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Misconception of Understanding Flat Building Theory with the Application of Polya Theory in Pgmi 3 Uinsu

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ABSTRACT: Misconceptions are things that must be avoided by teachers and students in learning. The reality in the field shows that there are still many students who experience misconceptions, one of which is in mathematics. This study aims to describe the misconception of PGMI UINSU students on flat building material with the application of Polya Theory. This research is a qualitative descriptive research. The subjects in this study were conducted to several students who had the most misconceptions of all students in UINSU's PGMI class. The cause of misconceptions that occur is the ability to understand the concepts and images given to the problem. Alternatives include re-explaining, class discussion or using cognitive conflict strategies.

KEYWORDS: Misconception, Flat Build Theory, Polya Theory

INTRODUCTION

In this study, misconception is a concept that is not in accordance with the concept recognized by experts (Suparno, 2013: 8). It can be said that a weak understanding of the concept will lead to misconceptions. Geometric material is seen as one of the subjects that is quite difficult because geometry is abstract. This can lead to misconceptions occurring in students if students do not understand the concept strongly. The concept of a quadrilateral is one of the materials for the study of geometry in school mathematics. Where students still have difficulty especially in expressing the definition of a quadrilateral flat build. This can result in misconceptions in both students and teachers. Misconception is a condition that needs to be addressed because it will hinder students from learning mathematics. This needs to be done an identification of what misconceptions students have and their causes in order to determine alternatives to overcome them.

Misconception is the occurrence of differences between a person's conception and the conception of experts (Berg, 1991). Usually the distinction is difficult to change to correct (Berg, 1991). This misconception arises because someone before knowing the correct concept they already have their own concept formed from reasoning, intuition, culture, or others.

The concept that is owned is maintained to explain the phenomena that exist around it but the concept is different from the actual concept. When a student experiences misconceptions, it is usually difficult to rebuild correct concepts in the student's thinking (Berg, 1991). So that misconception *can* be interpreted as a misunderstanding of the concept of a science. Sometimes it is also called *misunderstanding or* alternative concepts. According to Soedjadi (2000), misconceptions arise because of preconceptions. Preconception is the initial concept a person has about an object. This initial concept is obtained by a person from a certain level of formal education. The initial concept of an object owned by a child is not impossible to differ from the concept taught in the second grade (about the same object). In that situation, preconception becomes a misconception. Misconception or misconception refers to a concept that is not in accordance with scientific understanding or understanding accepted by experts in the field. The form is in the form of initial concepts, errors, incorrect relationships between concepts, intuitive ideas, or different views (Ibrahim, 2012). Misconceptions can happen to students or someone who is studying. This is in line with Rusel and O'wyer (2009) who stated that misconceptions occur when children incorrectly apply the strategy of knowledge learned previously to solve new problems.

Basically, every child who has learning difficulties can be helped individually or in groups according to the abilities of each student. One of the efforts that can be made to overcome student learning difficulties, especially in solving story problems, is through the application of problem-solving strategies, one of which is the polya model in mathematics learning. One of the steps used to solve problems in this research is according to the stages compiled by Polya (in Indrawati et al., 2019), namely (1) understanding the problem, (2) making a problem solving plan (*devise a plan),* (3) completing the problem solving plan (*carry out the plan),* and (4) re-examining *(looking back).*

According to Rudtin (2013), the phases of problem solving according to Polya are more popularly used in solving mathematical problems than others. Perhaps this is due to several things, including: (1) the phases in the solving process developed by Polya are quite simple,

(2) the activities in each phase proposed by Polya are quite simple, (3) the phases of problem solving according to Polya have been commonly used in solving mathematical problems. Because with this model students will better understand the problem, can develop problem solving strategies, and can carry out these strategies in solving math story problems.

The formulation of the problem and the purpose of this study is to describe subjects who master the Misconception of Understanding Flat Build Theory with the Explanation of Polya Theory at PGMI 3 UINSU. So that in this study researchers can reveal and analyze the ability to solve mathematical problems based on polya theory on flat material in terms of the mathematical representation ability of grade 3 PGMI UINSU students.

METHOD

Research has two approaches, namely; qualitative approach and quantitative approach. Researchers use a qualitative *field research* approach with descriptive methods. The qualitative approach is research that intends to understand phenomena about what is understood by research subjects, such as behavior, perception, motivation, holistic action by means of narrative and description in the form of words and language and other actions holistically (Moleong, 2010: 6). Description is exploratory research and plays a very important role in creating hypotheses or one's understanding of various social variables (Burhan Bungin 2011: 69)

The descriptive method of analysis is a method to obtain data that contains significant meaning and can be influenced by the substance of the study. It can be interpreted that the method presents directly the nature of the relationship between researchers and participants or objects and research subjects. This method also seeks to analyze the research subject in order to obtain in-depth data. The subjects in this study are grade 3 PGMI students at the State Islamic University of North Sumatra for the 2023 academic year. The subject of this study was chosen from several students who understood from the Misconception of Understanding the Theory of Flat Wake with the Explanation of Polya Theory.

In this study, the data obtained from interviews on the subjects' answers are in the form of sentences related to the focus of the study, so that the data presentation is a set of information arranged systematically that provides the possibility to draw conclusions. The final stage in data analysis is drawing conclusions. Drawing conclusions in the form of descriptions of the subjects' abilities in solving problems in the Flat Build material based on Polya theory. Student problem solving data is validated by triangulating methods which are data checking techniques with a different data collection method. Researchers validated students' math problem-solving data by comparing the results of students' problem-solving ability tests with the results of student interviews.

RESULTS AND DISCUSSION

Based on the analysis of misconceptions with the interview method, it can be seen that each subject has different misconceptions on the concept of definition and the properties of flat wake and the causes that occur in student misconceptions. In addition, alternative solutions can be provided to overcome these misconceptions that occur.

In this study, it is known that the misconception of subject 1 lies in defining flat wake based on polya theory. Also, the subject assumes that a rectangle is a flat shape equal to a rectangle. In this case the subject experiences a misconception towards the concept of flat wake definition. This is in accordance with the theory explained by Suparno (2013), misconceptions, namely concepts that are not in accordance with scientific concepts or concepts set by experts. In this study, it is known that the misconception of subject 2 lies in defining a quadrilateral flat build. Actually, the subject does not experience any misconceptions in the definition in general. However, the subject has suffered a misconception when indicating a wake that includes a flat wake that fits the definition of what it should be. In this case, the subject experiences a misconception of the concept of a quadrilateral flat construct definition.

This is in accordance with the theory explained by Suparno (2013), misconceptions, namely concepts that are not in accordance with scientific concepts or concepts set by experts.

In this study, it is known that the misconception of subject 3 lies in defining flat shapes in the application of polya theory. The subject chose only a flat shape of a regular rectangle. In this case, the subject experiences a misconception of the concept of a quadrilateral flat construct definition. This is in accordance with the theory explained by Suparno (2013), misconceptions, namely concepts that are not in accordance with scientific concepts or concepts set by experts.

From some of the explanations above, it can be seen that students' misconceptions are in the definition of a quadrilateral flat shape. The student's misconception in defining lies in a flat shape that has several sides of equal length, four corners, and two diagonals that form a right angle. It can be shown that students cannot choose a general quadrilateral, but only select a square of regular shape (such as a concave shape). In addition, students experience misconceptions in distinguishing between sides and ribs.

Based on these misconceptions, it can be known that the cause of the misconceptions that occur is in the picture. The images presented are images that are raised in order to find out student misconceptions. The alternative that can be used to overcome the cause of these misconceptions is to use a cognitive conflict approach. In accordance with Swedosh and Clark (1997), namely by demonstrating cognitive conflict. With this cognitive conflict, students are first challenged to point out the concepts they have where the concepts they have conflict with the actual concepts. The cognitive conflict presented by the teacher is expected to make students aware of the error of the concept, and eventually they will construct the concept towards a scientific conception.

The results showed that: (1) Subject 1 was able to understand the problem, plan the problem solving, implement the solution plan, and re-examine the answers according to the Polya stages. (2) Subject 2 is only able to understand the problem, plan and implement the problem-solving plan, but is unable to double-check the answers. (3) Subject 3 is only able to understand the problem and plan but in carrying out the problem solving plan is not thorough until the solution is still wrong, and also unable to double-check the answers.

Based on the data analysis of the results of the study above, the three research subjects are students who master the three mathematical representations. Obtained Subject 1 in the ability to solve the problem is fairly good in line with the opinion of Yulia & Surya (2017) the ability of mathematical representation of students in mathematics learning when students are faced with a situation of mathematical problems in classroom learning, they will try to understand the problem and solve it in ways they know. Subject 1 is able to understand the problem, plan the solution of the problem, carry out the resolution plan, and re-examine the answers according to the Polya stages. Subject 1 is able to answer all questions correctly and precisely. Subject 2 is only able to understand the problem, plan and implement the problem solving plan, choose the appropriate problem solving plan depending on how often the student experiences solving previous problems the more often students do problem solving exercises, the easier the problem solving pattern will be obtained.

To plan problem solving, students can look for possibilities that can occur or recall problems that have been solved that have similar properties / patterns with the problem to be solved. Then draw up the procedure for solving it. But subject 2 is unable to double-check the answers, which is very important at this stage because it examines solutions, which consists of using specific checks of each information and resolution steps, and using general checks to find out the problem in general and its development. Subject 3 is only able to understand the problem and plan but in carrying out the problem solving plan is not thorough until the solution is still wrong, and also unable to double-check the answers. This is in accordance with what Akbar et al. (2017) conveyed that students' mathematical problem solving abilities need special attention to be developed.

Supported by Riastini & Mustika's (2017) research that the cause of students' errors in completing the problem-solving ability test is reviewed from Polya's steps, namely

(a) students are not familiar with complicated question language, (b) students are not careful so that when working on questions there are often mistakes when using formulas, (c) students are less careful resulting in frequent calculation errors and wrong solving steps, and (d) students are less able to use the processing time well. Students' mathematical problem solving ability is a necessary ability in learning and mathematics itself.

Therefore, solving math problems is very important in learning mathematics because it can make it easier for students to face problems in student life today and in the future. Problem solving is a real effort in order to find solutions or ideas regarding the goals to be achieved.

Problem solving is a complex process that requires a person to coordinate experience, knowledge, understanding, and intuition in order to meet the demands of a situation. While the problem-solving process is the work of solving problems, in this case the process of accepting challenges that require hard work to solve the problem. In simple terms, a problem is a person's journey to reach a solution that begins with a certain situation.

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The misconceptions that students have are manifold. Student misconceptions on quadrilateral flat building material include defining quadrilateral flat shapes like rectangles, defining flat shapes only in regular shapes and the definitions given are incorrect, and distinguishing between sides and ribs. Misconceptions that occur as above, are caused by the picture in the problem. The alternative that can be done in overcoming the causes of misconceptions that occur is with a cognitive conflict approach. Students who have mathematical representations both symbolic, visual and verbal are generally able to solve problem solving problems in terms of Polya steps. Although there are some subjects who are unable to in one or two of the four stages of Polya, namely: students are able to understand the problem, plan the solution of the problem, carry out the solution plan, and re-examine the answers according to the Polya stages. However, there are other students who are only able to understand the problem, plan and implement the problem-solving plan, but are not able to double-check the answers. Although students who have the ability of all three mathematical representations, there are also students who are only able to understand problems and plan, but in carrying out the problem solving plan is less thorough so that the solution is still wrong, and also not Able to double-check answers.

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