

Increased Activity, Ability to Understand Concepts and Mathematical Problem Solving Through Guided Discovery Learning Models of Class VII.2 of SMP Negeri 15 Sijunjung Academic Year 2017/2018

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Abstract. This study aims to determine the increase in activity, the ability to understand concepts and solve mathematical problems using guided discovery learning models. This research is a classroom action research. There are two cycles in this study, where the results from one cycle become a reflection material to make improvements to the implementation of learning in the next cycle. The research subjects were 25 students of class VII.2 of SMP Negeri 15 Sijunjung. Research data was collected through observation and final tests. Indicator of achievement in this study is more than 60% of students who complete the understanding of the concept and more than 55% of students who complete the problem solving and reach 61% for student activities. The results of the data analysis showed that in the first cycle 48% of students were completed for understanding concepts and 40% of students were complete for problem solving, while in the second cycle there were 64% of students who were complete for understanding concepts and 56% of students who were complete for problem solving. Whereas for the activities of students in the first cycle had reached good criteria, but with a still low percentage of 61.6% and in the second cycle reached 77.6%, it was seen that there was an increase in activity from the first cycle to the second cycles by 16%. Based on the results of the study it can be concluded that guided discovery learning can improve students' activities, understanding concepts and mathematical problem solving.

Keywords: Activity, Understanding of Concepts, Problem Solving, Guided Discovery Learning.

I. INTRODUCTION

Mathematics is a universal science that is useful for human life and also underlies the development of modern technology, and has an important role in various disciplines and advancing the power of human thought. Mathematics is the key to opportunity (Shadiq: 2014). The general purpose of providing mathematics learning in schools includes two things, namely: (a) Preparing students to be able to face changing conditions in life and in a world that is always developing, through practice acting on a logical, rational, critical, careful, honest, effective and efficient, (b) Preparing students to be able to use mathematics and mathematical mindset in everyday life, and in learning various sciences (Suherman,dkk: 2003).

In the process of learning mathematics, it is necessary to develop students, so that students can understand what is called learning in mathematics (Chesimets: 2016). Mathematics learning is an effort to help students to construct mathematical concepts or principles with their own abilities through an internalization process so that the concept or principle is rebuilt (Susanto:2013).

In general, the process of learning mathematics in the dominant class is teacher-centered. Teachers always teach mathematics by lecture method (Gunantara:2014). Learning that has happened is too broad learning which results in too much material being taught. Submission of knowledge material is only a knowledge transfer activity which means that the teacher only transfers knowledge to students without

regard to whether students understand or not the knowledge provided.

The learning process is only one direction, students only copy and record how to solve problems that have been done by the teacher (Nurhayati:2014). This causes many students to be passive in following the learning process. They are more silent, only listen to explanations and do not want to ask if they do not understand (Guntara:2014).

In such conditions, the opportunity for students to find and build their own knowledge does not exist. Students only accept what the teacher has prepared Fauziah: 2010). As a result, students' understanding of mathematical concepts and problem solving abilities is low (Guntara:2014).

Problem solving ability means the ability to apply knowledge acquired previously into unknown situations. Problem solving skills are needed by students. Because basically students are required to try themselves to find problem solving and the accompanying knowledge, producing knowledge that is truly meaningful (Hertiavi:2010). Schools should also apply technology in every educational activity, not just as a mathematical calculation tool, but it has been used as a learning medium that helps teachers in explaining a concept in class.

The teacher must be able to grow students' awareness in conducting learning activities so that students not only have the skills to do something but must understand why the activity is carried out and what the implications are (Yanuar:2014). Students are less involved in the learning process and tend to be passive, the teacher more often dominates learning activities which results in more learning going in one direction, where communication is not optimal between teacher and student, proven in learning activities students are always silent when they have difficulty learning.

Students are accustomed to waiting for the teacher to be given examples of problems and how to do the correct work without trying to think to explore and build their own ideas, students never ask questions about the material that is considered incomprehensible, so that in the learning process students feel that the teacher is a source of information the other. Even though everything around students is a source of information that can support the implementation of the learning process

Monotonous learning methods also make students bored in the learning process. In this case the teacher is expected to be able to choose models, models, approaches and methods

that can improve the ability to understand concepts, students' mathematical problem solving and varied learning models.

The fact that researchers faced as a teacher at Sijunjung Middle School 15, students had difficulty in understanding mathematical concepts and solving problems related to problem solving. Some factors that cause low understanding of concepts and students' mathematical problem solving abilities include students who still do not understand the questions given, students experience confusion about how to solve them.

In mathematics learning, the accuracy in choosing models and learning methods to be used is one of the main factors in achieving learning goals and good results, for that we need a learning model that gives students the opportunity to learn more meaningfully.

The concept of learning that is expected to be achieved by students is not directly given by the teacher but involves students in finding it, so that with this model students are expected to have their own experience in learning. The success of learning can be improved if the learning process that takes place is supported by the teacher's ability to manage the class through the right methods, strategies or models (Tota:2017). The success of learning can be improved if the learning process that takes place is supported by the teacher's ability to manage the class through the right methods, strategies or models. one of the learning models that researchers try to apply in the guided discovery learning model.

Discovery learning method is a method of teaching that focuses on the activities of students in learning (Windah:2017). One of the learning models that researchers are trying to apply is the guided discovery learning model.

Learning with discovery learning methods is in accordance with a constructivist approach where students learn more effectively by building their own knowledge (Ali: 2009). Learning with the method of discovery, has a huge effect on students in understanding mathematical concepts

Guided discovery is learning that invites students or is encouraged to carry out activities in such a way that eventually students find something to be expected. Furthermore. guided discovery involves students in answering teacher questions. Students do discovery, while the teacher guides them towards the right / right direction (Hamalik:2005)

Guided discovery learning is a learning process centered on the activeness of students while the teacher is only a

facilitator (Sumarni: 2014). Guided discovery is the implementation of the findings from the teacher.

Guided discovery or guided discovery method is a learning method that creates learning situations that involve students learning actively and independently in finding a concept or theory, understanding, and solving problems.

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The discovery process requires teachers as facilitators and mentors. The amount of assistance provided by the teacher does not affect students to make their own discoveries. Guided discovery is learning that invites students or are encouraged to carry out activities in such a way that eventually students find something that is expected.

II. RESEARCH METHODS

The type of research used for this research is classroom action research, because it aims to solve problems faced by researchers in carrying out the main task of managing the implementation of learning activities. This research was conducted at Sijunjung 15 Middle School starting from April 4 to May 15, 2018. The research subjects were students of class VII.2 of SMP Negeri 15 Sijunjung in the 2017/188 academic year as many as 25 people.

Data retrieval is done by testing and non-test techniques. Test techniques include the final test of the first cycle and the final test of the second cycle and non-tests that obey the observation of student activities, observation of teacher learning. Indicators of achievement in this study are: for understanding the concept of at least 60% of students who get a minimum score of 65, for problem solving at least 55% of students who get a minimum score of 55, while the indicator of success is student activity in the learning process, namely when the activity score students at least reach 61% with good categories.

This research procedure consists of four stages that are carried out in a repeated cycle. Four stages exist in each cycle, namely: A). Planning, B). Action, C). Observation, D). Reflection.

A. Planning

In the planning stage that needs to be prepared includes RPP, LKS, and assessment instruments in the form of final test questions. Before learning devices are used, it is

necessary to validate them first. In this case all learning devices used were validated by two validators.

B. Implementation of actions

In the early stages students are given a brief explanation of the tasks that must be completed by way of discussion with their peers.

C. Observation

Observations are carried out in conjunction with actions, the researcher / observer (peers) observes the students' accuracy and activities in group discussions by making field notes that can be used during reflection.

D. Reflection.

At the end of the cycle a final test is held by giving written tests to students. Test results and observations of student activities are used as the basis for improvements and changes in cycle II. Weaknesses in the first cycle were attempted to be improved and good things were maintained and improved in the next cycle.

III. RESULT AND DISCUSSION

A. Research Results

1. Cycle I learning activities

The first cycle learning activities are held on 5, 11, 12 and 18 April 2018, consisting of meetings with material on the properties of quadrilateral, circumference and area of square, rectangular, parallelogram and trapezoidal rows. Broadly speaking, learning activities in the first cycle, namely a) Stimulus: (1) the teacher distributes LKS; (2) the teacher asks students to read and understand the problems that exist in the LKS b) Problem statement: (1) the teacher asks students to identify the problems they find; (2) choose and formulate it in the form of a hypothesis. c) Data collection: (1) teachers provide opportunities for students to collect information that supports their hypothesis; (2) students gather information both from friends and relevant books that can support their hypothesis. d) Data processing: (1) the teacher asks students to process data obtained by students; (2) students process the data with their respective partners. e) Verification: (1) the teacher asks to communicate the results of their data processing; (2) in this activity each teacher's guidance conducts a careful examination to prove whether the hypothesis is correct or the results of their data processing; (3) the teacher asks other students to pay attention and give their comments. f) Generalization: (1) the teacher confirms to students through questions; (2) students

with direction and guidance from the teacher draw conclusions about their findings.

The results of the first cycle study show that student activity from the beginning of the meeting until the end of the meeting has increased, but it has not been satisfactory. classically the percentage increase in student activity at each meeting can be seen in table 1 below:

Table 1. Percentage of student activity achievement during cycle I

Percentage of Achievement per Indicator	Meeting To			
	1	2	3	4
Indicator 1	96	96	96	100
Indicator 2	32	40	40	56
Indicator 3	16	24	32	40
Indicator 4	100	100	100	100
Indicator 5	8	12	16	16
Achievement average	50,4	54,4	56,8	62,4
Achievement category	C	C	C	B

while for the test results siklus I seen in the understanding of the concept there are 12 people from 25 students who are complete or 48% of all students while for problem solving there are 10 students who are complete or 40% of the total number of students. More clearly can be seen in table 2 below:

Table 2. Completeness of Concept Understanding Tests and Students' Mathematical Problem Solving in Cycle I

Classification	Understanding of concepts		Mathematical problem solving	
	The number of students	Percentage	The number of students	Percentage
Complete	12	48	10	40
Not complete	13	56	15	60
Total	25	100	25	100

2. Cycle II Learning activities

The second cycle learning activity was held on 25, 26 April, 02, 03, 09 May 2018, which consisted of four meetings with material about "circumference and area of rhombus, kite flying, type and nature of triangles and circumference and area of triangles". Broadly speaking, learning activities in cycle II, are still the same as the previous cycle, only in the second cycle are improvements made to cycle I which have not been implemented optimally.

The results of the second cycle study show that student activity from the beginning of the meeting until the end of the meeting has increased. Classically, the percentage increase in student activity at each meeting can be seen in table 3 below:

Table 3. Percentage of student activity achievement during cycle II

Percentage of Achievement per Indicator	Meeting To			
	1	2	3	4
Indicator 1	100	100	100	100
Indicator 2	52	56	72	72
Indicator 3	56	60	72	76
Indicator 4	100	100	96	100
Indicator 5	16	24	36	40
Achievement average	64,8	68	72,8	77,6
Achievement category	B	B	B	B

Furthermore, for the test results siklus II is seen in the understanding of the concept there are 16 people from 25 students who are complete or 64% of all students while for problem solving there are 14 students who are complete or 56% of the total students. For more details can be seen in table 4 below:

Table 4. Completeness of Concept Understanding Tests and Students' Mathematical Problem Solving in Cycle II

Classification	Understanding of concepts		Mathematical problem solving	
	The number of students	Percentage	The number of students	Percentage
Complete	16	64	14	56
Not complete	9	36	11	44
Total	25	100	25	100

B. Discussion

Based on the treatment action and the results of reflection in cycle I and cycle II, it shows that there is a positive change in activity, the ability to understand concepts and mathematical problem solving of students. In cycle I, it was seen that learning was still individual, even though they sat together, there were even students who only copied friends' answers. Learning guided discovery learning models requires students to discover their own learning concepts. The concept will be successfully mastered by students if students start

looking for answers to questions or problems by reading books or discussing with other students.

By discussing your own difficulties, you can share them together. Likewise in terms of learning, when a problem is solved together it will find a variety of solutions because it comes from different ideas.

If students work on their own it turns out that students experience difficulties in understanding the material, let alone to understand the material, if students experience difficulties in understanding the material how the student will share with other friends. Therefore, in the second cycle, there is an action change by conditioning students to actually learn in discussion.

Learning with guided discovery learning models has distinctive characteristics, each student is expected to find their own concepts from the material being studied. This is expected to make the knowledge gained more meaningful and lasting. There is an explanation from a friend, it is easier to understand and students are easier to respond if there is something that is not understood. Because students interact with their friends, it is hoped that students will be more free to ask questions that are not understood.

This activity is proven to be able to improve students' understanding of concepts and mathematical problem solving. Besides giving rewards to students who want to come to the front of the class also give positive influence to students.

Learning through guided discovery learning models that have been implemented and have a positive impact on improving students' understanding of concepts and mathematical problem solving. Basically without discussing, asking questions, practicing, and maybe without teaching them to other students, maybe real learning will not occur.

The guided discovery learning model applied to class VII.2 has familiarized students to read instructions before doing something, discuss solutions to solve problems, find solutions and information from books. This self-conducted process has been able to improve students' understanding of concepts and mathematical problem solving.

The learning process that takes place during research students are accustomed to working on questions. Besides that, the explanation from his friends was also able to make students better understand the material that was running. It is seen that the ability of students to restate a concept, classify objects according to certain characteristics has increased. Habituring students in working on questions and discussing

questions and answers also increases students' ability to use / choose certain procedures or operations in accordance with problems.

Improved understanding of concepts supports students' mathematical problem solving. The provision of problem solving questions on the student worksheets and in the final test has shown that students' mathematical problem solving increases. This is shown by the ability of students to understand and interpret known elements, draw conclusions to increase. This increase and increased understanding of the concept of supporting abilities has an impact on students in selecting or planning solutions to solutions and implementing solutions.

Students' conceptual understanding increased from cycle I to cycle II, which previously was 48% to 64%. But this increase does not occur in all indicators of understanding the concept under study. Indicators of ability to provide examples and not examples of concepts studied have decreased from 68% to 64%.

This is presumably because the level of the questions given is less difficult to compare compared to the problems in cycle I. However this is inversely proportional to the indicators identifying the nature of operations / concepts, classifying objects based on whether or not the requirements form the concepts and applying the concepts logically have increased. As for the indicator to re-state the concept logically it does not experience a decrease or an increase.

Mathematical problem solving of students also increased from cycle I which is 42% increased to 56% in cycle II. Ability. Indicators of the ability to understand and interpret elements known and asked increased from 60% in cycle I to 80% in cycle II. Indicators of selecting and planning solution solutions increased from 48% in the first cycle to 56% in the second cycle. Indicators Carrying out completion increased from 36% in cycle I to 48% in cycle II. And indicators of ability to draw conclusions increase from 60% in the first cycle to 76% in the second cycle.

Based on the final test results, the ability to understand concepts and solve mathematical problems has increased. So the ability to understand concepts and mathematical problem solving has reached the set of success indicators that is 60% for concept understanding and 55% for problem solving. Overall, the ability of students to understand concepts and problem solving increases from cycle I to cycle II. It can be concluded that learning using guided discovery learning models can increase activity, ability in understanding concepts and solving mathematical problems of students.

IV. CONCLUSIONS

Based on the research that has been done and based on the discussion that has been described, it can be concluded that the application of guided discovery learning model can increase the activity, understanding of concepts and the ability of mathematical solving skills of students. At first the students experienced still not being able to get used to discussing with friends, not being able to find solutions from other books/learning resources, and still afraid to come to the front of the class in the context of presentation.

After applying the guided discovery learning learning model students begin to get used to discussing material, looking for answers from books or other sources as reinforcement of the answers. This activity paved the way for students to better understand the material, because the concept of the material being studied was cultivated by students themselves. And in finding learning concepts students gain learning experiences that will last a long time in students' memories.

Activities such as this make students who do not know become more understanding, students who were previously hesitant in giving examples and not examples of concepts learned, have not been able to identify the nature of objects / concepts, classify objects, apply concepts and restate concepts to better understand after there is discussion and self-search of material concepts.

Improved understanding of concepts has a positive impact on students' mathematical problem solving abilities, in other words increasing understanding of concepts supports students' mathematical problem solving abilities. The provision of problem solving questions on LKS and in the final test has shown that students' mathematical problem-solving abilities increase.

Based on the description above, it can be concluded that learning using guided discovery learning models can improve activity, understanding concepts and mathematical problem solving abilities of students of class VII.2 SMP N 15 Sijunjung academic year 2017/2018.

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