the subject of statistics. even semester for math subjects with the subject matter of statistics. The population in this study were all active students of class VIII F SMP Negeri 3 Yogyakarta. While the sample of this study consisted of 30 students of class VIII F SMP Negeri 3 Yogyakarta. The sampling technique used simple random sampling. Class selection was carried out randomly, by selecting one of the six classes as an experimental class. experimental class. Observation is carried out by making direct observations in the field to record and analyze events that occur, both from the cognitive and psychomotor aspects. This observation was carried out during the learning process to observing

activities carried out by teachers and students. This research was conducted in class VIII F SMP Negeri 3 Yogyakarta in even semester for mathematics subject with the subject matter of statistics. Time The timing of the research can be seen in the following table :

Table 2. Research time

No	Day/Date	Activities
1	Monday, March 25, 2024	Pretest of math ability in terms of from the problem solving ability of the mean material
2	Monday, April 1, 2024	1st Meeting Material delivery
3	Wednesday, April 3, 2024	2nd meeting Material delivery
4	Monday, April 22, 2024	3rd meeting Material delivery
5	Wednesday, April 24, 2024	4th meeting Material delivery
6	Monday, April 29, 2024	Posttest of math skills in terms of from the problem solving ability of the mean material

The math ability test consists of 5 description questions. The test was designed to test problem-solving skills by considering relevant indicators. Before use, the questions were consulted and discussed with peers. The math ability test consisted of two parts, namely pretest and posttest.

The tests carried out in this study are normality, homogeneity and hypothesis testing. The normality test aims to determine whether the observed data has a normal distribution or not. The normality test uses the Kolmogorov-Smirnov method. The criterion for determining normal distribution is if the significance value is greater than 0.05. While the homogeneity test is carried out to determine whether the data comes from a homogeneous population. This test uses the Levene method. If the significance value in the “Test of Homogeneity of Variance” table is greater than 0.05, then the data is considered to come from a homogeneous population. After testing the normality and homogeneity of the data, the next step is to conduct a hypothesis test to determine whether the research hypothesis can be accepted or rejected, focusing on the comparison of Post-Test and Pre-Test scores. The Paired Sample T-Test test is a comparative hypothesis test or comparison test that aims to determine whether there is an average difference between two paired or related samples. Paired samples refer to samples consisting of the same subject, but get two different treatments, namely before and during the learning process (Santosa, 2001). The Paired Sample T-Test test is included in parametric statistics, so before conducting this test, the data must be confirmed to be normally distributed. The hypotheses set for this Paired Sample T-Test test are as follows :

$H_0$ = There is no effect of using the problem-based learning model to improve problem solving ability

$H_a$ = There is an effect of using a problem-based learning model to improve problem solving ability

The basis for decision making in the Paired Sample T-Test Test is as follows :

1. If the significance value (2-tailed)  $<0.05$ , then  $H_0$  is rejected and  $H_a$  is accepted

2. If the significance value (2-tailed)  $<0.05$ , then  $H_0$  is accepted and  $H_a$  is rejected.

### III. RESULT AND DISCUSSION

Researchers conducted observations in class VIII F, Where the class is one of a total of six VIII classes in SMP Negeri 3 Yogyakarta. State Junior High School 3 Yogyakarta. The number of students in class VIII F is 30 students. After the researcher asked and answered about the material with the teacher who teaches math math teacher, the material that was determined to be delivered by researchers in the class was statistics.

The first step the researcher took after getting approval of the material that will be delivered to students, researchers compile learning tools requested by the teacher such as lesson plans, LKPDs, and lesson plans requested by the teacher such as lesson plans, LKPD, teaching materials, and pretest and posttest instruments that have the aim of measuring the results of the study also posttests which have the aim of measuring problem solving skills in students. students.

During the learning process, the learning model used by researchers is the problem-based learning model learning model, namely the problem-based learning model. After the pretest, in the next study, researchers also provide complex problems that are real and relevant to statistical material real and relevant to statistics material. Students are asked to form groups so that they can find solutions together, but researchers also provide real problems to be solved individually.

The pretest activity was carried out on March 25, 2024 which was attended by 30 students of class VIII F. The time used by researchers to conduct the pretest was 2x40 minutes. The implementation of the pretest went smoothly. However, some students still seemed very confused about solving the problems given. The pretest questions given were in the form of 3 story problems of statistics material related to everyday life so that they were real.

The teaching process was carried out for 4 meetings. The first meeting was held on Monday, April 1, 2024. At this meeting the researcher introduced students to the retrieval and presentation of data. Researchers also asked students to practice retrieving and presenting data first. After successfully retrieving and presenting data, at the end of the lesson the researcher reviewed the learning material that had been learned.

In the second and third meetings held on Wednesday, April 3, 2024, researchers introduced students to the average or mean, how to find the average, and gave students LKPD with 5 story problems related to everyday life. At this second meeting, the researcher asked the students to form a group to solve the problems given together.

The next meetings, namely the third and fourth meetings, were held on Monday, April 22, 2024 and Wednesday, April 24, 2024. At the meeting the researcher delivered material related to the mean, mode, quartile, and interquartile values. At this meeting the researcher also distributed LKPD in the form of story problems related to daily life. The LKPD work system at this meeting is individual.

After the learning objectives at all meetings were achieved, the closing activity in this study was the posttest. The posttest was conducted on Monday, April 29, 2024. The purpose of this posttest is to measure problem solving skills

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and see the effect of the problem-based learning model. The implementation of the posttest went smoothly and was attended by 30 students, so it can also be said that the participants of this posttest were complete. The time used during the posttest is 2x40 minutes. After obtaining the pretest and posttest scores, the researcher obtained the following description results :

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
pretest	30	54.00	82.00	68.3333	8.53929
posttest	30	56.00	95.00	78.3000	9.51641
Valid N (listwise)	30				

Based on the results above, it can be seen that the Post-Test results are better than the Pre-Test results in every section. The difference can be seen starting from the minimum score produced. Previously, the minimum score was 54.00, but after treatment, the minimum score on the Post-Test increased to 56.00. The maximum score also increased, from 82.00 on the Pre-Test to 95.00 on the Post-Test. This led to an increase in the class average score which at the time of the Pre-Test only reached 68.3333. After applying the problem-based learning model, the average score of students in class VIIF increased to 78.3000.

In this study, the normality test was carried out using the Kolmogorov-Smirnov method with a significance level of  $\alpha = 0.05$ . The results of data processing can be seen in the following figure :

**Tests of Normality**

	Kelas	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Hasil belajar siswa	pretest	.138	30	.153	.941	30	.097
	posttest	.113	30	.200 <sup>*</sup>	.966	30	.445

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the picture above, it can be seen that the normality test results for the questions Pre-Test and Post-Test questions show a significance value of 0.097. The decision was taken because  $0.097 > 0.05$ , which means that the Pre-Test and Post-Test questions are normally distributed. While the homogeneity test was carried out, the results of data processing can be seen in the following figure :

**Test of Homogeneity of Variance**

		Levene Statistic	df1	df2	Sig.
Hasil belajar siswa	Based on Mean	.125	1	58	.725
	Based on Median	.152	1	58	.698
	Based on Median and with adjusted df	.152	1	56.832	.698
	Based on trimmed mean	.144	1	58	.706

Based on the following figure, it can be seen that the homogeneity test based on the mean produces a value of 0.725. Therefore, it can be concluded that with a significance value of 0.725 which is greater than 0.05, this indicates that the pre-test and post-test data come from a homogeneous population.

After ensuring that the data is normally distributed and homogeneous. In the hypothesis testing section, researchers used the T-Paired Sample Test with the following results :

**Paired Samples Statistics**

	Mean	N	Std. Deviation	Std. Error Mean
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Pair 1	pretest	68.33	30	8.539	1.559
	posttest	78.30	30	9.516	1.737

**Paired Samples Correlations**

	N	Correlation	Sig.
Pair 1	pretest & posttest	.780	.000

**Paired Samples Test**

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	pretest - posttest	-9.967	6.060	1.106	-12.229	-7.704	-9.008	.29	

Based on the illustration provided, a significance value (2-tailed) of 0.000 was obtained. Therefore, based on the T-Paired Sample Test, with a significance value of 0.000 which is smaller than 0.05, the null hypothesis ( $H_0$ ) is rejected and the alternative hypothesis ( $H_a$ ) is accepted. Thus, it is proven that there is an effect of using the Problem Based Learning model in improving problem solving skills.

In this study, the number of pretest and posttest questions given were each 3 average (mean) questions related to daily life. Before the learning was carried out, students were given pretest questions first. Furthermore, the class was given statistics learning with a problem-based learning model. When the learning objectives have been achieved, students are given a posttest to see if there is an increase after being given learning using problem-based learning. Researchers will find out whether there is a significant difference between problem solving skills before and after PBL learning by processing data from pretest and posttest results. When researchers analyzed the answers of students with the highest score which is the acquisition score of 95. During the learning process, it was seen that the student had a good ability to solve mathematical problems related to statistics related to everyday life. The following are the results of posttest number 1 to number 3 which fulfill each indicator of problem solving.

1. Jumlah siswa putri pada kelas 8F sejumlah 15 anak sedangkan siswa putra sejumlah 10 anak. Apabila rata-rata nilai matematika siswa putri yaitu 70 dan rata-rata nilai matematika siswa putra 85. Berapakah rata-rata nilai keseluruhan siswa dalam kelas tersebut?

Jawaban:

$$1. \frac{(85 \times 10) + (70 \times 15)}{25}$$

$$= \frac{850 + 1050}{25}$$

$$= \frac{1900}{25}$$

$$= 76$$

2. Nilai ulangan matematika Bima pada 6 kali ulangan yaitu 64,86,89,100,71, dan 82. Untuk memenuhi syarat tuntas nilai rata-rata minimal yang harus diperoleh seorang siswa yaitu 76. Berapa nilai rata-rata ulangan matematika yang diperoleh Bima dan apakah nilai rata-rata matematika Bima sudah mencapai tuntas?

$$2. \frac{64 + 86 + 89 + 100 + 71 + 82}{6}$$

$$= \frac{492}{6}$$

$$= 82$$

3. Jumlah siswa di kelas VIII yaitu 35 siswa. Saat jadwal dilakukannya ulangan matematika 8 siswa tidak berangkat dikarenakan sakit. Namun di hari berikutnya 8 siswa tersebut melakukan ulangan susulan. Jika hasil rata-rata ulangan matematika 27 siswa yang mengikuti ulangan sesuai jadwal adalah 85 dan nilai ulangan susulan yang diperoleh 8 siswa tersebut adalah 80,76,72,84,68,90,74, dan 66, Maka rata-rata ulangan matematika seluruh siswa kelas VIII adalah....

$$3. \frac{(85 \times 27) + 80 + 76 + 72 + 84 + 68 + 74 + 66}{35}$$

$$= \frac{2295 + 520}{35}$$

$$= \frac{2815}{35}$$

$$= 80$$

Based on the answers to the student's posttest questions, it can be seen that he has good problem solving skills. This can be seen from the student's answers which are coherent in accordance with the problems given. He can also understand the solution of the problem related to the mean which is related to daily life.

However, there were also some obstacles experienced by researchers during the research period, namely that there were still students who tended to be difficult to control during the material delivery process. Although the majority of students are still in the safe category, there are some

students who are the source of problems in the classroom. Thus, several times other students were carried away by students who made noise in the classroom. However, this does not happen continuously. So that the class can still be said to be easy to control and can be cooperative. When students work on posttest questions, students can concentrate on working on the questions.

It can be concluded that there is an effect of learning mathematics using a problem-based learning model to improve problem solving skills on statistical material, especially the mean. In addition, the acquisition of the average value of the class when the pretest was only 68.3333 while after the treatment, the average value of the posttest showed an increase. treatment, the posttest average value shows a significant increase, namely significant increase, namely with a class average on the posttest of 78.3000.

Furthermore, based on the conclusions that have been described, the researcher suggests further researchers to identify other mathematical abilities possessed by students by applying various models and strategies that are different from this study, as well as forming more innovative learning tools in carrying out mathematics learning in classrooms that can improve students' mathematical abilities.

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