



Mathematical Problem Solving Ability: Comparison between Application of Discovery Learning Model and Problem Based Learning in Class VIII Students of SMPN 2 Majene

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Abstract

The research aims to determine whether there is a difference in mathematical problem-solving ability between the application of the discovery learning model and problem-based learning models in grade 8 at SMPN 2 Majene. This type of research is quasi-experimental with a nonequivalent control group design. The population studied were all class VIII students at SMPN 2 Majene, Majene Regency, which was divided into 6 classes, and then the sample was selected using simple random sampling. In analyzing the data, descriptive and inferential statistical analyses were used. The results showed that the average mathematical problem-solving ability with the application of the discovery learning model was 63.97, with a standard deviation of 12.783. On the other side, the average mathematical problem-solving scores of students taught using the problem-based learning model is 72.31, with a standard deviation of 16.175. The results of the inferential analysis show that there are differences in mathematical problem-solving abilities between those who apply discovery learning and problem-based learning with the results of the calculation of the sig value. $0.014 < 0.05$ which means H_0 is rejected. Thus, it can be seen that the mathematical problem-solving ability of students taught using applying the problem-based learning model is higher than the application of the discovery learning model.

Keywords: Discovery learning; Problem Based Learning; Mathematical Problem Solving Ability.

INTRODUCTION

One aspect of learning mathematics is the ability to solve mathematical problems. Problem-solving ability is a cognitive understanding of parsing and explaining all ideas, information, and thinking processes that a person has when solving a problem. The indicators are understanding the problem, compiling a settlement plan, completing the settlement plan, and looking back at the entire answer (Syahrudin, 2016: 54). Problem-solving will be difficult to have if you only expect and rely on educators as the only source of information. Therefore, it is necessary to develop various ways to teach mathematics, teachers are expected to have the ability to create active, creative, and fun learning models so that the learning process is not boring and that students can receive lessons well (Sari and Arcana, 2018: 1).

Based on the results of interviews with teachers of SMPN 2 Majene, the understanding of class VIII students is still lacking. This can be seen in the score of the second daily test. In these questions, there are indicators of problem-solving abilities that students cannot solve correctly. Some students paid attention when the teacher explained, while others were busy alone or playing with friends.

Based on the problems above, researchers are interested in providing solutions by applying a different learning model, namely the discovery learning model. The discovery learning model is a discovery-based learning model where students find teaching materials in the final form. Based on the learning experiences carried out, it is hoped that the knowledge gained by students can last a long time

and that students not only know but also understand. In addition to the discovery learning model, the learning model that can also be applied is the problem-based learning model. The problem-based learning model is a problem-based learning model in which students are given problems, and students are required to be able to solve them. This model is also a group learning model and a heterogeneous group division. Based on the learning experience that has been done, it is hoped that students will be trained to solve problems.

The problem of the mathematical problem-solving ability of class VIII students at SMPN 2 Majene, Majene Regency, is expected to be overcome through the application of discovery learning models and the application of problem-based learning models. Many researchers have studied the two learning models. Among these researchers, the research conducted by Oktaviani, et al., showed that learning outcomes with the application of the Problem Based Learning model were significantly higher than the application of the Discovery Learning model. This study can be seen in the learning outcomes, while the thing to be studied is overcoming mathematical problem-solving abilities. From this research, researchers want to see the representation ability, while what will be studied will compare mathematical problem-solving abilities.

METHOD

This research is a quantitative approach with the type of quasi-experimental research with the design of a *nonequivalent control group design*. This research was carried out at SMPN 2 Majene, Majene Regency, West Sulawesi Province, with a population of all students in grade VIII for the 2021/2022 academic year. Then the sample was selected using a *simple random sampling technique* so that class VIIC was selected as the class applying the *discovery learning model* (experiment 1) and class VIID applying the *problem-based learning model* (experiment 2).

The subject to be measured or the variable is mathematical problem-solving ability after being given treatment. The indicators of mathematical problem-solving ability used in this study understand the problem, preparing a settlement plan, completing a settlement plan, and looking back at all answers. Data were collected through tests and observation sheets. In addition, the instrument used is a test of mathematical problem-solving ability and an observation sheet on implementing lesson plans.

RESULT AND DISCUSSION

Based on the data that has been obtained before applying the researched teaching and learning model or pretest (initial test) and after being given or posttest (final test) to students of class VIIC and class VIID. Then the data obtained is analyzed so that descriptive and inferential statistics are obtained from the two classes.

Table 1. Description of *pretest* and *post-test* in experimental class 1

	Descriptive Statistics				
	N	Minimu m	Maximu m	mean	Std. Deviation
Experimental pretest 1	39	20	40	23.33	4.492
Expert posttest 1	39	35	90	63.97	12,783
Valid N (listwise)	39				

Based on table 1, we can find out the highest score of students in class VIIC before being given treatment is 40, and the lowest score is 20 so the average obtained is 23.33 with a standard deviation of 4.492. In contrast, the highest score obtained by students after being given treatment is 90, and the lowest score is 35 so the average obtained is 63.97 with a standard deviation of 12.783.

Therefore, it can be concluded that students' mathematical problem-solving ability by applying the *discovery learning model* has increased in terms of the average learning outcomes.

Table 2. Description before and after treatment in the experimental class 2

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Pretest experiment 2	39	20	70	35.51	17.045
Posttest eksperimen 2	39	35	95	72.31	16.175
Valid N (listwise)	39				

Based on table 2, we can see that the highest score of students in class VIIID before being taught using the problem-based learning model is 75, while the lowest score is 20, so the average score was 35.51 with a standard deviation of 17.045. However, the highest score obtained by students after the treatment given is 95, and the lowest value is 35 so the average obtained is 72.31 with a standard deviation of 16.175. So, it can be concluded that the ability to solve mathematical problems by applying problem-based learning models has increased in terms of the average value.

Before testing the hypothesis, the data were tested to determine whether they met the assumptions, namely normality, and homogeneity. After testing the assumptions, it is found that all data are normal and homogeneous. After doing the prerequisite test, then the hypothesis was tested. To find out the established hypothesis, a two-way test was used with $\alpha = 0.05$. The independent sample t-test was used in this test using SPSS 22.

Table 3. Independent sample test of mathematical problem-solving abilities of class VIIIC and class VIIID students

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
X1	Equal variances assumed	6.288	.014	-2.524	76	.014	-8.333	3.301

Based on the results of SPSS 22 in table 3, it is found that the 2-tailed sig value is $0.014 < 0.05$. This means that H_0 is rejected, which means that there is a difference in mathematical problem-solving abilities between students taught using the discovery learning model and those taught using the problem-based learning model to class VIII students at SMPN 2 Majene, Majene Regency.

Through the observations and analysis results of researchers, there are differences in mathematical problem-solving abilities with the application of discovery learning models and the application of problem-based learning models. This is due to the advantages and disadvantages of each of these learning models. Based on the average score, students taught by applying the discovery learning model average score is 63.97, while the average score of students taught using the problem-based learning

model is 72.31. It can be seen that the average score of students taught with problem-based learning is higher. This means that there are significant differences in mathematical problem-solving abilities between students taught using discovery learning and problem-based learning models.

The explanation above shows that there are significant differences in mathematical problem-solving abilities. The *discovery learning model* and *problem-based learning* can improve the mathematical problem-solving ability of class VIII students of SMPN 2 Majene. Both of these models provide opportunities for students to solve problems given at the beginning of the learning process. In addition, these two models are group learning, making it easier for students to find material concepts or solve problems. However, the *problem-based learning model* further enhances mathematical problem-solving abilities compared to the *discovery learning model*. It is because the *problem-based learning model* includes scientific methods used in problem-solving, namely understanding the problem, planning a solution, and implementing a plan that is carried out repeatedly for four meetings. Meanwhile, in the application of the *discovery learning model*, there is no such procedure because each student meeting is only directed to find the material that has been given, not in *its final form*. In line with the results of this study, the research conducted by Tanjung et al. (2020) under the research title "*Problem Based Learning, Discovery Learning, and Open-Ended Models: An Experiment on Mathematical Problem-Solving Ability*" shows the results that the ability to solve mathematical problems is taught using learning problem-based learning is better than the ability to solve mathematical problems of discovery and open learning. However, Suci (2020) argues that there is no difference in the achievement of significant mathematical problem solving ability between the application of the two learning model.

CONCLUSION

Through the research results listed in the discussion, it can be concluded that there are significant differences in mathematical problem-solving abilities between students who are taught by applying the *discovery learning model* and students who are taught by using the *problem-based learning model* to class VIII students at SMPN 2 Majene, Majene Regency.

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