

## THE EFFECT OF THE PROBLEM-BASED LEARNING MODEL ON LEARNING RESULTS MATHEMATICS STUDENT OF CLASS VIII

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### ABSTRACT

A learning model that focuses on the teacher resulted in the students more passive in following the teaching and learning activities, especially math lessons, so that teaching and learning activities are still less satisfactory. This affects students' mathematics learning outcomes. This study aims to determine the effect of the Problem Based Learning (PBL) learning model on grade VIII students' mathematics learning outcomes. This study's population is the students of class VIII Junior High School (SMP) Muhammadiyah Pleret 2016 school year consisting of 4 classes. The sampling technique used the purposive sampling technique and obtained class VIII D as experiment class and class VIII C as control class. The method of collecting data is done by the test method. The data analysis technique uses a prerequisite analysis test, including normality test, homogeneity test, and hypothesis tests. The research results obtained that (1) there are differences in learning outcomes between learning mathematics using Problem Based Learning model learning with Direct Learning model. This is based on the two-party hypothesis test obtained  $t_{count} = 2,00437$  and  $t_{table} = 1,6723$  with 5% significant level and degrees of freedom, respectively  $n_1 - 1 = 27$ , and  $n_1 - 1 = 27$ , which means  $t_{count} < t_{table}$ , so  $H_0$  is accepted, and  $H_1$  is rejected. (2) Learning mathematics using Problem Based Learning model is more influential than the Direct Learning model toward the mathematics learning result of the VIII student of SMP Muhammadiyah Pleret of the academic year 2016/2017. This is indicated by a one-sided hypothesis test obtained  $t'_{count} = 0,28701$  and  $t_{table} = 2,00437$  with a significant level of 5% and degrees of freedom, respectively  $n_1 - 1 = 27$  and  $n_1 - 1 = 27$  which means  $t_{count} \leq t_{table}$  so  $H_0$  is accepted and  $H_1$  is rejected

**Keywords:** Influence, Problem Based Learning, Direct Learning.

### INTRODUCTION

Education is one of the tools to create a quality society. Therefore, the Indonesian government is constantly trying to improve education quality, even though the results have not met expectations. It was more focused after it was mandated that national education aimed to improve the quality of education at each type and level of education. As one of the school subjects, mathematics is considered an essential role because mathematics can increase students' knowledge in thinking logically, rationally, critically, accurately, effectively, and efficiently.

Therefore, mathematical knowledge must be mastered as early as possible by students. Learning mathematics in schools and fostering basic mathematical knowledge to provide further learning helps students develop various methods or methods by mathematical concepts found in everyday life. Learning is the most important thing in education. With learning, students can obtain a change in behavior in interaction with the environment. For the learning process to achieve optimal results, supporting factors such as facilities, learning models, and methods are used. Students' learning difficulties are usually influenced by several factors, including how students learn, interest in learning, motivation, models, learning methods, and others, especially mathematics.

Based on observations and interviews at SMP Muhammadiyah Pleret in May 2016, it was found that there were student learning outcomes that had not yet reached the MCC. Some students paid little attention to the lesson and were still lazy to work on the teacher's questions. Teaching and learning activities are less conducive because some students make noise when learning takes place. The learning activities carried out have used several learning methods by the material taught, including the lecture

method, group discussions, and student activity sheets. However, the application of some of these learning methods has not been carried out optimally, so the learning outcomes are less satisfying. Based on the end of semester 1 test scores of SMP Muhammadiyah Pleret 2016/2017 academic year, the mathematics learning outcomes of VIII students have not yet reached the minimum completeness criteria (MCC) of 70 as shown in Table 1.

**Table 1.** Middle Semester 1 results of Class VIII SMP Muhammadiyah Pleret. Mathematics Subjects for 2016/2017 Academic Year.

Class	Mean	Highest Score	Lowest Value	Student >MCC	Student < MCC
A	33,71	87,50	20,00	2	28
B	30,60	45,00	17,50	0	25
C	30,54	55,00	12,50	0	28
D	26,79	42,50	15,00	0	28
Amount				2	109

(source: SMP Muhammadiyah Pleret Yogyakarta)

Based on the table 1 above, the value of students who are still below the MCC are 109 students out of 111 students, and 2 of them have passed the MCC. Students are still having difficulty working on the questions given by the teacher. Especially when students are given practice questions, students feel confused and difficulty working. This is because learning mathematics tends to be less exciting and boring, so students become lazy to learn mathematics and assume mathematics lessons are transformed into something scary, and incorrect use of the methods used to cause low student interest and attention. As a result of these problems, students get low grades.

Based on the background described above, the problems to be resolved are: 1) Is there a difference in students' mathematics learning outcomes using the Problem Based Learning (PBL) learning model and students who use the Direct learning model in class VIII students in the even semester of SMP Muhammadiyah Pleret 2016/2017 school year? 2) Does mathematics learning using the Problem Based Learning (PBL) learning model influence the mathematics learning outcomes of VIII grade students in the even semester of SMP Muhammadiyah Pleret 2016/2017 school year?

Based on the problem formulation above, the following research objectives can be formulated. 1) To determine whether there are differences in mathematics learning outcomes using the Problem Based Learning (PBL) learning model for class VIII students in the even semester of SMP Muhammadiyah Pleret 2016/2017 school year. 2) To determine whether there is an influence between the Problem Based Learning (PBL) learning model on the mathematics learning outcomes of VIII graders of the even semester of SMP Muhammadiyah Pleret 2016/2017 school year.

## METHODS

This type of research in this study is a quantitative study by taking place at SMP Muhammadiyah Pleret Bantul Regency in the even semester of the 2016/2017 school year. This study's population were all eighth-grade students of SMP Muhammadiyah Pleret, Bantul Regency, which consisted of classes VIII A, VIII B, VIII C, VIII D, totaling 111 students. As a sample class, 28 students were taken in class VIII C and 28 students in class VIII D using random sampling techniques. In this study, the data collection technique used was a test. Test technique to obtain data about student mathematics learning outcomes. The test used is an analysis prerequisite test with normality and homogeneity tests. In this study, the hypothesis test used was a t-test.

## RESULTS AND DISCUSSION

**Table 1.** Description of students' initial ability scores

Class	Parameter				
	Highest score	Lowest Value	$\bar{x}$	S	S <sup>2</sup>
Experiment	42,5	15	26,9643	6,9840	48,7762
Control	42,5	12,5	26,4286	7,3727	54,3567

The initial ability score was obtained from the Middle Semester (UTS) class VIII test at SMP Muhammadiyah Pleret 2016/2017 school year.

**Table 2.** Normality test results of students initial ability scores

Class	$\chi^2_{count}$	$\chi^2_{table}$	Significant Level	df	Info.
Experiment	0,3616	5,5915	5%	2	Normal
Control	0,1683	5,5915	5%	2	Normal

Criteria for normal samples if  $\chi^2_{count} < \chi^2_{table}$ . Based on the normality test calculation in Table 5 shows that in the experimental class  $\chi^2_{count} = 0,3616$  and  $\chi^2_{table} = 5,5915$  so  $\chi^2_{count} < \chi^2_{k-1}$  with a significance level of 5% and degrees of freedom 2, the initial ability data of the experimental class is normally distributed, in the control class  $t = 0,1683$  and  $t^2_{table} = 5,5915$  so that  $t^2_{hitung} < t^2_{k-1}$  with a significant level of 5% and degree of freedom two, the data on the control class's initial ability is normally distributed.

**Table 3.** Homogeneity test results of students' initial ability scores

$t^2_{count}$	$t^2_{table}$	Significant Level	Df	Info.
0,08	3,8415	5%	1	Homogeneous

Based on homogeneity tests carried out in class VIII D and VIII C with degrees of freedom one and a significance level of 5%,  $t^2_{count} = 0,08$  and  $t^2_{table} = 3,8415$   $t^2_{count} < t^2_{k-1}$ , which means that both classes have the same variance.

**Table 4.** Hypothesis testing

$t'_{count}$	Significant Level	$n_1 - 1$	$n_2 - 1$	Info.
0,2870	5%	27	27	H <sub>0</sub> accepted

Based on the analysis results conducted with a significance level of 5%, the value of  $t' = 0.2870$  and  $t_{\frac{1}{2}(0,05);54} = 2.00437$ , which means that H<sub>0</sub> is accepted. So it can be said that students' initial mathematics learning ability in the experimental class and the control class has no difference.

**Table 5.** Description of the test scores of students' mathematics learning outcomes

Class	Parameter				
	Highest score	Lowest Value	$\bar{x}$	S	S <sup>2</sup>
Experiment	100,00	57,14	73,4693	11,6411	135,5150
Control	92,86	42,86	68,3675	13,8049	190,5752

The assessment used in this test is if the student answers correctly given a score of 1. Suppose the answer incorrectly is given a score of 0, with the scoring guidelines. In that case, that is the number of scores obtained by students divided by the number of questions multiplied by 100.

**Table 6.** Test results for normality in mathematics test scores

Class	$\chi^2_{count}$	$\chi^2_{table}$	Significant level	df	Info.
Experiment	5,6665	7,8147	5%	3	Normal
Control	2,2770	5,9915	5%	2	Normal

Sample criteria are standard if  $t_{count}^2 < t_{k-1}^2$ . Based on the calculation of normality test in table 14 shows that in the experimental class  $t_{count}^2 = 5,6665$  and  $t_{table}^2 = 7,8147$  so  $t_{count}^2 < t_{k-1}^2$  with a significant level of 5% and a degree of freedom three then the test scores for mathematics learning outcomes the experimental class is normally distributed and in the control class  $t_{count}^2 = 2,2770$  and  $t_{table}^2 = 5,9915$  so that  $t_{count}^2 < t_{table}^2$  with a significant level of 5% and degrees of freedom two then the value of the mathematics learning test results of the normally distributed control class.

**Table 7.** Homogeneity test results in mathematics test scores

$t_{count}^2$	$t_{table}^2$	Significant level	Df	Info.
0,7809	3,8415	5%	1	Homogeneous

Based on homogeneity tests carried out in class VIII D. VIII C with degrees of freedom one and a significant 5%, the results are obtained that  $t_{count}^2 = 0,7809$  and  $t_{k-1}^2 = 3,8415$   $0,7809 < 3,8415$ , which means that both classes have the same variance.

The two-party test scores test results in learning mathematics

**Table 8.** Hypothesis testing

$t'_{count}$	Significant level	$n_1 - 1$	$n_2 - 1$	Info.
1,4950	5%	27	27	$H_0$ accepted

Based on the analysis results conducted with a significant level of 5%, the value of  $t' = 1.4950$  and  $t_{\frac{1}{2}(0,05);54} = 2,00437$ . That means that  $H_0$  is rejected. So, the test results of the experimental class students and the control class have differences.

One-party test scores on mathematics learning outcomes

**Table 9.** Hypothesis testing

$t'_{count}$	Significant level	$n_1 - 1$	$n_2 - 1$	Info.
1,4950	5%	27	27	$H_0$ accepted

The analysis results were conducted with a significant level of 5%, the value of  $t' = 1.4950$ , and  $t_{\frac{1}{2}(0,05);54} = 1,67438$ , so  $t' > 1,67438$  means that  $H_0$  is rejected. So it can be said that the experimental class students' test results are more influential than the control class.

## CONCLUSION

1. There are differences in students' mathematics learning outcomes using the Problem Based Learning model and direct learning in class VIII students of SMP Muhammadiyah Pleret even semester 2016/2017 academic year.
2. Mathematics learning of students who use the Problem Based Learning model is more influential than students who use the direct learning model in class VIII students of SMP Muhammadiyah Pleret even semester 2016/2017 academic year.

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