

Analysis of Mathematics Learning Problems in High School

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Abstract

This study aims to describe the problems of learning mathematics and its alternative solutions at State Senior High School 6 Surakarta. The method used in this research is a qualitative approach. The research subjects were two students from class IX MIPA 6 and class IX IPS 2 and two mathematics teachers at SMA Negeri 6 Surakarta who taught in class IX MIPA 6 and IX IPS 2. The research instruments used in this study were observation, documentation and interviews. The results of this study indicate that the problems of learning mathematics at SMA Negeri 6 Surakarta are poor mastery of mathematical concepts and poor learning motivation. Alternative solutions to these problems are scaffolding, a personal approach to students.

Keywords

problems; learning;
mathematics; solutions



I. Introduction

Mathematics is one of the compulsory subjects given in high school. According to NCTM in Principles and Standards for School Mathematics (2000), there are five main standard competencies in mathematics learning, namely: problem solving (problem solving) communication skills (communication), connection skills (connection), reasoning skills (reasoning) and ability representation (representation). Thus, one of the standards of the mathematics learning process is communication. Communication is the process of delivering messages by someone to other people to tell, change attitudes, opinions or behavior either directly orally or indirectly through the media. In this communication requires a reciprocal relationship between the delivery of messages and recipients namely communicators and communicants (Hasbullah, et al: 2018). One of the standards of the mathematics learning process is communication (Juniasani et al., 2022). Learning mathematics is a process that contains two types of activities that are inseparable, namely learning and teaching. These two activities combine into an activity that makes interaction between students and teachers and fellow students during the learning process at school (Sahudin, 2014). The learning process is something important in the world of education that should be considered, planned and prepared, because learning is the main determinant in the success of education (Hamid, 2013; Damaningsih, 2016). The process of teaching and learning mathematics is related to many concepts. Mathematical concepts have a relationship between one concept and another. Students assume that mathematics is a difficult subject, because of its abstract nature (Novitasari, 2016).

In learning mathematics, mastery of concepts is one of the problems that often arise in high school. Abstract mathematical concepts are arranged sequentially and tiered and require special proof, so that in the process of learning the previous mathematical concepts must be mastered because it is a prerequisite to continue the next concept (Misel, 2016; Suandito, 2017).

The quality of learning requires various efforts to make it happen. These efforts are related to the various components involved in learning (Hikmawati, 2013). The government needs to produce quality teachers for every math class (Wasserman, 2010). A good mathematics teacher must provide prerequisite knowledge, promote mathematical understanding, engage and motivate students, and require effective management (Wasserman, 2010). So competent mathematics teachers are needed in learning mathematics to produce quality learning.

Mathematics learning outcomes are still far from expectations, although many efforts have been made by the Government to improve and improve mathematics learning achievement at every level of education, including: curriculum revisions, education and training for teachers, provision of learning facilities, and so on. . However, the reality shows that mathematics learning outcomes are still low. The use of inappropriate methods in delivering material can make the teaching and learning process tend to be ineffective (Agustyaningrum, 2016).

Problems in learning can be divided into two, namely learning disabilities which lie in the cognitive development of these students and the causes of learning difficulties outside of children or other problems in students (Dumont, 1994; Steenbrugge, et al., 2011; Asnawir & Usman B, 2002, Hikmawati, 2013). A learning disability diagnosis can be drawn from a global assessment of the child including learning and school context (Mazzocco & Myers, 2003; Steenbrugge, et al., 2001). The primary diagnosis is based on the combined use of diagnostic tools (Denburg & Tranel, 2003; Kamphaus, et al., 2000; Steenbrugge, et al., 2011).

Some students at all levels of education in developing countries have problems in learning mathematics (Mundla, 2012). Problems that arise are caused by problems from within and from outside the students themselves. The academic and personal problems of learners in educational institutions can be identified and resolved in a number of ways related to educational psychologists, school counselors, and educational research. The problems of students tend to be many, diverse and complex so that it requires an interdisciplinary approach to understand them well. The problems of learning mathematics can be caused by several factors, both from students, teachers, the environment and learning facilities. One of the teacher factors that causes problems in learning mathematics is the selection of teaching methods that are not appropriate to the material given in each class.

Based on the above background, the formulation of the problem in this study is how the characteristics of problems in learning mathematics and alternative solutions in high school, namely SMA Negeri 6 Surakarta. The purpose of this study is to describe the problems in learning mathematics and alternative solutions in high school, namely SMA Negeri 6 Surakarta.

II. Research Method

In this research, the type of research is a qualitative approach. In qualitative research, reality is plural, comprehensive, and is a unit that cannot be separated (Sutama, 2019). The research design is a case study, which describes the management of mathematics learning with google classroom at SMA Negeri 6 Surakarta. In this study, 4 people will be used as informants or respondents consisting of 2 teachers and 2 students from class XI MIPA 6 and XI IPS 2 at SMA Negeri 6 Surakarta. In this study the data were obtained by (1) in-depth interviews, (2) participatory observation and (3) documentation. The interview technique used is not standardized, namely with a list of questions that are not strict

(subject to change). In this study, the validity of the data was carried out by triangulation of sources, triangulation of methods, other researchers and member checks. The data analysis technique in this study is in accordance with the opinion of Miles and Huberman. According to him, there are several steps taken to analyze qualitative data, namely data reduction, data presentation and conclusion drawing (Sugiyono, 2021).

III. Result and Discussion

Based on the results of observations and interviews with mathematics teachers and students at SMA Negeri 6 Surakarta, it shows that there are problems that occur in learning mathematics. The following is a description of the problem.

The first problem in learning mathematics at SMA Negeri 6 Surakarta is an immature understanding of mathematical concepts. This has an impact on the process of learning mathematics in the classroom. The main focus in the mathematics learning process is the mastery of concepts, algorithms and problem solving skills. Learning mathematics means learning the concept, structure of a topic and looking for the relationship between the structure and the concept. Mathematical concepts must be taught sequentially, because learning mathematics cannot be done jumping around but must be step by step, starting with understanding simple ideas and concepts to complex stages (Gusniwati, 2015). For example, to understand the concept of linear programming, students must first understand the concept of integers, one-variable linear inequalities, two-variable linear inequalities, two-variable linear inequalities system, the optimum value of an algebraic function, mathematical modeling and shading the solution area. If students do not understand these concepts before then students will be constrained to understand the following concepts. Lack of understanding of students' mathematical concepts brought from the previous grade level. Most students tend to forget the subjects that have been taught at the previous grade level. The low mastery of students' mathematical concepts at the previous level makes teachers have to always repeat the material and this will waste a lot of wasted lesson time and cannot be used to explain new material in accordance with the previously planned learning implementation plan.

The low mastery of students' mathematical concepts can be described in the following ways: a) the intelligence of students who are not good, b) talents that are lacking or not in accordance with the lesson materials provided by the teacher, c) learning activities in the classroom are lacking and more lazy than doing learning activities, d) poor learning habits, namely learning with mastery of science at the rote level and not with an understanding that they can understand without rote.

The second problem in the process of learning mathematics at SMA Negeri 6 Surakarta is the low learning motivation of students which results in not wanting to learn mathematics. Students are often late for class after a break even though they should have math lessons and don't immediately follow math lessons, instead they open their cellphones. This is in accordance with the following interview excerpt: "Sometimes students do not immediately work on or open a Math book instead they chat with their friends or even open their cellphones".

The third problem in learning mathematics at SMA Negeri 6 Surakarta is the use of media. Teachers do not always use learning media and less use of varied media. This is because not all mathematics material can be explained using concrete media and the media used cannot always support the learning material being taught. This can be seen from the interview excerpt of the teacher as follows: "I don't always use learning media because I don't think all material in mathematics can use concrete media in explaining it." Some

students admitted that they were happy when the teachers in teaching mathematics used the help of learning media, but there were some who felt confused and did not understand so the teacher had to repeat the material with lectures. This is in accordance with the results of the following interview: "I am happy with the use of media, but I do not understand the material being taught and must be repeated." Some students think that the use of media in the mathematics learning process is a waste of time. This can be seen from the following interview excerpt: "I understand better if the teacher teaches with lectures or the material is explained because mathematics is difficult, because in my opinion the use of learning media only wastes time".

The fourth problem in learning mathematics in the learning process at SMA Negeri 6 Surakarta is the use of learning methods that cannot be applied to all classes at the same level. This is in accordance with the following interview results: "Every semester I prepare a Lesson Plan that I should be able to use for all classes at the same level". The teacher prepares lesson plans in one semester to be used in the same class level, but in reality the lesson plans that have been designed cannot be applied immediately to every class. This is because each class has different characteristics of students. Classes that basically contain students with medium to upper abilities tend to be more receptive to mathematics lessons using lesson plans that have been designed using various learning methods and learning media that have been provided. Meanwhile, classes with moderate to low ability students tend not to be able to take lessons using lesson plans that have been designed using many varied learning methods. Classes that contain students with medium to upper abilities are easier to condition with varied learning methods. Whereas classes with moderate to low ability students, when teachers apply learning methods with many variations, they tend to be less able to follow instructions from the teacher. This is one of the problems of learning mathematics experienced by teachers, where students cannot be conditioned to one learning method simultaneously in the same class level. Inequality in the use of this learning method results in inequality in achieving learning objectives in each class with the same level.

Based on the results of the research that has been described above, here will be described solutions to the four problems found during the research. The four problems and solutions are described as follows.

The solution for the first problem is that the understanding of mathematical concepts is not good, the teacher should provide more scaffolding. Scaffolding aims to provide assistance to students when they find difficulties in learning. As the results of research by Min Young Doo, Curtis J. Bonk and Heeok Heo (2020) that the effect of scaffolding is effective for improving the quality of learning (Doo et al., 2020). Similarly, in accordance with the opinion of Khatimah (2017) that the provision of scaffolding can overcome the thinking barriers of students in solving problems (Khatimah et al., 2017).

The solution to the second problem of learning mathematics is that the motivation of students is not good, namely by the teacher providing a personal approach, providing guidance and psychological approaches to students so that they are more enthusiastic in participating in mathematics learning or with a fun learning approach, for example with STAD or jigsaw. As stated by Podomi (2015) that there is a good influence in learning by using a personal analogy approach to the learning independence of students and also the results of research conducted by Lestari et al (2018) that learning using the STAD type can increase students' learning motivation (Lestari et al., 2018).

The solution to the third problem is to use learning media that cannot fully support the material, which is done contextually and takes advantage of everything that exists in the school environment. Learning media serves as a presenter of information stimuli,

attitudes, and others and to increase harmony in receiving information. Media also serves to regulate progress steps and provide feedback. This is in accordance with the results of research (Asnawir, 2002; Toheri and Aziz, 2016). In addition, teachers must be good at choosing appropriate learning media in delivering Mathematics subject matter. Learning media can use digital-based media, for example by using Geogebra learning media, macromedia flash and educational games. Macromedia flash can easily motivate student learning and stimulate students to be active in the learning process and does not reduce the main meaning of learning, but instead helps clarify it (Septian et al., 2020). The results of research conducted by Soheila Belgheis and Rosemaliza Kamalludeen that geogebra can improve the learning process of discovery, motivation, engagement and student achievement in learning mathematics (Soheila Belgheis & Rosemaliza Kamalludeen, 2018). The use of learning media can stimulate the enthusiasm of students in learning. This condition is in accordance with Hirtanto's (2015) statement, namely the use of media in the learning process is one of the efforts to motivate students in improving the quality of student learning outcomes.

Solutions for the application of learning methods must be adapted to the characteristics of students. Homogeneous classes can be applied to varied learning, and heterogeneous classes can also be applied to varied learning methods but require more guidance during learning. The suitability of the method used in learning with the material and characteristics of students can make the mathematics learning process more enjoyable, so that the teaching and learning process will be more effective, which in turn will make students obtain good learning achievements (Agustyaningrum, 2016).

IV. Conclusion

The problems of learning mathematics at SMA Negeri 6 Surakarta are 1) poor understanding of mathematical concepts, this results in students not having the initial knowledge in learning mathematics from the previous grade level, 2) learning motivation is still lacking, many students have motivation low in learning mathematics, 3) the use of learning media has not been effective in attracting the interests and talents of students to learn, and 4) the application of learning methods is not in accordance with the characteristics of students.

The solutions to the problems that occurred in SMA Negeri 6 Surakarta according to the results of the study were 1) providing scaffolding, the provision of scaffolding was given to students who had problems with mastering science concepts that were not good from the previous grade level so that students better understood the material taught by the teacher. , 2) the teacher provides a personal approach, provides guidance and a psychological approach to students so that students are more motivated to participate in the mathematics learning process, 3) the use of contextual and digital-based media such as macromedia flash, geogebra and educational games to stimulate students and make adjustments learning media with the material being taught, and 4) the application of learning methods adapted to the characteristics of students according to homogeneous or heterogeneous classes.

Suggestions that can be expressed are that teachers should pay attention to various kinds of problems in the classroom and find solutions. If the problem is related to mastery of the concept, then the teacher should be able to provide scaffolding. If the problem is related to motivation, then the teacher should provide guidance and a psychological approach. If the problem is related to learning media, then the teacher should use media that is in accordance with the material being taught. If the problem is related to the

characteristics of students, then the teacher should use learning methods that are in accordance with the characteristics of students in the class. So that each class is given treatment that is not always the same because it adjusts to the conditions in the class.

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