

**DISCOVERY LEARNING MODEL TO SOLVE PROBLEM IN
MATHEMATICS: IS THERE ANY INFLUENCES?**

**Lela Chayaning Ati^{1)*}, Tri Candra Wulandari²⁾, Yuli Ismi N.I.³⁾, Roikhatul
Jannah⁴⁾**

^{1,2,3} Mathematic Education Universitas Islam Malang, Indonesia

⁴ MTs Nasruddin Dampit, Malang, Indonesia

^{1)*} 21901072017@unisma.ac.id

Abstract

The purpose of this study was to determine whether there is an effect of applying the discovery learning model on the ability to solve higher order thinking skills of students in mathematics learning. This research is a quantitative research using quasi experiment research design. The population of this study were all VIII grade students at MTs Nasruddin, Dampit, Malang district. The samples used in this study were 2 classes selected using random sampling technique, each class consisting of 27 students. Students' problem solving ability was measured using a valid description test. The data obtained were analyzed using independent sample t-test with a significant level of 5% ($\alpha = 0.05$). The results of hypothesis testing show that learning using the discovery learning model has a positive effect on students' problem solving ability.

Keywords: *Discovery Learning, Problem Solving Abilities, Higher Order Thinking Skills, Mathematics Learning*

INTRODUCTION

As science information and communication technology develop, humans are required to improve their quality. Personal quality can be improved with education. Education is an effort to develop knowledge and abilities that have the potential to become real and useful in everyday life (Tantra, Widodo and Katminingsih, 2022). The success of education in schools is influenced by various factors such as students' basic abilities, teachers' ability to explain, learning models, and infrastructure for students' creativity (Ferawati and Suhendri, 2020).

One of the learning models applied in schools is discovery learning. Discovery learning is a learning model that emphasizes understanding concepts, meanings, and relationships through an intuitive process to finally conclude (Sugianto, Suyitno and Asih, 2022). According to Syafitri (2021), the discovery learning model provides better problem-solving abilities because students can analyze, solve and conclude existing problems themselves. One use of the discovery learning model in school subjects is mathematics. Five basic mathematical abilities in mathematics learning according to NCTM Kurnia Putri et al., (2019) namely problem-solving, reasoning, communication, connection, and representation. Among these

mathematical abilities, problem-solving ability is one of the abilities that is needed by every student in facing challenges in the current era of globalization and information. (La'ia and Harefa, 2021). Problem-solving ability is a complex cognitive activity, as a process for overcoming problems encountered and solving them requires several strategies (Layali and Masri, 2020). Someone who has high problem-solving abilities is expected to be able to face change, survive, and make the right decisions in everyday life. Mathematical abilities in Indonesia are still relatively low. This was obtained from the results of the 2018 Program for International Student Assessment (PISA) survey regarding reading, science, and mathematics abilities, Indonesia's score was 74th out of 79 countries with a score of 379. This score is still relatively low compared to the international average score of 500 (Nadjamuddin and Hulukati, 2022). The survey questions used in PISA are HOTS-based questions.

HOTS (Higher-order thinking Skills) can be defined as a complex thinking process in describing the material, drawing conclusions, making representations, analyzing, and constructing its relationship to the most basic mental operations (Milenia, Resti and Rahayu, 2022). According to Blomm, the levels of thinking after revision are remembering, understanding, applying, analyzing, evaluating, and creating. The stages of remembering, understanding, and applying are categorized as low-order thinking skills (LOTS). Meanwhile, the stages of analyzing, evaluating, and creating are categorized as High Order Thinking Skills (Susilowati and Sumaji, 2020).

HOTS-based questions train students to think creatively and critically and be skilled in finding solutions to problems and not fixate on discussion examples given by the teacher. The results of the survey conducted by PISA follow the facts in the field, especially at MTs Nasruddin, Dampit. The students at MTs Nasruddin are still unable to solve problems independently. So, it still depends on the teacher and the teaching and learning process is still centered on the teacher. Based on the exposure, this study was to determine whether there is an effect of applying the discovery learning model on the ability to solve higher order thinking skills of students in mathematics learning.

LITERATURE REVIEW

This research is a development of the results of previous research. To avoid repetition of research results with the same problems, the researcher included previous research. Discovery learning is one of the scientific learning models that applies constructivism. Constructivism believes that knowledge cannot be simply transferred, but must be built and interpreted by learners themselves. Learners must build all kinds of information they get into knowledge, so

that the knowledge gained can last long and be meaningful to students. Jana and Fahmawati (2020) in a journal entitled "Discovery Learning Model to Improve Problem Solving Abilities" concluded that the discovery learning model can improve the mathematical problem solving abilities students at SMP PGRI Kasihan, Bantul, Yogyakarta in cube and block material. Data collection techniques using observation and tests. Data analysis techniques by examining all data, both qualitative data and quantitative data from various sources starting from observations, written tests, documentation and field notes. Another research from Jan'nah and Suherman (2021) concluded that the discovery learning model can improve students' mathematical problem solving abilities. The type of research carried out in this research is literature study research. The data collection technique used is literature review, namely by collecting data sourced from various journals and books related to the object to be discussed.

Problem solving ability is the skill of students in using mathematical concepts to solve everyday problems, as well as things related to other sciences. Problem solving ability is an effort made by students in analyzing to find a solution to the problem at hand. Someone who has high problem solving ability is expected to be able to face changes, can survive and make decisions appropriately in life (Tantra, Widodo and Katminingsih, 2022). Nasution (2022) concluded that the discovery learning model had a significant effect on the mathematical problem solving abilities of class IV students. This research is quantitative research with a quasi-experimental design research methodology. The population in this study was all students in class IV of MIs Istiqomah Islamic Fullday School Sri Gunting Sunggal with the samples chosen being class IVA as the control class and class IVB as the experimental class. The data analysis used is the normality test, homogeneity test, and test test.

RESEARCH METHODS

This research is a quantitative study with a quasi-experimental research design. This research was conducted at MTs Nasruddin, Dampit, Malang Regency. The population in this study were all VIII grade students, consisting of seven classes, with a total of 234 students. Researchers used 2 classes as samples, with many students in each class being 27. The selection of classes using random sampling techniques, one class was used as a control class and the other class as an experimental class. In the control class, math learning uses question and answer learning, lectures and discussions. While in the experimental class, mathematics learning activities used the discovery learning model. In this study, data collection used a description-shaped test that had been declared valid. The tests given to students to measure

mathematical problem solving ability. The test results were analyzed using an independent sample t-test with a significant level of 5% or $\alpha = 0.05$.

The instrument is said to be valid after testing the validity of the instrument by the validator. Researchers used two validators, namely one mathematics education lecturer and one mathematics teacher. The validation results showed that the instrument was declared valid with a score of 3.3.

Data analysis was carried out to test the research hypothesis, by conducting prerequisite tests first. The prerequisite tests required are normality test and homogeneity test. If both tests are met, then hypothesis testing will be carried out using independent sample t-test. The hypotheses used in this study are

- a. $H_0: \mu_1 = \mu_2$ (there is no difference in students' mathematical problem solving ability between the experimental class and the control class)
- b. $H_0: \mu_1 \neq \mu_2$ (there is a difference in students' mathematical problem solving ability between the experimental class and the control class)

RESULTS AND DISCUSSION

The pretest and posttest data obtained need to be tested first, using the normality test and homogeneity test. **Pretest and Posttest Data Normality Test**

Data normality test using the Shapiro-Wilk test. The test results are presented in Table 1.

Tabel 1. Normality test using Shapiro-Wilk

Class	Pretest			Posttest		
	Statistic	df	Sig.	Statistic	Df	Sig.
Control	0,955	27	0,288	0,935	27	0,90
Experiment	0,933	27	0,82	0,959	27	0,351

Based on the table 1. It can be seen that the pretest and posttest results for the experimental class and control class have a value of sig>0.05. it means that the sample are from a normally distributed population.

Homogeneity Test

After a normality test has been carried out and it is proven that the sample comes from data with a normal distribution, a homogeneity test is then carried out to prove whether the data has significant differences or not. The homogeneity test results are presented in Table 2.

Table 2. Pretest Homogeneity Test Results

	Control Class	Experiment Class	Sig.
	Mean ± SD	Mean ± SD	
Pretest	31,44 ± 9,124	35,22 ± 6,919	0,092
Posttest	43,74 ± 6,218	62,26 ± 9,933	0,000

Based on the table above, a $\text{sig} = 0.092$ value was obtained for the pretest homogeneity test. This means that $\text{sig} = 0.092 > 0.05$ so H_0 is accepted. So, there is no significant difference in the initial abilities (pretest) of students between the experimental class and the control class. Meanwhile, for the posttest homogeneity test, the value obtained was $\text{sig} = 0.000$. This means that $\text{sig} = 0.000 < 0.05$ so H_0 is rejected. So, there is a significant difference in the final abilities of students between the experimental class and the control class.

Hypothesis Test (Independent t-test)

It is known that the results of the Independent Sample T-Test using posttest questions show a sig value = $0.000 < 0.05$ so that H_0 is rejected, which means there is a significant difference. This can be seen from the mean \pm SD value of the control class is 43.74 ± 6.218 and the mean \pm SD of the experimental class is 62.26 ± 9.933 . The results of the independent t-test data can be seen in Table 3.

Table 3. Independent Sample T-Test Results

Control Class	Experiment Class	Sig.
Mean \pm SD	Mean \pm SD	
$43,74 \pm 6,218$	$62,26 \pm 9,933$	0,000

Based on the results of the hypothesis testing posttest data on students' problem-solving abilities above, it can be concluded that there are differences between the control class and the experimental class. The problem-solving abilities of students in the control class and the experimental class are quantitatively different when seen from the average value of the problem-solving ability of the class treated with the discovery learning model and the class treated with the cooperative learning model. So it can be concluded that there are differences in students' problem-solving abilities because they are treated with the discovery learning model.

This is in line with Layali's opinion (2020), that the difference in problem-solving abilities for students who are treated with an innovative learning model is better compared to a learning model that is dominated by the teacher during the learning process so that students become passive. In addition, discovery learning can increase student activity and develop thought patterns so that students become more creative in finding learning concepts. (Ferawati and Suhendri, 2020). So, the discovery learning model is better and has an influence on students' problem-solving abilities compared to the cooperative learning model.

CONCLUSION

Based on the research results, it can be concluded that there are differences in the problem-solving abilities of students who are treated with the discovery learning model and the

cooperative learning model. This can be seen from the mean \pm SD value of the control class which is 43.74 ± 6.218 and the mean \pm SD value of the experimental class is 62.26 ± 9.933 with a sig value = $0.000 < 0.05$. Suggestions that can be given to teachers are to continue to innovate in the learning process and improve the quality of learning by using innovative learning models, one of which is the discovery learning model. For students, it is important to always be enthusiastic and try to find out the material independently in the learning process. For researchers, it is hoped that they can innovate in the world of education.

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