EFFECTIVENESS OF LEARNING WITH GUIDED DISCOVERY METHOD ON MATHEMATICAL LEARNING OUTCOMES OF CLASS VII SMP

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ABSTRACT

This study aims to determine whether there are differences in students' mathematics learning outcomes using guided discovery methods and the expository method. These populations in the study were the students of two classes. The design of this study uses Randomized Pretest-Postest Comparison Group Design. The technique of collecting data uses a test in the form of an essay. The test instrument used is a validity test. The data analysis technique used is the analysis prerequisite test, including the normality test and homogeneity test followed by hypothesis testing. The results of the experimental and control class hypothesis tests with a significant level of 5% and dk = 62 indicate that for students' mathematics learning outcomes (posttest) 1) there are differences in students' mathematics learning outcomes by using the guided discovery method and the expository method in class VII students. of State Junior High School (SMP Negeri) 2 Kalasan, 2) Guided Discovery method is more effective than the expository method on students' mathematics learning outcomes of class VII of SMP Negeri 2 kalasan
Keywords: Effectiveness, Guided Discovery, Expository, Students' Learning Outcomes

INTRODUCTION

Mathematics is an important subject, but many students think that mathematics is a complicated and dull subject. Therefore, teachers' teaching and learning processes can be done by implementing a learning atmosphere that can make students enthusiastic and happy in learning mathematics and realizing optimal mathematical learning outcomes. Based on observations made by researchers on November 11, 2018, at SMP Negeri 2 Kalasan Sleman Regency shows that in the mathematics learning process tends to be still satisfied with the teacher (Teacher Center) with a method that is often applied is the method of reflection and assignment so that the attitudes of students who are less active in participating in mathematics learning. This results in students having less interaction with the teacher or with fellow students. Student participation in concluding the results of the discussion is also still lacking.

Based on the results of interviews with mathematics teachers, the material taught by teachers is often not well received by students. Students are still challenging to understand the teacher's material, so they need repetition on every material taught. Students are more dominant in listening to the teacher's explanation and recording what the teacher writes on the blackboard. When the teacher asks a question, only a few students actively answer, and other students tend to be quiet. The results of learning mathematics, especially in class VII, are still low. The low completeness and learning outcomes are shown from the acquisition of the Semester Mid Term Assessment grades in the 2018/2019 school year. Student mathematics learning outcomes can be maximized in various ways, one of them by maximizing the learning process well. To overcome this, the teacher must make students active and interested in learning mathematics. One way to overcome this is by creating exciting teaching and learning conditions that allow students to be more active and creative. Students can build their knowledge and understanding from their learning environment.

Teachers' efforts to choose learning methods suitable for the material will support the creation of active teaching and learning activities. Therefore, teachers need to use various teaching methods by using other learning methods so that the methods used can maximize learning outcomes in mathematics. According to Nana Sudjana (1989: 54), in teaching practice, an excellent method to use is a variety of teaching methods, or it can also be a combination of several teaching methods. The same thing was

expressed by Djamarah (2000: 109), who found that the characteristics of a method have strengths and weaknesses so that teachers are required to use only a variety of methods, but can also use a combination of two or more learning methods that are tailored to the characteristics of existing students. The approach that is generally used by teachers in the classroom is called the conventional approach—according to Mulyatiningsih (2012: 224), methods generally used in conventional approaches in the form of lectures, recitations, practices, and exercises. The combination of lecture, recitation, practice, and practice methods is the expository method. According to Suryosubroto (2002: 165), the lecture method verbalizes verbal speaking to his class. In practice, according to (Sanjaya 2008: 185-189), the expository method has the following implementation procedures: Preparation, Presentation, Correlation, Generalization, and Application.

The learning process as a large teacher does not show the use of learning methods desired by students, even though the presence of learning methods occupies an important position in delivering learning material. In this study, the learning method used is a guided discovery learning model. According to Joromi Bruner (Markaban, 2006: 9), discovery is a process, a way/approach in approaching problems rather than a product or certain knowledge items. Thus, in Bruner's view, learning by discovery is learning to find, where a student is confronted with a problem or situation that seems odd so students can find a way to solve it. Moreover, according to (Markaban 2006: 15) that the guided discovery learning method is a learning model that is done by the teacher guiding students if the treatment and students are encouraged to think based on the material provided by the teacher and to what extent students are guided depending on their ability and the material being studied.

From the above understanding, it can be concluded that the guided discovery learning method is the boosting method by the teacher guiding students in the right direction, and students are actively involved in learning activities so that students can find patterns of conclusions based on what the teacher provides and teacher guidance. According (Riyanto 2008: 138) Broadly speaking, the procedure of guided fulfillment methods as follows: 1) Simulation, 2) Problem Statement, 3) Data collection, 4) Data processing, 5) Verification, 6) Generalization.

In every learning process carried out by students' students will produce learning outcomes. Teachers, as instructors, play an important role in providing in order to improve student learning outcomes. Even from every learning process at school, students expect good learning outcomes to achieve their goals. Good learning outcomes can be achieved if the learning process achieves good conditions too. If the learning process is less than optimal, it is not easy to feel that learning outcomes will also be achieved well. According to Hamalik Oemar (2007: 135), learning outcomes is a question of students' abilities expected to master some or all of the competencies in question. While another understanding of learning outcomes cited by (Aldursani Ridwan), namely: According to Nasution learning outcomes are changes that occur in individuals who learn, even changes change regarding knowledge, but also knowledge to know skills, habits, attitudes, understandings, authorities, and association within the individual learning individual. According to Sudjana, Learning Outcomes are the abilities students have after receiving a learning experience. In the description above, it can be concluded that the learning outcome is an ability obtained by students after they have done the learning process to determine the absorptive capacity and success of the competency standard authorities, which is stated in the form of numeric or letter values given by the teacher.

METHODS

The design of this study used a pretest-posttest control group design. In this design, the experimental and control classes are given a pretest to determine the initial state. The next stage is given treatment with the guided discovery learning method in the experimental class and the control class's expository method after being given a pretest. The last stage is given a posttest. This study's independent variable is mathematics learning by giving treatment in the form of guided discovery methods in the experimental class and giving treatment in the form of an expository method in the control class.

Table 1. Research Design

Class	Pretest	Treatment	Posttest
Experiment	X_A	P	Y_A
Control	X_B	K	Y_B

Information:
XA: Pretest in the experimental class
XB: Pretest on the control class
YES: Posttest in the experimental class
YB: Posttest in the control class
P: Learning by the guided discovery method
K: Learning by the expository method

This research took place at SMP Negeri 2 Kalasan. The subjects of the study were the seventh-grade students of junior high school. In this study, the experimental class sample was student VII F, and the class for the control class was class VII E by looking at the class average. Data collection techniques in this research are test methods. Researchers' steps to collect data on the test method are as follows:

1. Giving an initial test (pretest) in the experimental and control classes.
2. Implementation of learning in the experimental class and the control class.
3. Giving the final test (posttest) in the experimental class and the control class.

The research instrument used was a test in the form of essay questions or descriptions. There were four questions for the pretest and posttest. The test material is in the form of questions with mathematics subject matter in the seventh-grade junior high school. Data analysis techniques include:

1. Prerequisite analysis tests in analytical testing. The tested data are the initial test results and the experimental class's final test results and the control class. The analytical test used for the initial ability test results is the normality test and the homogeneity Test
2. Hypothesis testing to test the difference in average student learning outcomes used t-test analysis includes:
   a) Two-Party Hypothesis Test is used to find out that there are real differences regarding the initial ability of students who use the learning method with the guided discovery method and students who use the method learning by the expository method.
   b) One-party hypothesis testing is used to determine that the learning method with Guided Discovery is more effective than the expository learning method. Similar to a two-party hypothesis test, one-party hypothesis testing uses the t-test statistic.

RESULTS AND DISCUSSION

The research results obtained students' initial ability test scores in class VII F (experimental class) and VII E (Control class). The values used are Pretest scores.

Table 2. Description of Early Mathematics Ability Learning Values

Parameter	Learning	
	Control	Experiment
Lowest Score	48	52
Highest Score	76	81
X	63,28	65,07
S	7,6658	7.3669
S^2	58,764	54,272

A summary of the calculation results is presented in Table 3. Below:

Table 3. Test the Normality of Initial Ability Values

	χ^2_{count}	χ^2_{table}	T-Sig	df	Info.
Experiment	2.154	9,487	5%	4	Normal
Control	2,720	7,814	5%	3	Normal

Based on the table above done in the experimental class (VII F) at a significant level of 5% and degrees of freedom = 4, it can be obtained $\chi^2_{\text{count}} = 2.15418$ and $\chi^2_{\text{table}} = 9.4877$. Because $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, H_0 is accepted, which means that the experimental class (VII F) has normal distribution data. While the Normality test that has been carried out in the Control class (VII E) at a significant level of 5% and degrees of freedom = 3, it can be obtained $\chi^2_{\text{count}} = 2.72098$ and $\chi^2_{\text{table}} = 7.82472$. Because $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, H_0 is accepted, which means that the control class (VIII E) has normal distribution data

A summary of the homogeneity test results of the initial capability can be seen in table 4.

Table 4. Summary of Homogeneity Test Results Initial Ability

χ^2_{count}	χ^2_{table}	T-Sig	df	Info.
0,0546	3,8414	5%	1	Homogeneous

Based on homogeneity tests that have been done in class VII F and class VII E with df = 1 and a significant level of 5%, it can be seen that the results of $\chi^2_{\text{count}} = 0.0546$ and $\chi^2_{\text{table}} = 3.8414$. Because $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, the two classes, namely class VII F (experimental class) and class VII E (control class), have the same variance (have homogeneous variance).

The average similarity test on the initial ability is done to determine whether there are differences in the students' initial ability between the control class (VII E) and the experimental class (VII F).

Table 5. Summary of Initial Hypothesis Test Results

t_{count}	t_{table}	T-Sig	df	Info.
-0,163	1,998	5%	62	H_0 accepted

Based on the analysis results on the first hypothesis test with a significant level of 5% and degrees of freedom = 62, so obtained $t_{count} = -0.1636$ and $t_{table} = 1.99897$ were obtained. Because $t_{count} < t_{table}$, then H_0 is accepted, and H_1 is rejected, which means that there is no difference in the initial ability between students who use the guided discovery learning method and students who use the expository method in class VII students of SMP Negeri 2 Kalasan 2018/2019 school year.

The value used as the initial ability to learn mathematics from both samples is the posttest value.

Tabel 6. Description of the Value of Learning Mathematics

Parameter	Learning	
	Control	Experiment
Lowest Score	67	71
Highest Score	90	100
X	78	82,84
S	5,267	6,057
S^2	27,75	36,69

A summary of the calculation results is presented in Table 7. Below:

Table 7. Test Normality of Mathematics Learning Outcomes

	χ^2_{count}	χ^2_{table}	T-Sig	df	Info.
Experiment	2.844	7,814	5%	3	Normal
Control	0,702	7,814	5%	3	Normal

Based on the table above done in the experimental class (VII F) at a significant level of 5% and degrees of freedom = 5, it can be obtained $\chi^2_{count} = 2.84487$ and $\chi^2_{table} = 7.81472$. Because $\chi^2_{count} < \chi^2_{table}$, H_0 is accepted, which means that the Experiment class (VII F) has normal distribution data. While the Normality test that has been carried out in the Control class (VII E) at a significant level of 5% and degrees of freedom = 5, it can be obtained count = 0.70268 and table = 7.81472. Because the $\chi^2_{count} < \chi^2_{table}$, H_0 is accepted, which means that the Control class (VII E) has normal distribution data.

Homogeneity Test of Mathematics Learning Outcomes. A summary of the homogeneity test results of the initial capability can be seen in table 8.

Table 8. Summary of Homogeneity Test Results in Mathematical Learning Outcomes

χ^2_{count}	χ^2_{table}	T-Sig	df	Info.
0,0546	3,8414	5%	1	Homogeneous

Based on homogeneity tests carried out in class VII F and class VII E with dk = 1 and a significant 5% level, it can be seen that $\chi^2_{count} = 0.0546$ and $\chi^2_{table} = 3.8414$. Because the $\chi^2_{count} < \chi^2_{table}$, then the two classes, namely class VII E (Control class) and class VII F (experimental class), have the same variance (have homogeneous variance).

Hypothesis Test of Two Parties Learning Outcomes of Mathematics

Table 9. Summary of Hypothesis Test Results Mathematics Learning Outcomes

t_{count}	t_{table}	T-Sig	df	Info.
2,018	1,998	5%	62	H_0 rejected

The analysis results on the first hypothesis test with a significant level of 5% and degrees of freedom = 62, so obtained $t_{count} = 2.01812$ and $t_{table} = 1.9989$. Because $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted, which means that there are differences in student learning outcomes between those using the guided discovery method and the expository method in class VII students of SMP Negeri 2 Kalasan 2018/2019 school year.

One-Party Hypothesis Testing Learning Outcomes of Mathematics

Table 10. Summary of Hypothesis Test Results Mathematics Learning Outcomes

t_{count}	t_{table}	T-Sig	df	Info.
2,018	1,998	5%	62	H_0 rejected

Based on the analysis results on the second hypothesis test with a significant level of 5% and degrees of freedom = 62, the value of t_{count} = 2.01812 and t_{table} = 1.9989 was obtained. Because $t_{count} > t_{table}$, H_0 is rejected, and H_1 is accepted, which means that the guided discovery learning method is more effective than the guided discovery learning method for the mathematics learning outcomes of SMP Negeri 2 Kalasan students.

CONCLUSION

Based on the results of research and discussion in experimental research in class, it can be concluded that for Student Learning Outcomes (posttest), there are differences in the ability of students between those who use the guided discovery learning method and students who use the expository method in VII grade students of SMP Negeri 2 at the time of the 2018/2019 school year based on observations with a significant level of 5% and degrees of freedom = 62, then the value of $t_{count} = 2.01812$ and $t_{table} = 1.9989$. Because $t_{count} > t_{table}$, then H_0 is rejected and H_1, which means that the learning method with guided discovery is more effective than learning with expository to student mathematics learning outcomes. With a significant level of 5% and degrees of freedom = 58, the obtained $t_{count} = 2.01812$ and $t_{table} = 1.9989$. Because $t_{count} > t_{table}$, H_0 is rejected, and H_1 is

accepted. Thus, through the guided discovery method and expository to students' learning outcomes in learning mathematics in class VII SMP, there are differences in learning outcomes. Learning with the guided discovery method is more effective than learning with the expository method.

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