THE EFFECTIVENESS OF MODEL-ELICITING ACTIVITIES AND COOPERATIVE LEARNING MODELS OF PROBLEM SOLVING TYPE ON THE STUDENT'S UNDERSTANDING OF MATHEMATICAL CONCEPT

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ABSTRACT

Lack of understanding of a concept would affect student learning outcomes, especially in mathematics. That matter which led to lower student learning outcomes. This study aims to determine the differences in the ability of understanding mathematical concepts that use model-eliciting Activities and cooperative learning model of problem-solving as well as to compare the effectiveness of the model-eliciting Activities and cooperative learning model of problem-solving on the ability of understanding mathematical concepts at eleven grade of TKJ's student in SMK Negeri 2 Depok Yogyakarta of even semester at academic year of 2016/2017. The population in this study is a class XI TKJ SMK Negeri 2 Depok Yogyakarta. Selection of the sample by means of a non-probability sampling with purposive technique, the sample selection based on objective and specific considerations. The sample in this research is class XI TKJ A as an experimental class 1 and class XI TKJ B as the experimental class 2. Of each class of samples taken 5 students for a testing-grade. The research design in this study is non-equivalent (pretest-posttest) Control-Group Design. The data collection method is a method of documentation and tests. The instrument was a matter of the description. Test data collection instruments used validity and test data analysis used reliability. The analysis of the data is the prerequisite test analysis including normality test and homogeneity test; and hypothesis testing using t-test. The result of the research on the significance level on 5% and df = 52 indicates that: (1) There is the difference between the ability to understand mathematical concepts in learning that uses the model-eliciting activities with learning that uses the cooperative model of the problem-solving type. It can be seen that $t_{count} = 2.99588$ greater than $t_{table} = 1.67592$. (2) Learning mathematics students who use model-eliciting activities more effective than learning using a cooperative learning model of the problem-solving type. It can be seen that $t_{count} = 2.99588$ greater than $t_{table} = 2.0086$.

Keywords: Effectiveness, Model-Eliciting Activities, Cooperative Learning Model of Problem Solving Type, The Ability of Mathematics Concept

INTRODUCTION

Education is a very important thing and cannot be separated from our lives as humans. According to Ihsan, Fuad (2003: 7): Education is a human activity and effort to improve his personality by fostering his personal potentials, namely spiritual (thought, intention, taste, creativity, and conscience) and body (five senses and skills)).

Mathematics according to Suherman, Erman et al (2003: 25-26) is the queen or source of knowledge from other sciences, in other words, mathematics grows and develops for itself as a science, and can serve the needs of science in its development and operation. Understanding of a previous concept will affect the understanding of the next concept. According to Suherman, Erman et al (2003: 22) that in mathematics, there are topics or prerequisite concepts as a basis for understanding the next topic or concept.

The importance of understanding this concept is also stated in the Minister of Education Regulation No. 22 of 2006 concerning Content Standards in that the objectives of mathematics learning are to:
1. Understanding mathematical concepts, explaining the interrelationships between concepts and applying concepts or algorithms in a flexible, accurate, and efficient manner, and appropriate in problem-solving.

2. Using reasoning on patterns and traits, doing mathematical manipulation in making generalizations, compiling evidence, or explaining mathematical ideas and statements.
3. Solve problems that include the ability to understand problems, design mathematical models, solve models and interpret the solutions obtained.
4. Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.
5. Having an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention, and interest in learning mathematics, as well as being tenacious and confident in problem-solving.

Permendiknas No. 22/2006 states that "understanding mathematical concepts, explaining the interrelationships between concepts and applying concepts or algorithms flexibly, accurately, efficiently, and precisely in problem-solving". The ability to understand concepts is very important in learning mathematics because learning mathematics contains mathematical problems in everyday life, therefore in solving mathematical problems, it is very necessary to understand concepts to solve these problems.

Based on the results of interviews with mathematics teachers in class X SMK Negeri 2 Depok Yogyakarta, namely Mrs. Sri Eko Handayani Ratnawati S.Pd, regarding the level of understanding ability of students in general concepts towards mathematics learning that the level of understanding of student concepts is sufficient but still standard depends on the material that can be understood. As stated earlier, students lack an understanding of exponential material and logarithms, while in equation material students understand well. This is alleged because the emphasis in the delivery of material is only focused on the ability to remember (memorizing) or memorize (rote learning) and lack of emphasis in terms of understanding (understanding).

Based on observations made a second time by researchers at SMK Negeri 2 Depok Yogyakarta, that the results of documentation for the average value of midterm mathematics tests for class X students majoring in TKJ SMK Negeri 2 Depok Yogyakarta in the odd semester of the academic year 2015/2016 there were a number of students who still get a value that hasn't yet reached the KKM. That is because students still experience difficulties in working on math problems. Students who have difficulty working on these problems are caused by a lack of understanding of mathematical concepts. The results of interviews with mathematics subject teachers showed that the percentage of students' success had not yet reached KKM, which was still below 75%. The average value of the odd midterm semester of the class X TKJ for the 2015/2016 school year is 71.1875. This can be seen in Table 1:

Table 1. Average and Completion of Students in UTS Mathematics Grade X TKJ Odd Semester Vocational School 2 Depok Yogyakarta

Class	Average	Total students		Percentage (%)	
		Complete	Not Complete	Complete	Not Complete
TKJ A	69,391	14	18	43.75	56.25
TKJ B	72,984	18	14	56.25	43.75

Data Source : SMK Negeri 2 Depok Yogyakarta

From Table 1 it can be seen that the average number of odd semester midterm grades of TKJ SMK Negeri 2 Depok Yogyakarta still many do not reach the KKM (Minimum Mastery Criteria) set by the school, which is 75.

Given the importance of understanding concepts in mathematics learning, therefore a learning model is needed that can facilitate students to be able to understand concepts well so that they can solve a mathematical problem. The selection of learning models is very necessary for the process of teaching and learning mathematics so that it can facilitate students in accepting the material presented.

Learning models are guidelines in the form of programs or teaching strategies that are designed to achieve learning objectives that contain the responsibilities of teachers in planning, implementing, and evaluating learning activities. One learning model that can be used is a cooperative learning model.

According to Suherman, Erman et al (2003: 260) the cooperative learning model includes a small group of students who work as a team to solve a problem, complete a task, or do something to achieve another shared goal. The cooperative learning model is a learning model that prioritizes students working in study groups. Some variations in the cooperative learning model are Model-Eliciting Activities and problem-solving.

Based on the results of interviews with several students of class XI TKJ, in the process of teaching and learning activities, they only listen, take notes, and do what is instructed by the teacher. This activity makes the ability to understand mathematical concepts in students is very low. This shows that the teacher still dominates in learning activities so that it causes less active students in participating in learning because teaching and learning activities are still centered on the teacher.

Several learning models that can be used to improve student activity in learning, namely Model-Eliciting Activities and problem-solving type cooperative learning models. Model-Eliciting Activities is a learning model that begins with the presentation of real problem situations that lead to activities that produce mathematical models that are used to solve mathematical problems. Whereas Problem-solving is a learning model by exposing students to real problems or simulated problems, working together in groups to develop problem-solving skills or problem-solving. At SMK Negeri 2 Depok, Yogyakarta, Model-Eliciting Activities have never been used, whereas cooperative learning models of problem-solving have been used but are still very rarely used in learning. By using Model-Eliciting Activities and problem solving cooperative learning models are expected to stimulate students to think creatively to improve students' understanding of mathematical concepts in solving real problems.

From the explanation above, researchers are interested in applying Model-Eliciting Activities in mathematics learning at SMK Negeri 2 Depok Yogyakarta, which will be compared with learning models that have been used in schools, namely problem solving so that learning interest grows and is maintained, so as to improve understanding of student concepts in mathematics.

The formulation of the problem in this study are:
1. Is there a difference in the ability to understand mathematical concepts of students who use Model-Eliciting Activities with the ability to understand mathematical concepts of students who use problem-solving in class XI TKJ SMK Negeri 2 Depok Yogyakarta odd semester 2016/2017 school year?
2. Is mathematics learning using Model-Eliciting Activities more effective than problem-solving for the ability to understand mathematical concepts of students of class XI TKJ SMK Negeri 2 Depok Yogyakarta odd semester 2016/2017 school year?

Based on the above problem formulation, the objectives of this study are:
1. To find out whether or not there are differences in the ability to understand mathematical concepts of students who use Model-Eliciting Activities with the ability to understand mathematical concepts of students who use problem-solving in class XI TKJ SMK Negeri 2 Depok Yogyakarta odd semester 2016/2017 school year.
2. To find out mathematics learning using Model-Eliciting Activities is more effective than problem-solving on the ability to understand mathematical concepts of students of class XI TKJ SMK Negeri 2 Depok Yogyakarta odd semester 2016/2017 academic year.

METHODS

In this study, the method used is a quasi-experimental method or quasi-experimental research (Sugiyono, 2013: 114). The quasi-experiment is a development of true experimental design that is difficult to implement because all the external variables that affect the course of the experiment are controlled. In this study, the subjects were divided into two groups, namely the experimental class 1 and the experimental class 2. The experimental class 1 was a group of students who were treated using the Model-Eliciting Activities learning model when the learning process took place. While the experimental class 2 is a group of students who use problem-solving type cooperative learning models.

The research design used in this study is Non-equivalent (pretest-posttest) Control-Group Design (Tayibnapis: 83). This design is almost the same as the pretest-posttest control group design (one of the designs in true experiment research), only in this design, the experimental group 1 and experimental group 2 were not randomly selected.

According to Arikunto, Suharsimi (2013: 173), the population is the whole subject of research, the population does not only mean people or other objects but includes the characteristics or properties possessed by an object. The population in this study was class XI TKJ SMK Negeri 2 Depok Yogyakarta.

The sample in this study was selected by means of non-probability sampling with a purposive technique, namely the selection of samples based on specific objectives and considerations. The sample in this study was class XI TKJ A as an experimental class 1 and class XI TKJ B as an experimental class 2. The variables in this study were learning models and the ability to understand mathematical concepts.

Techniques or methods used by researchers in collecting data are documentation and test methods. The test methods used are pre-test and post-test. The form of the instrument used in this study was a test in the form of a description item.

Analysis of the data used in this study is the test for normality, homogeneity, and hypothesis testing (t-test). The first hypothesis test is conducted to find out the hypothesis that there is a difference between the ability to understand mathematical concepts of students who use Model-Eliciting Activities with the ability to understand mathematical concepts of students who use cooperative models of problem-solving types. The second hypothesis test is done to prove the hypothesis that Model-Eliciting Activities are more effective than problem-solving on the ability to understand mathematical concepts.

RESULTS AND DISCUSSION

From the results of the study, the value of the ability to understand the concept (posttest) after the experiment is presented in Table 2

Table 2. Summary Descriptions of Final Capabilities (Posttest)

Class	Highest score	Lowest Value	$\bar{x}$	S	S^2
Experiment 1	95.83	68.06	82.7778	6.7924	46.1369
Experiment 2	90.28	61.11	80.8333	7.2070	51.9404

Before testing the hypothesis, the data will be tested in advance. The prerequisite tests are a normality test and a homogeneity test. The normality test is used to ensure that the students' mathematical concept understanding ability of each experimental class is normally distributed.

With a significant level of 5% and a degree of freedom 1 for the experimental class 1 and the experimental class 2. This is indicated in the experimental class 1 is known that $X^2{}_{count} = 2.65803$ and $X^2{}_{table} = 7.8147$ while in experimental class 2 was obtained $X^2{}_{count} = 4.42558$ and $X^2{}_{table} = 5.9915$ the $X^2{}_{count} < X^2{}_{table}$.

The homogeneity test is used to obtain the assumption that the research sample on the mathematical concept understanding ability data comes from the same or homogeneous conditions. With a significant level of 5% and degrees of freedom 1 for the experimental class 1 and experimental class 2 obtained $X^2{}_{count} = 0.0912$ and $X^2{}_{table} = 3.8415$ proven homogeneous.

This study is intended to calculate two hypotheses, while the two hypotheses tested are: (1) The first hypothesis is obtained $t_{stat} = 2.99588$ and $t_{table} = 1.67592$, because $t_{count} > t_{table}$ then H$_0$ is rejected and H$_1$ is accepted. So, there is a difference between the value of the final ability (posttest) of students who use Model-Eliciting Activities with the value of the final ability of students who learn using cooperative models of problem-solving type XI class TKJ odd semester SMK Negeri 2 Depok Yogyakarta 2016/2017 school year. (2) The second hypothesis is obtained $t_{count} = 2.99588$ and $t_{table} = 2.0086$, because $t_{count} > t_{table}$ then H$_1$ is accepted and H$_0$ is rejected. So, Model-Eliciting

Activities are more effective than problem-solving type cooperative learning models on the ability to understand mathematical concepts of class XI students of TKJ SMK Negeri 2 Depok Yogyakarta in the 2016/2017 school year.

From the description above, it can be seen that mathematics learning using Model-Eliciting Activities is more effective than problem-solving type cooperative learning models because students take an active role in learning and are motivated to solve the problems given because each student is responsible for the results of group discussions. So that in the Model-Eliciting Activities, students learn independently in understanding the concept of a real problem, by learning independently (without explanation of the teacher's material) their memories last longer because they discover the mathematical model themselves. Whereas in mathematics learning using the type of problem-solving cooperative learning model, where students only rely on material notes, which some of them just copy without understanding the learning material. When they are discussing, they only rely on one of the group members to do the assignment given by the teacher. This causes students to tend to participate less in groups and ultimately lack understanding of the material that has been taught.

From the description above gives an illustration that the process of learning mathematics using Model-Eliciting Activities gives a positive influence on the ability of students because students can learn actively and be able to understand the material well. So it can be concluded that the process of learning mathematics that uses Model-Eliciting Activities is more effective than the process of learning mathematics that uses cooperative learning models of problem-solving type.

CONCLUSION

Based on the results of research and discussion, the following conclusions can be drawn:
1. There is a difference in the ability to understand mathematical concepts of students who use Model-Eliciting Activities with the ability to understand mathematical concepts of students who use Problem-Solving in class XI TKJ students of SMK Negeri 2 Depok Yogyakarta odd semester 2016/2017 academic year.
2. Mathematical learning models using Model-Eliciting Activities are more effective than Problem Solving on the ability to understand mathematical concepts of students in class XI TKJ SMK Negeri 2 Depok Yogyakarta odd semester 2016/2017 academic year.

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