Analysis of Student Difficulty in Solving Geometry Transformation Problems at UIN Syekh Ali Hasan Ahmad Addary Padangsidimpuan

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Abstract

Learning is a process that occurs in education, including formal and informal education. The learning process requires assessment to determine the choice of appropriate learning methods. In addition, there are two student errors in solving math problems, namely mathematical processing errors and conversion errors. At the same time, errors in mathematical processing are greater than other errors. Problem transformation (transformation), which is the process by which students transform mathematical problems into the forms of mathematical models, trying to find the relationship between what is known and what is needed, the next step. This study uses descriptive qualitative research methods to know the difficulty of Mathematics Tadris Study Program students of State Islamic University Syekh Ali Hasan Ahmad Addary Padangsidimpuan in solving geometry transformation problems. The question difficulty is the difficulty in starting a solution. There are two types of problems in the proof of the geometry of transformation, namely the problem known definition of a mapping and the problem known formula for the results of a mapping. This study will discuss the difficulties made by students when solving problems that contain the definition of a mapping. In this study, in addition to analyzing the results of student test results, researchers also conducted interview tests. Based on the results of research and analysis conducted on students, it can be concluded that students have difficulty representing the definition of the solution of the problem and students have difficulty in determining the final result.

Keywords: *Transformation Geometry; Difficulties; and Solving Problems.*

Abstrak

Belajar merupakan suatu proses yang terjadi dalam pendidikan, termasuk pendidikan formal dan tidak resmi. Proses pembelajaran memerlukan penilaian untuk menentukan pilihan metode pembelajaran sesuai. Selain itu ada dua kesalahan siswa dalam menyelesaikan masalah matematika, yaitu kesalahan pengolahan matematika dan kesalahan konversi. Pada saat yang sama, kesalahan dalam pemrosesan matematis lebih besar daripada kesalahannya lainnya. Transformasi masalah (transformasi), yaitu proses dimana siswa mentransformasikan masalah matematika ke dalam bentuk-bentuk model matematika, mencoba mencari hubungan

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antara apa yang diketahui dan apa yang dibutuhkan, langkah selanjutnya. Penelitian ini menggunakan metode penelitian kualitatif deskriptif dengan tujuan untuk mengetahui kesukaran mahasiswa program studi tadris matematika Universitas Islam Negeri Syekh Ali Hasan Ahmad Addary Padangsidimpuan dalam menyelesaikan soal geometri transformasi. Kesukaran yang dimaksud ialah kesukaran dalam memulai suatu penyelesaian. Ada dua jenis pembuktian geometri transformasi yang digunakan dalam tulisan ini, yaitu soal yang membutuhkan pemahaman tentang definisi pemetaan dan soal yang diketahui rumus untuk hasil pemetaan. Penelitian ini akan membahas masalah yang dihadapi siswa saat menyelesaikan soal-soal yang berisi definisi pemetaan. Dalam penelitian ini selain hasil analisis hasil tes mahasiswa, peneliti juga melakukan tes wawancara. Berdasarkan hasil penelitian dan analisis yang dilakukan terhadap mahasiswa, dapat ditarik kesimpulan bahwa mahasiswa sulit dalam merepresentasikan definisi kedalam penyelesaian soal dan mahasiswa sulit dalam menentukan hasil akhir.

Kata Kunci: Geometri Transformasi; Kesulitan; dan Menyelesaikan Soal.

INTRODUCTION

Learning is a process that occurs in education, including formal and informal education. In formal education, learning is an interactive process between learners. Learning resources for students, between students and educators, and in the learning environment (Wahyuni, 2016). Learning is a process of developing potential and building character Each student is the result of synergy between school, family, and community school. This process provides opportunities for students to realize their potential Hopefully this potential continues to increase over time. The learning process requires assessment to determine the choice of appropriate learning methods. In addition, there are two student errors in solving math problems, namely math processing errors and conversion errors (Maifa, 2019). At the same time, errors in mathematical processing are greater than other errors. Errors cannot be avoided in the learning process, especially in the field of mathematics, one of which is in transformation geometry whose completion requires accuracy (Nanna et al., 2020). Transformation Geometry, difficulties, and solving problems.

A detailed explanation of the various stages of mathematical processing errors is as follows (Athania Purba & Dewayanto, 2023): 1) Problem

transformation (transformation), which is a process where students transform mathematical problems into forms of mathematical models, trying to find the relationship between what is known and what is needed, the next step. To test students' ability to transform problems, students are asked to identify methods, procedures, or strategies used to solve problems such as making graphs and tables. 2) Process skills; 3) Answer writing (encoding). At this stage, students are asked to write the final answer to the question given. Based precisely on the results obtained at the process skills stage, students must be able to write according to context.

Students' mathematical connection skills are an integral part of a series of mathematical processes. Connections are designed to help shape students' perceptions through observation. Mathematics is an integral part of life. Course materials will be more meaningful and interesting. Are the topics that students learn relevant to the context of their lives. Students' mathematical connection skills are currently still low and students have not been able to apply previously learned concepts, students are unable to interpret the sentences presented, as well as students are confused when choosing which concept to use. The importance of understanding mathematical connections is so that students can see the relationship between concepts in mathematics so that students do not view mathematics as material only. With mathematical connections, learning about mathematics is no longer a boring science, because students are required to be able to relate their knowledge to the real world (Khoirunnisa & Hasanah, 2022).

RESEARCH METHODS

This study uses descriptive qualitative research methods. Descriptive qualitative research is a research method that uses the philosophy of postpositivism as its foundation (Manu & Fallo, 2022), where it is generally used to conduct research on objective conditions with researchers serving as key instruments (Ridwan et al., 2021). The purpose of this study was to determine the difficulty of students of the Tadris Mathematics Study Program at the State Islamic University Sheikh Ali Hasan Ahmad Addary Padangsidimpuan in solving

transformation geometry problems. The question difficulty is the difficulty in starting a solution. Data were collected through observation, tests, and interviews. Tests were conducted on 32 students and interviews with 3 students were selected with high, medium, and low indicators. Test results and interviews were compared to ensure data validity, given one basic geometry problem and four transformation geometry problems. The research subjects were Tadris Mathematics students of UIN Syahada semester VII.

RESULTS AND DISCUSSION

In this geometry proof, there are two types of problems: problems that require an understanding of the definition of mapping and problems that require a formula for the mapping result. This study will discuss the problems faced by students when solving problems that contain the definition of mapping. In this study, in addition to analyzing the results of students' test results, researchers also conducted interview tests (Dewi & Dasari, 2023). This interview was used as an auxiliary method to collect data. The purpose of this interview activity is to complement the data information that has been obtained from the test results. In the interview, researchers tried to find out whether the difficulties experienced by students in solving geometry transformation problems based on the analysis of students' answers. The difficulties found in this study are:

In the first type of difficulty, namely difficulty in representing definitions in problem-solving, students cannot describe definitions in the form of points and lines. Students who cannot describe the definition in the form of points and lines will not have a good initial understanding of basic geometry. (Kumanireng, 2022). One can acquire initial skills in geometry, or basic geometry expertise, both at the school level and in basic geometry courses.

To represent the definition of a mapping, students must have basic geometry skills because they are required to have simple to high-level abstract thinking about the place of points and lines. (Budiman, 2015). In visualizing or illustrating images related to geometry problems, students must be able to perform

various thought processes. The following difficulties are experienced by students when solving geometry transformation problems.

1. Students Have Difficulty in Placing Dots

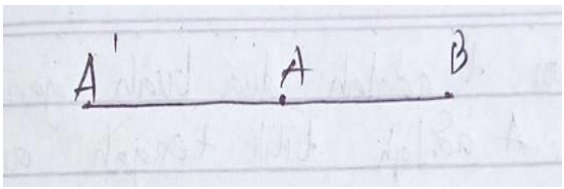

Figure 1. Student Answers in Determining the Dots

In Figure 1, students can already draw a line. However, when they put point A, which is mentioned in the mapping definition as the midpoint of the line, it means that they put point A at the end of the line. The student replied that she had not fully understood the definition of the question when asked why point A was placed in this way. The student could not identify the question in this case. The student did not seem to understand the midpoint of a line.

Previous research also showed that students did not have prior proficiency in basic geometry (Dewi & Dasari, 2023). In the problem, students were asked to describe the position of three points: points A, B, and C, with P(A), P(B), and P(C) as the shadow of each point. The midpoint of points A and B is the shadow of point A.

2. Students Have Difficulty in Determining Shadows

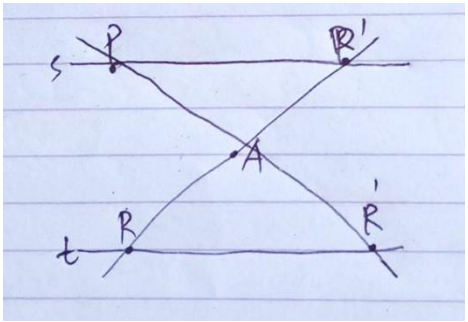

Figure 2. **Student Answers in Determining the** Shadows

In this one problem, it was clear that the student's initial skills were very poor; they were only able to place the point with the shadow but failed to find the midpoint and the line containing the point.

3. Students Difficulty in Defining Shadows

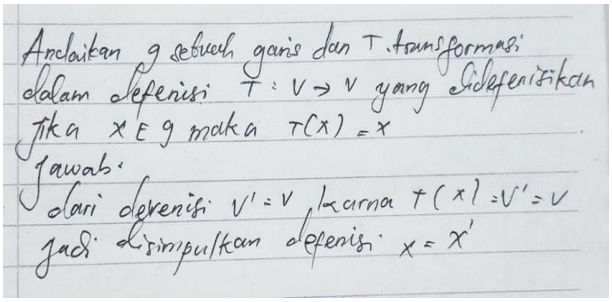

Figure 3. Student Answers in Defining Shadows

Students have an understanding of the shadow of a point. This can be seen in the picture, where students are wrong in placing the shadow of x (x').

4. Students Have Difficulty in Determining the Origin and Result Regions

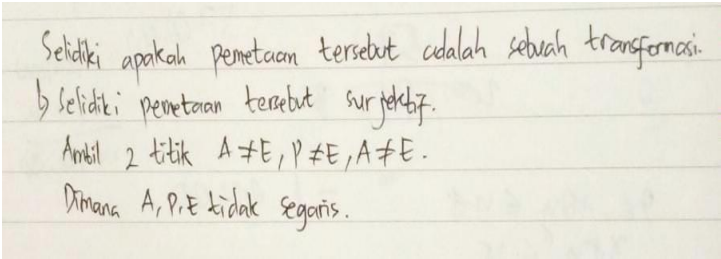

Figure 4. Student Answers in Determining the Origin and Result Regions

In this problem, students were wrong in determining the origin and result areas. For the third difficulty, students find it difficult to determine the final result. That is, students have obtained the final result, but still doubt whether the result is the final answer or there is still a next step. Students are still lacking an understanding of the correct order of transformation and how one transformation affects another.

5. Students find it difficult to know the final result

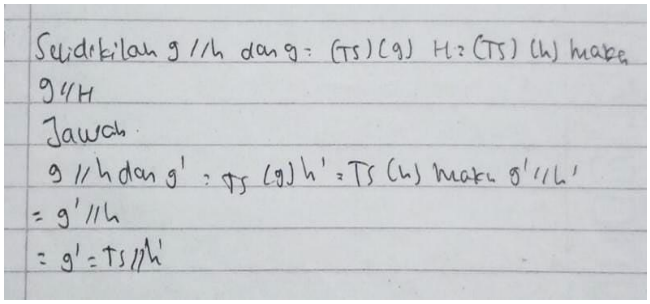

Figure 5. Final Results of Student Answers

The student was correct in the solution, but could not find out the final result. When asked why he only reached g', he explained that he did not know what he was looking for. In this case, students cannot know the final result because they do not understand what is asked in the problem.

An important requirement in solving transformation geometry problems is that students must be able to understand the problem and have basic geometry skills (Paradesa, 2016). This ability is intended when students can translate transformation geometry problems into mathematical sentences (represent) and can understand the concepts related to the problem. Some of the difficulties experienced by students include a lack of understanding from students about the steps in solving transformation geometry problems (Faradisa & Saputro, 2019). Preferably, when solving the problem students do it through the steps of completion.

Based on the results of interviews conducted, the factors that affect student difficulties in solving geometry transformation problems are student motivation and interest.

CONCLUSION

Based on the results of research and analysis conducted on students, it can be concluded that: students have difficulty putting points, students have difficulty in determining shadows, students find it difficult to define shadows, students find it difficult to determine the origin and the result area and students find it difficult to know the final result.

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