Analysis of Mathematical Connection Abilities in the Seventh Grade Students of SMP Muhammadiyah Pakem in Solving Line and Angle Question

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ABSTRACT
Currently, the development of the quality of human resources will determine the progress of a nation. The era of the industrial revolution 4.0 requires someone to master several skills, one of which is the ability of students' mathematical connections. By having mathematical connection skills, students know the relationship between the material they get so they can understand the material easily and students' memories can last longer. The research method used in this research is descriptive qualitative. This research was conducted at SMP Muhammadiyah Pakem with 6 students as research subjects. The instrument used in this study was a student's mathematical connection ability test with 3 questions. After the data is analyzed according to the indicators, the conclusion obtained is that students with high-ability master the three indicators well. Students can recognize and be able to relate the materials they have obtained. They can determine and use the material that is the basis for solving problems. Students with medium-ability are able to master the first indicator well. Students are able to recognize and use ideas in mathematics. But not yet able to know the underlying relationship with each other. Students already recognize mathematics in everyday life. However, it has not been able to implement it properly. . Students with low-ability have not been able to master the three indicators. Students have not been able to recognize and use ideas in mathematics This is related to students who do not understand how these ideas relate to and underlie one another. So it is difficult for students to use and relate mathematics to everyday life.

Keywords: *geometry module, RME, Mathematical Connection Abilities.*

1. INTRODUCTION

Currently, the development of the quality of human resources will determine the progress of a nation. The era of the industrial revolution 4.0 requires someone to master several skills, so it is hoped that education can prepare students to master these various skills. Education is a conscious effort for students to play a role in their future lives through guidance, teaching and training activities [1].

Mathematics is a science that has links with other fields, and has a big role in everyday life. Mathematics is a universal science that underlies the development of modern technology, has an important role in various disciplines and develops human thinking power [2]. Mathematics is also the material that underlies developments in technology and information. This makes mathematics an important science to learn.

The standard of mathematical ability has five basic skills, namely problem solving, reasoning and proof, communication, connection, and representation [3]. In accordance with the educational curriculum in learning activities, students are trained to learn to connect the material that has been studied and apply it in everyday life. Here it is seen that it is important for students to know the connections in each material as well as with other materials [4]. Mathematical connection is a learning activity where students can define how to solve a problem, situation and mathematical idea that are interconnected into the form of a mathematical model, and students can apply the knowledge gained to solve one problem to another [5]. This ability is important for students because by having mathematical connection abilities students are able to connect one material with another material. Mathematical connection is closely related to students' mathematical understanding [6]. The linkages here are not only between the topic of mathematics but mathematics with other sciences as well as with everyday life. Therefore, by knowing the relationship, it is easy for students to be able to

understand the material and students' memories can last longer.

Therefore, it is important for students to have mathematical connection skills. Coxford [7] explained that the ability to connect conceptual and procedural knowledge, use mathematics in other topics, use mathematics in life activities, and know the relationship between topics in mathematics is the ability of mathematical connections. One of the important skills that must be achieved is the ability to connect mathematically. However, according to Hotmaria [8], the facts show that mathematical connection abilities are still low, therefore we need to analyze students' mathematical connection abilities. Because by knowing the mathematical connection students will understand the mathematical concepts they have learned are interconnected and can be the basis for understanding further concepts. Mathematical connections can also help students to know the relationship between various concepts and their application in everyday life so that students know the benefits of mathematics. According to NCTM [3] the indicators of mathematical connection ability are: (1) Recognizing and using the relationship between ideas in mathematics (2) Understanding how ideas in mathematics are interconnected and with each other to produce a coherent whole (3) Recognizing and apply mathematics in contexts outside of mathematics.

Based on the definitions and indicators of students' mathematical connection abilities, one of the materials that can be applied to measure students' mathematical connection abilities is Lines and Angles. The basic material that must be mastered before entering Lines and Angles is Algebraic Forms, One Variable linear equations and Comparison. Line and angle material is also the basic material that must be mastered by students before studying the material for flat shapes and spatial shapes. This study aims to analyze the mathematical connection abilities of seventh grade students of Muhammadiyah Pakem Junior High School on Lines and Angles. This research is expected to provide information or an overview of the mathematical connection abilities of class VII students of Muhammadiyah Pakem Junior High School and can help teachers to find out what steps must be taken to further improve students' mathematical connection skills.

2. METHOD

The research method used in this research is descriptive qualitative. This research was conducted in the even semester of the 2020/2021 academic year at Muhammadiyah Pakem Junior High School. The subjects of this study were 6 students, 2 students from the high ability category, 2 students from the medium ability category, 2 students from the low ability category. The procedure used in this research is to make observations, compile tests of mathematical connection abilities according to indicators, collect data, analyze data, and then draw conclusions. Data collection techniques using test and interview techniques. This study uses triangulation to test the validity of the data used.

3. RESULTS AND DISCUSSION

This section presents an analysis of students' answers to the questions given. The results of students' answers were analyzed each step according to 3 indicators of students' mathematical connection abilities.

3.1. Analysis of High-ability Students

Analysis based on 2 student answers concluded that:

Indicator 1. High-ability students' answers can be seen in Figure 1.

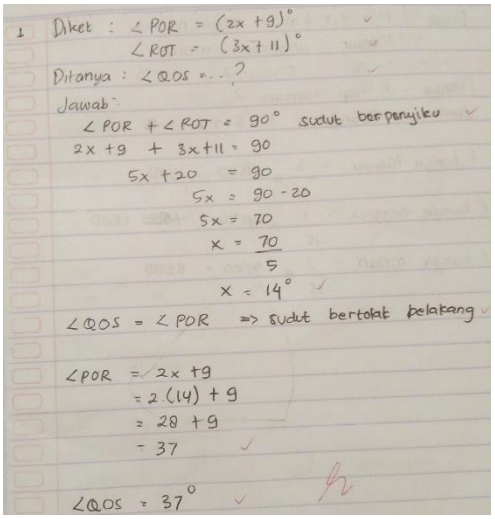

Figure 1. High-ability students' answers

Figure 1 is student's answer no. 1 to measure the first indicator. Based on students' answers, students can find out information in questions that can help them solve problems. Students are able to write down any information in the questions and write down what they are asked to make symbols to help them in the process of working on the questions. In the interview process students are able to explain the answers they wrote down and know the process of doing it correctly. Students know the meaning of each word in the problem. the 2nd student was not able to answer question no 2 correctly, but when the interview was conducted students were able to follow and without being given an explanation the student was able to rework the question correctly. Based on this, high-ability students can recognize and use relationships between ideas in mathematics well.

Indicator 2. Students can understand the questions well, it can be seen from the students' answers. Students can read and understand the pictures contained in the problem. Based on the student's picture of question no. 1,

students can understand that there are right angles and opposite angles. Students know what to look for first to get the angle asked in the problem. Both students are also able to operate linear equations with one variable well, so that they can find the size of the angle in question. So it can be concluded that high-ability students can know that in mathematics the ideas are interconnected and underlie each other.

Indicator 3. Problem no. 3 is an example of a math problem related to everyday life. Students can imagine the conditions in the problem, describe the condition of tree A and tree B with a house wall so that they know the real meaning of the problem. Both students were able to work on and conclude the questions well. This is also in line with Baiduri [9] which states that students at this stage have made mathematical connections with everyday life problems. So it can be concluded that high-ability students can know and apply mathematics in contexts outside of mathematics.

3.2. Analysis of Medium-ability Students

Indicator 1. medium-ability students' answers can be seen in Figure 2.

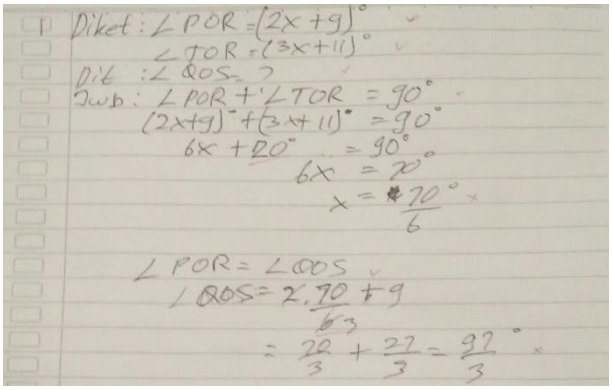

Figure 2. Medium-ability students' answers

Students are able to understand the problem well. Students can recognize and understand the concepts contained in the problem. Students know the relationship between angles and are able to know where to use them. Based on interviews, students were able to answer questions, memorized and knew about formulas, but students did not understand well the use of these formulas. This is in line with Rosliana's research [10] that students can do calculations correctly but have not been able to explain clearly the calculation process in the problem. So, medium-ability students can recognize and use relationships between ideas in mathematics well.

Indicator 2. Students know the relationship between angles and know what steps to take but students are less able to understand the problem well this can be seen in student answers. No. 1, it is also related to the material that students have previously obtained, namely a one-variable linear equation. Students are actually able to write down important information in the questions but have not been able to connect and operate it to solve the problem. When asked about a system of linear equations with one variable, students answered "know but have forgotten". So it can be concluded that medium-ability students have not been able to know that in mathematics the ideas are interconnected and underlie each other.

Indicator 3. Students need the help of pictures to work on the problem. Based on the answers and interviews, students know important information and problems in the questions but do not understand which formula to use. After students were given a picture of help to work on the questions, students began to understand a little about the intended meaning of the questions, but were still not able to do it correctly. So it can be concluded that medium-ability students can recognize mathematics in contexts outside of mathematics but have not been able to apply it in daily life.

3.3. Analysis of Low-ability Students

Indicator 1. Based on the results of the two students' answers, it can be seen that in almost every question students are not able to mention things that are known in the questions. This shows that students do not understand the question. Students also have not been able to determine the concept and what steps they have to do to solve the problem. From the results of interviews, students were also unable to mention what things were known in the questions. students do not understand so it is not easy to remember the material previously presented. Students do write what they know but don't know how to use it. Based on this, low-ability students can recognize but have not been able to use the relationship between ideas in mathematics well.

Indicator 2. Students have not been able to do the questions correctly. Based on interviews, it appears that students do not know the problems in the questions. Students forget about the previous material related to lines and angles. Students have completely forgotten the material for comparison and a one-variable system of linear equations. This shows that low-ability students have not been able to know that in mathematics the ideas are interconnected and underlie each other.

Indicator 3. Students need the help of pictures to work on the problem. Based on the analysis of answers and interviews, students are able to recognize some of the problems discussed in the questions, but are still not able to know what steps they should take to do it. When given a picture to help work on the students are still not able to work on the questions. Students still look confused in understanding the questions. So it can be concluded that low-ability students have not been able to know and apply mathematics in contexts outside of mathematics.

4. CONCLUSION

Based on the analysis of the data in the discussion, it can be concluded that: (1) Students with high-ability master the three indicators well. Students can recognize and be able to relate the materials they have obtained. They can determine and use the material that is the basis for solving problems. It also makes it easier for students to relate and use mathematics in everyday life. (2) Students with medium-ability are able to master the first indicator well. Students are able to recognize and use ideas in mathematics. But not yet able to know the underlying relationship with each other. Students already recognize mathematics in everyday life. However, it has not been able to implement it properly. Generally, students know the formulas but cannot apply them in problems. (3) Students with low-ability have not been able to master the three indicators. Students have not been able to recognize and use ideas in mathematics This is related to students who do not understand how these ideas relate to and underlie one another. So it is difficult for students to use and relate mathematics to everyday life.

AUTHORS' CONTRIBUTIONS

RAD conducted RESEARCH on students and WROTE down the results. RR and S.S GUIDED and REVISED the research.

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