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THE EFFECT OF THE PROBLEM BASED LEARNING (PBL) MODEL ON STUDENTS' MATHEMATICS PROBLEM SOLVING ABILITY IN COMPARISON OF CLASS VII SMP PRIVATE PAB 1 KLUMPANG ACADEMIC YEAR 2020/2021

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ABSTRACT

This study aims to determine how the effect of the Problem Based Learning (PBL) model on students' mathematical problem solving abilities in the Comparison material for class VII Private Junior High School PAB 1 Klumpang in the 2020/2021 academic year. The instrument used in this research is a mathematical problem solving ability test in the form of a description, with the material being taught is a comparison. The subjects in this study were seventh grade students of PAB 1 Klumpang Private Junior High School, while the sample in this study consisted of two classes. One class is the experimental class and the other is the control class. The sample in the experimental class amounted to 30 people, and the sample in the control class also amounted to 30 people. From data analysis using simple regression test, The average test of mathematical problem solving ability in the experimental class before and after learning is 73.33 and 83.83. While the average control class math problem solving ability test before and after learning was 74.17 and 75.5. Hypothesis testing in this study used the r-test, which was conducted to determine the level of students' mathematical problem solving abilities before and after being taught using the Problem Based Learning (PBL) learning model. If rcount > rtable, it can be concluded that there is an effect of the Problem Based Learning (PBL) learning model on students' mathematical problem solving abilities. After the calculation, the value of rcount on the mathematical problem solving ability of experimental class students is 0.722 while the value of rtable is 0.361, so it can be seen that rcount > rtable. Thus, it can be concluded that there is an effect of the Problem Based Learning (PBL) learning model on students' mathematical problem solving abilities in the Comparison material for class VII Private Junior High School PAB 1 Klumpang in the 2020/2021 academic year.

Keywords:

Problem Based Learning
(PBL) Comparative Problem
Solving

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1. PRELIMINARY

In terms of knowledge, mathematics education is very broad and can be grouped into subsystems according to the universe of the speaker. Education has a meaning as a process in developing each individual to be able to carry out life, so that he becomes an educated person. The first education we get in the family environment (informal education) and the school environment (formal education). Mathematics is a science that is used by many sciences.

Problem solving ability is one of the important abilities for every student to have. The importance of mathematical problem solving skills is because in everyday life we are always faced with a problem, whether it is an easy problem or a difficult one, and we are required to be able to solve it (Jonnasen, 2004:1).

Mathematics is also a medium for solving problems, as stated in Permendiknas No. 22 of 2006 concerning standard content of mathematics subjects, the purpose of learning mathematics is so that students are able to:

(1) Understanding mathematical concepts, explaining the relationship between concepts accurately, efficiently, and precisely in problem solving. (2) Using reasoning on patterns and traits, performing mathematical manipulations in making generalizations, compiling evidence, or explaining mathematical ideas and statements. (3) Solving problems which include the ability to understand problems, design mathematical models, complete models and interpret the solutions obtained. (4) Communicating ideas with tables, graphs and equations, or other media to clarify the situation or problem.

(5) Having an attitude of respect in life, namely having curiosity, attention, and interest in learning mathematics, as well as a tenacious and confident attitude in solving a problem.

The condition of education in Indonesia, especially mathematics, is considered very low. As data from Trends in International Mathematics Science Study (TIMSS) in 2011 shows that: "Indonesian students' mathematics mastery is ranked 36 out of 40 countries. Likewise, the results of the 2012 Program for International Student Assessment (PISA) research show that: "Indonesia is ranked 64th out of 65 participating countries. This is in line with the initial research conducted at the PAB 1 Klumpang Private Junior High School. One of the questions is as follows:

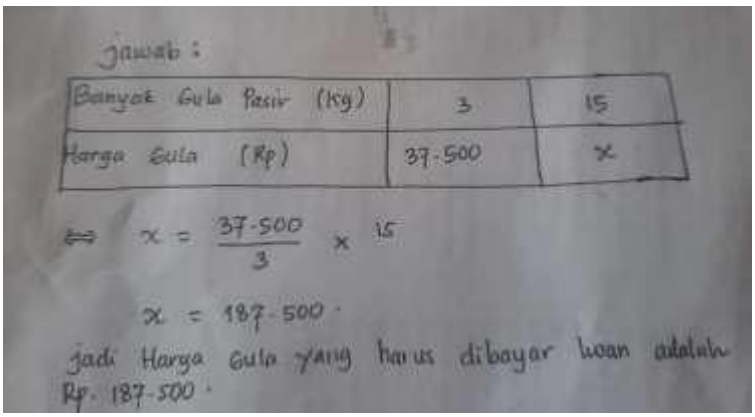
Problem 1

Figure 1. Initial Reasoning Test

Nurul bought 3 kg of granulated sugar at a price of IDR 37,500. At the same time Iwan also bought 15 kg of granulated sugar, how much did Iwan have to pay?

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Figure 2. One of the Student's Answers



From the results of the analysis of the problem-solving ability test on the comparative material given to 30 students, there were 20 students showing a low level of problem-solving ability, and there were 10 students who had sufficient problem-solving skills. After being analyzed, it can be seen that students' mathematical problem solving abilities are still low, in the category of not understanding or low achievement due to lack of understanding of concepts.

Abdurrahman (in Dewi, et al.) states that: "Mathematics problem solving is the application of concepts and skills". In problem solving usually involves some combination of concepts and skills in a new situation or a different situation. Problem solving ability needs to be improved in learning mathematics because it can improve students' mindset. Problem solving in mathematics requires thorough basic skills, including an understanding of definitions, an understanding of algorithms and an understanding of theorems that students must master. These three understandings must be mastered by students in a structured manner.

From the description above, it can be concluded that understanding mathematical problems requires students to understand the previous concepts. Polya (in Suci, et al.) states that there are four steps that must be taken in solving problems, namely: "(1) understanding the problem; (2) planning a settlement; (3) finalize the settlement plan; (4) check back".

Barell (in Sari, et al,) revealed that: "Problem Based Learning (PBL) invites students to be interested in finding real and relevant knowledge, and allows them to learn from real situations". Through the Problem Base Learning (PBL) learning model, it is hoped that students can practice relating the problems of everyday life with learning mathematics, so that mathematics is no longer too abstract for them and learning becomes more meaningful. Based on the description above, the researchers conducted a study with the title: "The Effect of Problem Based Learning (PBL) Models on Students' Mathematical Problem Solving Ability in Comparative Materials for Class VII Private Junior High School PAB 1 Klumpang in the 2020/2021 Academic Year".

Research conducted by Guntara, et al. (2014) entitled the application of the Problem Based Learning learning model to improve the mathematical problem solving abilities of fifth grade students.

The problem is that from cycle I to cycle II, 16.42% of the criteria are medium to high. The

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results of the study show that the Problem Based Learning (PBL) learning model can improve problem solving abilities in Mathematics subjects.

Further research conducted by Sari, et al. (2014) entitled the effect of the Problem-Based Learning approach on the mathematical problem-solving abilities of eighth grade students of SMP Negeri 1 Padang in the 2013/2014 academic year. The purpose of this study was to compare the improvement of mathematical problem solving skills between students who were taught using PBL and conventional approaches. The results of this study indicate that there is an increase in students' mathematical problem solving skills taught using the PBL approach by 18.25%, thus it can be concluded that the PBL approach has a positive impact on developing students' mathematical problem solving skills. In addition to the research conducted by Guntara and Sari, Dewi, et al., also conducted a similar study with the title of applying the Problem Based Learning model to the mathematical problem solving ability of class X students of SMA Negeri Tugumulyo in the 2014/2015 academic year. Based on the results of the t-test analysis with a significant standard of = 0.05, it can be concluded that the average mathematical problem solving ability of students is 7.24. This is shown by as many as 33 students or 82.5% experienced an increase in mathematical problem solving ability. Thus, it can be concluded that the students' mathematical problem solving ability after being taught using the model can conclude that the average mathematical problem solving ability of students is 7.24. This is shown by as many as 33 students or 82.5% experienced an increase in mathematical problem solving ability. Thus, it can be concluded that the students' mathematical problem solving ability after being taught using the model can conclude that the average mathematical problem solving ability of students is 7.24. This is shown by as many as 33 students or 82.5% experienced an increase in mathematical problem solving ability. Thus, it can be concluded that the students' mathematical problem solving ability after being taught using the model
Problem Based Learning (PBL) has significantly good criteria.

2. DISCUSSION

A. Problem-based learning model

Problem Based Learning or often referred to as Problem Based Learning has several meanings, including:

1. According to Boud and Felleti, (1997), Fogarty (1997) states that the problem-based learning model is a learning approach with practical problems, in the form of an open ended through stimulus in learning.
2. According to Arends (Nurhayati Abbas, 2000: 12) states that the problem-based learning model is a learning model with a student learning approach to authentic problems, so that students can construct their own knowledge, develop higher skills, become self-reliant, and increase self-confidence.
3. According to Ward, 2002: Stepien, et al., 1993 states that the Problem-Based Learning model is a learning model that involves students to solve a problem through the stages of the scientific method so that students can learn knowledge related to

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the problem and at the same time have the skills to solve the problem. problem.

4. Ratnaningsih, 2003: states that Problem-Based Learning is a learning that requires students' mental activity to understand a learning concept through situations and problems presented at the beginning of learning.

From the several definitions above, it can be concluded that Problem-Based Learning which in English is termed Problem-based Learning (PBL) is a strategy that begins by confronting students with real problems (Suryadi 2005). When students face these problems, they begin to realize that it can be viewed from various perspectives. As previously explained, this Problem-Based Learning model is an innovative learning model and can provide active learning conditions for students, so that students can learn knowledge related to the problem as well as have the skills to solve problems (Ward, 2002; Stepien, et al. ., 1993). In addition, PBL serves to stimulate students to think at a higher level in solving a problem.

In comparison material which is generally related to everyday life, Problem-Based Learning is of course necessary, because here students are required to think critically in solving problems.

Learning SuccessProblem Based depends on the teacher's ability to confront students with realistic problems that will help them develop problem solving skills and the ability to be independent. One important goal when using this method is to bring the real world into the classroom for analysis.

B. Problem Solving Approach according to Polya

Slameto (1995:3) states, learning outcomes are changes in behavior that occur in the lives of individuals that take place on an ongoing basis. A change in behavior that occurs will cause changes and be useful for life or the next learning process. Changes as a result of the learning process can be shown in various forms such as knowledge, experience, and attitudes. While mathematics is a science that is obtained by reasoning, namely thinking systematically, logically, and critically in communicating ideas or problems (Depdiknas, 2002:8). From the opinion above, it can be concluded that the results of learning mathematics are changes in behavior in reasoning, namely thinking systematically, logically, and critical in communicating ideas or problems so that they are useful for life or the next learning process. Polya (in Hobri, 2009:172) defines problem solving as an

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attempt to find a way out of a difficulty, achieving a goal that is not immediately achievable. According to Polya (in Suherman, 2001:91), in solving a problem there are four steps that must be taken, namely: (1) understanding the problem, (2) planning the solution, (3) solving the problem according to the second step plan, and (4) re-examine the results obtained (looking back). At the stage of understanding the problem, problem solving activities can be directed to guide achieve a goal that is not immediately achievable. According to Polya (in Suherman, 2001:91), in solving a problem there are four steps that must be taken, namely: (1) understanding the problem, (2) planning the solution, (3) solving the problem according to the second step plan, and (4) re-examine the results obtained (looking back). At the stage of understanding the problem, problem solving activities can be directed to guide achieve a goal that is not immediately achievable. According to Polya (in Suherman, 2001:91), in solving a problem there are four steps that must be taken, namely: (1) understanding the problem, (2) planning the solution, (3) solving the problem according to the second step plan, and (4) re-examine the results obtained (looking back). At the stage of understanding the problem, problem solving activities can be directed to guide

Students determine what is known and what is asked in the question. Questions that can be asked to students so that they can understand the problem include: (a) what is known from the problem, (b) what is being asked from the question, (c) what information is needed, and (d) how to solve the problem. .

3. RESEARCH METHODS

This type of research is a quasi-experimental research. The population in this study were all grade VII students of PAB 1 Klumpang Private Junior High School for the academic year 2020/2021, totaling 90 people consisting of 3 classes. The sample in this study was taken by means of simple random sampling, which is taking the sample members at random. From the results of sampling, two classes were selected as samples in this study. The two classes are class VII1 with 30 students as the control class, and class VII2 with 30 students as the experimental class. So, the total number of samples in this study was 60 people.

The design used in this study was a pretest and post-test control group design. The patterns in this design are

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E O_1 X O_2

K O_1 O_2

Arikunto (2013:125)

E : experimental group
K : group control
X : Model of Problem Based Learning (PBL)

Data collection techniques in this study used observation and tests of students' mathematical reasoning abilities. The test used is divided into two, namely the pretest to determine the students' mathematical problem solving ability before the learning process and the final test (post-test) to determine the students' mathematical problem solving ability after the learning process.

4. RESEARCH RESULTS AND DISCUSSION

Description of research results

The learning process is carried out on bothclass. The experimental class uses the Problem Based Learning (PBL) and Student Worksheet (LKPD) learning model, while in the control class, the learning process uses a conventional learning model. The results of this study were taken from the pretest and post-test scores of students' mathematical problem solving abilities. The average pretest score of the experimental class students was 73.33 and the control class students' average pretest was 74.17. While the post-test average value of the experimental class students was 83.83 and the post-test average value of the control class students was 75.50. Visually, the results of the students' mathematical problem solving ability tests before and after learning can be seen in the following graph:

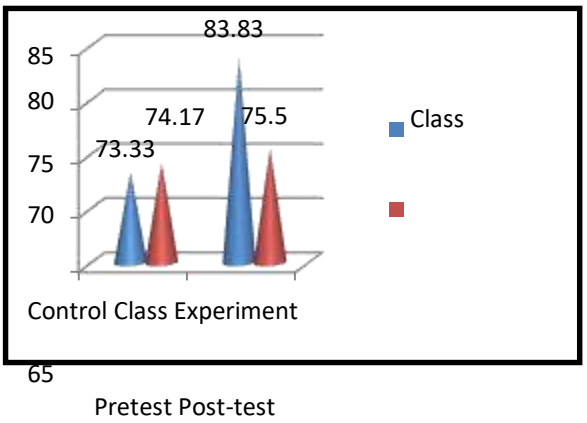


Figure 3. Mathematical Problem Solving Ability Test Results

Thus it can be seen that there is a significant increase in the experimental class between

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before and after the learning process.

To describe the achievement of student grades in the experimental class, namely the class that received learning treatment using the Problem Based Learning (PBL) learning model based on the results of the pretest and post-test that had been done, calculations were carried out using a simple regression analysis test. This test was conducted to see how much influence the Problem Based Learning (PBL) learning model had on students' mathematical problem solving abilities. The results of the regression analysis that have been carried out are as shown in the following table:

Table 1. Results of Analysis of Variance for Linear Regression

$$\hat{Y} = 26,11 + 0,79X$$

Source Variance	dk	KT	F
Total	30		
coefficient (a)	1	204446,43	
Coefficient (b | a)	1	1533,917	30.67
Remainder (S)	28	50.01	
Tuna Match (TC)	6	57,934	
Error (G)	22	43,862	1.32

After the analysis of variance for the regression is known, then the significance test is carried out. Testing for significant or dak. Ha ouch Is the relationship between the independent variable and the dependent variable meaningful?

si il of the significance test are as follows:

Table 2. Results of Significance Test

F_{hitung}	F_{tabel} □= 5%	dk loser	dk butt	Information
30.67	4.20	1	28	The regression direction coefficient means (b 0)

From the results of these calculations, the value of = 30.67, while the price of

$(1,28) = 4,20$ for a significant level of 5%. Thus the price Fcount > Ftable means Ho is rejected and Ha is accepted.

After the coefficient of the regression direction is significant, then the linearity test

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is carried out, with the aim of knowing whether the two variables have a linear relationship or not significantly. The results of the linearity test are:

Table 3. Linearity Test Results

F_{hitung}	F_{tabel} □= 5%	dk lang	dk butt	Information
1.32	2.55	6	22	Linear regression

The results of these calculations obtained the value of = 1.32, while the price of (6.22) = 2.55 for a significant level of 5%. Thus the price < means Ho is accepted and Ha is rejected, thus the conclusion is linear regression.

After known data meansand linear, then the hypothesis is tested. The calculation of the hypothesis test is carried out to determine whether or not there is an influence in learning by using the Problem Based Learning (PBL) learning model on students' mathematical problem solving abilities. Hypothesis testing in this study used the r-test by using data from the results of mathematical problem solving abilities obtained by students, namely data from pretest results and data from post-test results. The results of calculations using the r-test can be seen in the following table:

Table 4. Hypothesis Test Results

r_{hitung} r_{hitung}	r_{tabel} □= 5%	N	Information
0.722	0.361	30	There is an influence between the Realistic Mathematics Education (RME) approach and students' mathematical reasoning abilities (r 0)

After the calculation using the r-test is carried out, the value of . is obtained = 0.722. Then this value is compared with the value of with n = 35 and a significant level of 5% = 0.361. Because the price > , Ho is rejected and Ha is accepted, thus it can be concluded that there is an influence between the Problem Based Learning (PBL) learning model and students' mathematical problem solving abilities.

After doing the calculation using the r-test, then the value of . is obtained = 0.722. Then this value is compared with the value of with n = 30 and a significant level of 5% = 0.361. Because the price > , Ho is rejected and Ha is accepted, thus it can be concluded that there is an influence between the Problem Based Learning (PBL) learning model and students' mathematical problem solving abilities.

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Discussion of Research Results

The learning process using the Problem Based Learning (PBL) learning model makes students more able to participate in learning activities, students become more active, students become more responsible for their groups, students become more aware of the essence of the learning they are doing with the conclusions of learning activities , students become more capable in solving problems related to the material, and the impression of pleasure in learning is more visible because they can solve a problem with their group mates. While learning using conventional learning strategies makes students less active, many students show a bored attitude because they have to work on their own questions,

Regression tests conducted on the results of the pretest and post-test in the experimental class showed a significant difference in results between before and after being given treatment. The result of rcount = 0.722, the result of rtable value = 0.361. Because >

then Ho is rejected and Ha is accepted. Thus it can be concluded that the students' mathematical problem solving ability after being given treatment is better than before being given treatment. In other words, there is an influence between the Problem Based Learning (PBL) learning model and students' mathematical problem solving abilities.

5. CONCLUSION AND SUGGESTIONS

Conclusion

After conducting the research, based on data analysis and hypothesis testing, it can be concluded that there is an effect of the Problem Based Learning (PBL) learning model on students' mathematical problem solving abilities in the comparison material for class VII SMP Private PAB 1 Klumpang for the academic year 2020/2021. Based on the results of the calculations carried out, the results obtained are the value of rcount = 0.722, while the value of rtable = 0.361. Because > then Ho is rejected and Ha is accepted, thus it can be concluded that there is an influence between the Problem Based Learning (PBL) learning model and students' mathematical problem solving abilities. This is because the implementation of mathematics learning with the Problem Based Learning (PBL) learning model can increase the activity and creativity of students' thinking, because

In this model, the questions given are related to the daily life experienced by students, thus making students more interested in working on the questions. In addition, the method of processing is also made in discussion groups, this makes students more happy to work on questions, because they do not have to do it themselves, moreover at the end of the discussion students are given the opportunity to present the results of their group work, thus making students dare to speak in front of the class and grow student self-confidence.

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Suggestion

By looking at the results of the research and discussion, the researchers provide the following suggestions:

1. For students, it is expected that students are actively building knowledge, and improve their mathematical reasoning abilities and can gain new experiences and learning activities will be more meaningful.
2. For teachers, it can be a reference in using a variety of varied learning approaches in pursuing class.
3. For researchers, the results of this study can be used as input and comparison material in the development of further studies related to the application of the new paradigm of learning in schools.
4. For schools, provide input and considerations to improve the quality and quality of learning in schools, especially in the selection of various kinds of learning approaches that are more effective in teaching in the classroom.
5. For educational institutions, provide advice for the government in an effort to improve the quality of education through certain learning approaches in the teaching and learning process in schools.

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