UNDERSTANDING OF STRAIGHT-LINE GEOMETRY CONCEPTS IN NEW STUDENTS OF MATHEMATICS EDUCATION

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abstract

The results of a survey of new students at the Faculty of Tarbiyah and Teacher Training at the Islamic Institute of Religion Sultan Muhammad Syafiuddin Sambas, 87% did not like learning mathematics due to the many formulas that had to be memorized. To prevent students from experiencing difficulties in the geometry learning process, it is best to analyze the difficulties students face early. This type of research is a qualitative research conducted on new students receiving KIP Lectures at the Sultan Muhammad Syafiuddin Sambas Institute of Islamic Religion. This study aims to describe students' ability to understand the concept of straight-line geometry. It was found that students needed help understanding the concept of straight-line geometry. It is characterized by symptoms that students only directly answer questions, only use existing formulas in the reading material, and cannot change the current formulas in the reading material.

Keywords: Understanding of concepts, Geometry, Lines

Introduction

The purpose of geometry subject is to help students understand the properties and relationships between geometric elements and to encourage students to think critically and solve problems in everyday life (Fauzi & Arisetyawan, 2020). In addition, learning geometry can also help increase self-confidence, communication skills, and students critical reasoning abilities (Basuki, 2012). Kartono in Basuki considers that it should be easier for students to learn geometry due to geometrical ideas that are already known before they enter school, such as lines, planes, and space (2012).

The fact found from several research results is inversely proportional to the objectives of the geometry lesson, including the mastery of students' spatial abilities (spatial abilities), which are significantly lacking (Mawarsari & Purnomo, 2017). Then it can be seen that students' ability, when analyzed using Van Hiele's theory, found that only 3.13% reached the analysis stage. Besides that, no students reached the informal deduction and deduction stages (Sholihah et al., 2017). Even at the visualization stage, students still think a line is perpendicular because it looks perpendicular to the image/show, or students believe it is a parallel line because it looks parallel and does not intersect (Argaswari & Usodo, 2015).

The results found by the author on new students at the Sultan Muhammad Syafiuddin Sambas Institute of Islamic Religion, out of 100 new students who were given an interest in learning mathematics questionnaire, 87% of new students did not like learning mathematics. They don't like learning mathematics because math lessons memorize many formulas, and the teacher only provides learning materials according to the textbooks. From these results, the authors estimate that most new students need help to understand mathematical concepts but only memorize the formulas in textbooks.

Understanding concepts is necessary for students to know in learning mathematics. The National Council of Mathematics (NCTM) states that students must actively use understanding in learning mathematics to build new knowledge from learning experiences and previously acquired knowledge (Mulyono & Hapizah, 2018). Besides that, memorizing is not the answer to learning mathematics, especially if students need help understanding mathematics (Mulyono & Hapizah, 2018).

To be able to see the extent to which students understand mathematical concepts, they can use the following indicators, can restate formulas, can present concepts in various forms of mathematics, can determine mandatory requirements or minimum requirements of a concept, can apply images, algorithms/formulas in a

mathematical problem and can choose the procedure used to solve mathematical problems (Mawaddah & Maryanti, 2016).

To avoid that students do not always feel difficult, it is better to do an analysis of the difficulties encountered early on in the geometry learning process. Lecturers, teachers or educators should do this before carrying out the learning process because lecturers, teachers and educators must deliver interesting, fun, creative and innovative learning material (Larlen, 2013). In addition, lecturers, teachers or teaching staff in the learning process act as learning managers where teachers must be able to analyze, design, implement, and control all student activities in the learning process to achieve learning goals (Anwar HM, 2018). By doing the analysis before carrying out the learning process, it is hoped that lecturers, teachers, teaching staff will be able to find out the difficulties experienced by students. So that the analysis of these difficulties can be used as reference material for designing a learning process that makes it easier for students to understand concepts in learning geometry.

In the description above, there are indications that students consider a line perpendicular because it looks perpendicular to the image/show, or students consider a line parallel because it looks parallel and does not intersect. Therefore, researchers will describe the understanding of the concept of straight line geometry in new students of the Islamic Institute of Sultan Muhammad Syafiuddin Sambas. The author hopes that with this analysis, it can be used as reference material to develop a mathematics learning plan for new students of the mathematics tadris study program at the Tarbiyah and Teaching Sciences Faculty of the Islamic Institute of Religion Sultan Muhammad Syafiuddin Sambas.

Methods

The type of research conducted in this paper is qualitative research. Qualitative research is research conducted to understand phenomena that occur in a place in a very natural context without human intervention and optimal use as a scientific method that is commonly used (Dr. Umar Sidiq, M.Ag Dr. Moh. Miftachul Choiri, 2019). This research was conducted in March 2022 at the Sultan Muhammad Syafiuddin Sambas Islamic Institute. The subjects of this study were 3 new students who received KIP College scholarships. The selection of the 3 new students was seen from their report card scores which were low, medium and high levels.

The instrument used to collect data was a written test in the form of essay questions. Student test results are then collected, displayed, then reduced, and the data will be verified using the indicators set by the author.

Findings and Discussion

The findings from giving questions to see the understanding of the concept of straight line geometry in early semester students at the Sultan Muhammad Syafiuddin Islamic Institute of Religion The results of the research are presented in graphic, table or descriptive form.

a. First Sample of Students

First Sample Students are students who fall into the high category, the sample cannot solve all the questions.

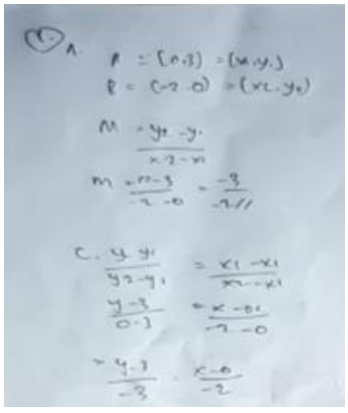

Figure 1: Answer No.1 Student First Sample

Seen in the answers of the First Sample Students answered no 1a correctly and wrote down a comparison of the two points with their own perceptions that were understood by the sample, for no. 1b First Sample Students do not answer. For question no 1c, First Sample Students answered the question but used the wrong concept so they found the wrong solution.

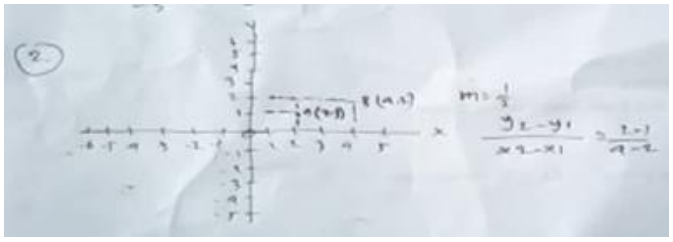

Figure 2: Answers No. 2 Student First Sample

For question no.2, the first sample of students could not determine the equation of the line with the gradient $\frac{1}{2}$, so the first sample of students could not describe the equation of the line.

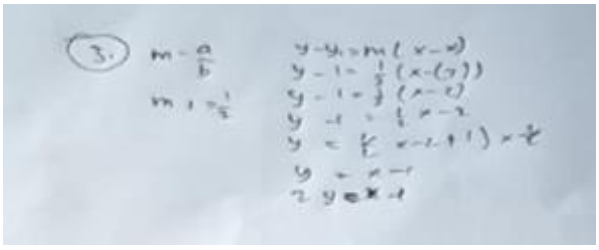

Figure 3: Answer No. 3 Student's First Sample

For question no. 3, the first sample of students has shown the process of finding solutions to the problem with the right concept and method, but confused in the calculations to find the final solution to the problem.

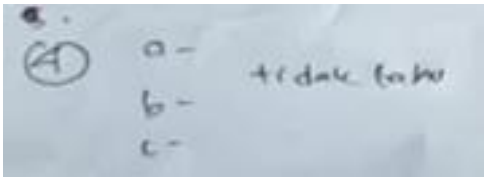

Figure 4: Answer No. 4 Student First Sample

For question no.4, the first sample of students wrote that they did not know. It means that the sample does not understand the concept to solve the problem.

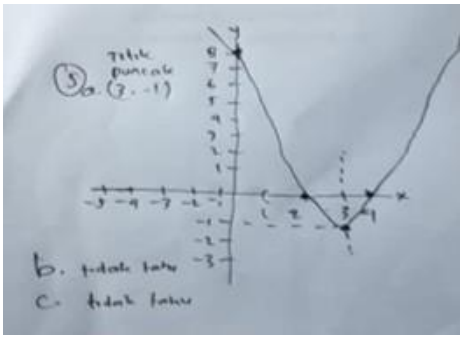

Figure 5: Answers No. 5 Student First Sample

For question no.5a, first sample Students draw a graph of a parabola with a vertex (3,-1). From the results of the image it is correct to form a parabolic graph, but an error occurs in the final solution. For questions no. 5b and 5c, the sample answers do not know.

b. Second Sample of Students

Second Sample Students are students who fall into the medium category, the sample only answers 3 questions.

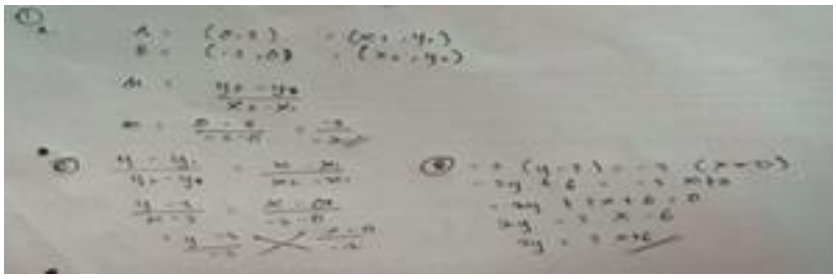

Figure 6: Answers No.1 Student Second Sample

Seen in the answers of the Second Sample Students answered no 1a correctly and wrote down a comparison of the two points with their own perceptions that were understood by the sample, for no. 1b First Sample Students do not answer. For question no 1c, First Sample Students answered the question but used the wrong concept so they found the wrong solution.

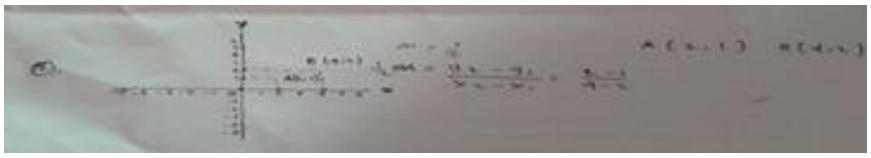

Figure 7: Answer No. 2 Student Second Sample

For question no.2, the second sample of students could not determine the equation of the line with the gradient $\frac{1}{2}$, so the first sample of students could not describe the equation of the line.

Figure 8: Answer No. 3 Student Second Sample

For question no. 3, the second sample of students has shown the process of finding solutions to the problem with the right concept and method, but confused in the calculations to find the final solution to the problem. Second Sample Students did not answer question no. 4 and 5.

c. Third Sample of Students

Third Sample Students are students who fall into the low category, the sample only answers 1 item.

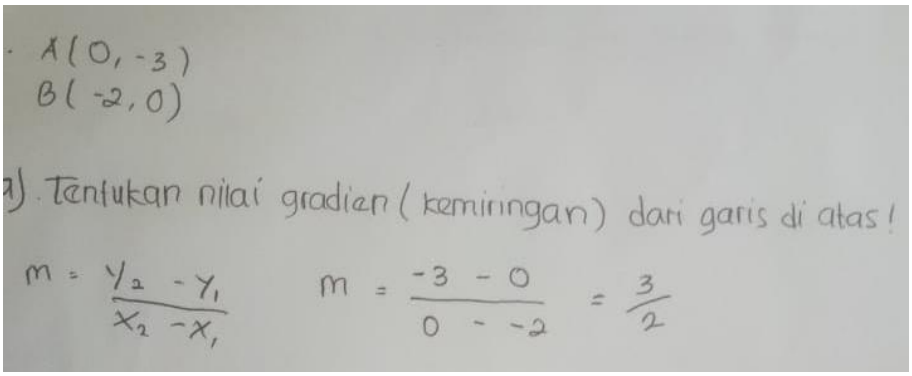

Figure 9: Answer No.1a of the third sample of students

As seen in the answers of the Third Sample, Students answering no 1a have written down the correct concept but still need clarification about determining the points on the Cartesian plane, so when substituting the points on the gradient search concept. For other questions, the three sample students still need to answer them.

Based on the data above, it was found that there were five indicators of students' understanding of concepts, namely restating a concept that had been learned, presenting the concept in various mathematical representations, developing necessary or sufficient requirements of a concept, applying concepts or algorithms to problem solving, using and utilizing and selecting a particular procedure or operation. In this paper, a discussion related to the research results will be presented and detailed according to the indicators of students' understanding of the concept.

a. Restate a concept that has been learned

In the early semester, students of the Sultan Muhammad Syafiuddin Sambas Islamic Institute were found to always write down the concepts they had learned when working on questions. This indicates that the student memorized the formula for straight-line equations, saw friends, or copied formulas from reading sources read by research subjects.

At this stage, students cannot be said to have understood the concept because students only copy back formulas found from memorization, imitate friends or find reading material. This is reinforced by the opinion that the characteristics of students understand the concept, namely being able to define concepts, identify, give examples and non-examples, and can connect mathematics with other sciences.

b. Presenting concepts in various mathematical representations

There are mathematical problem-solving questions to work on with the ability and understanding of each student's concept, found in the subject of early semester students at the Sultan Muhammad Syafiuddin Sambas Islamic Institute, all of whom always write down the concepts they have learned according to the manual.

At this stage students only rewrite the existing formula and cannot change the existing formula into another form of mathematics. So that at this stage, students have yet to be able to understand the concept of the straight line.

c. Develop necessary or sufficient conditions for a concept

Students are provided with mathematical problem-solving questions to work on with the ability and understanding of each student's concepts; not a single new student of the Islamic Institute of Sultan Muhammad Syafiuddin Sambas who develops the necessary and sufficient conditions on the console in answering questions.

d. Applying concepts or algorithms to problem solving

Students are provided with mathematical problem-solving questions to work on with the ability and understanding of each student's concept, found 1 subject who always writes down sequential steps in doing the task given. This indicates that these students are skilled in working on these mathematical problems or have memorized the flow of working on these mathematical problems.

As well as found 2 people who immediately wrote down the answers without writing down how to get the math problem solving. This indicated that the student knew how to solve the problem by reasoning without writing it down or it could also be indicated that the student saw the results of his friend's answers.

e. Using and utilizing and selecting certain procedures or operations

Students were given mathematical problem-solving questions to work on with the ability and understanding of each student's concepts; it was found that all students used the same basic procedures in their mathematical problem-solving process.

From the discussion, only 2 indicators can be carried out by research subjects. This can happen if students need help understanding the concept of straight-line geometry properly and correctly. Because all of these indicators are interconnected and must be carried out step by step, if there are steps that are missed or not carried out, it can be a big indication that students do not understand straight-line geometry material (Kusumawati, 2008)

Conclusion

From the above research results, it can be concluded that new students of the Islamic Institute of Religion Sultan Muhammad Syafiuddin Sambas do not understand the concept of straight-line geometry. It is characterized by symptoms that students only directly answer questions, only use existing formulas in the reading material, and cannot change the existing formulas in the reading material.

The research conducted by the author is not perfect because there are several limitations, while the suggestion that the author wants to convey is that there is a need for more in-depth research from the results obtained by the researcher, namely using the deep interview method to get more detailed results according to the conditions described. Experienced by students.

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