Daya Matematis : Jurnal Inovasi Pendidikan Matematika
Volume 9 Nomor 2 July 2021 Hal. 84-90
p-ISSN:2541-4232 dan e-ISSN: 2354-7146

Analysis Of Problem-Solving Ability Of Mts Students In Solving Geometry Transformation Problems Through Online Learning

Lutfiani Cahyaningrum[1], Trisna Roy Pradipta[2]
[1] Pendidikan Matematika
Universitas Muhammadiyah Prof Dr. HAMKA
Email: Lutfiani.cahyaningrum@gmail.com
[2]Pendidikan Matematika
Universitas Muhamaddiyah Prof.Dr. HAMKA
Email: troymath@uhamka.ac.id

(***Received***:23-03-2021; ***Reviewed:*** 5-04-2021; ***Revised:*** 28-05-2021; ***Accepted:*** 7-05-2021; ***Published:*** 1-06-2021)

Abstract
The research purpose to describe and analyze the mathematical problem solving abilities of MTs students in solving Geometry Transformation problems through Online Learning due to the Covid-19 pandemic int Indonesia. The research method used is descriptive qualitative. The subjects of this research were 3 students of MTs Al-Hamid Class IX who were selected as representatives of the very good problem-solving ability category, the problem-solving ability level category was sufficient, and the problem-solving ability level category was lacking. The data collection technique used was a test consisting of 4 non-routine items and interviews. The results of the analysis can be obtained: (1) students with excellent problem-solving abilities are able to fulfill the 4 steps of solving according to their pattern but there are errors in understanding the problem in question 1. (2) students with sufficient problem-solving skills are only able to solve problems in question 1 and 2 while 3 and 4 there are errors in understanding the questions. (3) students with poor problem solving skills were only able to solve problems in question 2, while in questions 3,4 and 5 there were errors in understanding the questions. The student error factor is due to the lack of understanding of the concept of geometric transformation to do the test because the geometric transformation test questions given are non-routine, while the geometric transformations that are often encountered only substitute formulas without understanding the concept of geometric transformation which includes translation, reflection, rotation and dilation. Many have to do with everyday life so that students experience difficulties in what is meant in the questions, especially in questions 3 and 4.

Keywords: *Mathematical problem solving skills, Geometry transformations, online learning*

INTRODUCTION

Problem solving ability is one of the abilities that is still a concern in learning mathematics. The importance of problem-solving skills in learning mathematics makes students try to find a way out in achieving goals that require readiness, knowledge, creativity and ability as well as application in everyday life (Novi and Wahyu, 2019). Therefore, Education in Schools is expected to give all students the opportunity to understand and even do mathematics in everyday life. Problem solving skills are also found in the 2013 curriculum which is currently used in Indonesia, namely the basic competencies contained in the content standards in Permendikbud Number 64 of 2013 which states that students are expected to show logical, critical, analytical, careful and thorough attitudes, be responsible, responsive, and do not give up easily in solving problems (Sutrisno, et al., 2020).

However, in reality, it is not in accordance with what is expected, mathematics learning is still about explaining writings in books, presenting material, providing examples of questions related to the material and then asking students to work on sample questions and discuss them together (Shinta et al., 2019). Learning like this is certainly less able to stimulate or develop mathematical problem solving abilities in students. The lack of mathematical problem solving ability is caused by students only being able to do routine or sample questions given by the teacher, so students have difficulty working on non-routine questions that make students experience errors and solve math problems (Solehah, et al., 2020). Zulfah (2017) states that there are symptoms associated with low mathematical problem solving abilities, namely: 1) most students cannot work on questions that are different from the sample questions given by the teacher; 2) most students cannot understand the questions in the form of good story questions; 3) most students cannot solve application questions or problem solving problems; 4) students answer questions without using general problem solving steps.

In 2021, Indonesia is still hit by the Covid-19 pandemic. So that the circular letter of the Minister of Education and Culture of the Republic of Indonesia Number 4 of 2020 concerning the Implementation of Educational Policies in the Emergency Period for the Spread of Coronavirus Disease (Covid-19) explained that the learning process is carried out at home through online/distance learning, is still in effect today to prevent the spread of the virus. corona virus. Even so, mathematics learning must remain in accordance with the learning objectives, namely developing mathematical problem solving abilities (Solehah, et al., 2020). However, one way that teachers in schools can apply to online learning is by using the assignment method without developing students' problem-solving skills.

To be able to deal with the problems from the statement above, it is necessary to conduct an analysis of the problem-solving abilities of MTs students on geometry transformation material through online learning. Researchers used indicators of students' mathematical problem solving abilities based on 4 problem solving steps according to Polya, namely: (1) Understanding the problem (2) preparing solutions, (3) implementing a settlement plan, (4) re-checking the results of the answers (Nurul, et al. ., 2020) The purpose of this study is to analyze and describe the mathematical problem-solving abilities of MTs students on geometry transformation materials through online ones. The results of this study are expected to assist teachers in determining appropriate learning methods for students in order to understand the material of geometric transformation and can find out students' errors in students' mathematical problem solving abilities.

METHOD

This research method uses descriptive qualitative research methods. Arikunto (2010) descriptive research is research that aims to find out errors and conditions in which the results are explained in the form of a research report. The instrument used in this study was the provision of a mathematical problem solving ability test for students of MTs Al-Hamid class IX totaling 30 students. The test is in the form of a validated description test consisting of 4 questions, each question representing a sub-chapter of geometric transformation, namely question 1 on translation, question 2 on reflection, question 3 on dilation and question 4 on rotation and interviews with research subjects. The selection of subjects in this study was taken by purposive sampling. The data analysis technique in this study used an interactive model qualitative data analysis method from Miles and Huberman which consisted of data reduction, data presentation, drawing conclusions/verification. Then compare the test results with interviews related to the questions given by using triangulation techniques. The triangulation technique is in the form of comparing the results of students' answers with the results of interviews and then analyzed based on the stages of problem solving according to polya.

RESULTS AND DISCUSSION

Result

This research was initiated by giving 30 students of MTs Al-Hamid class IX mathematics problem solving ability tests, which amounted to 30 people, which was conducted online using the help of Google meet and Whatsapp. The results of the mathematical problem solving ability test are classified based on (Japa, 2008). Then 3 students were selected as research subjects to be interviewed regarding the answers that had been given, each of which would represent each category, namely S-1 category of very good problem-solving ability representative of 2 students, S-2 category of problem-solving ability quite representative of 13 students, and the S-3 category of problem-solving abilities are less representative of 15 students. Researchers conducted interviews with research subjects to strengthen the data on problem-solving ability test results with the help of WhatsApp voice calls. The data that has been obtained is then analyzed and described according to the indicators of mathematical problem solving ability according to polya.

1. Indicators of understanding the problem

Based on the results of tests and interviews, the problem-solving ability on this indicator is only S-1 who are able to write down what is known and asked in each question completely by using their own language according to their understanding accompanied by illustrated pictures. However, there was an error in question 1, S-1 did not understand what was asked in the question. S-2 is able to write down what is known and asked in questions 1 and 2 completely but can only follow the language on the question. While questions 3 and 4 were only able to write down some of what was known and asked and only able to explain like the language in the question. S-3 is able to write down what is known and asked in questions 1 and 2 by making illustration pictures accompanied by explanations but only partially. In question 3, S-3 only writes down some of what is known and asked on the question using their own words according to their understanding of the problem. While for question 4, S-3 is able to describe what is known and does not write down what is asked.

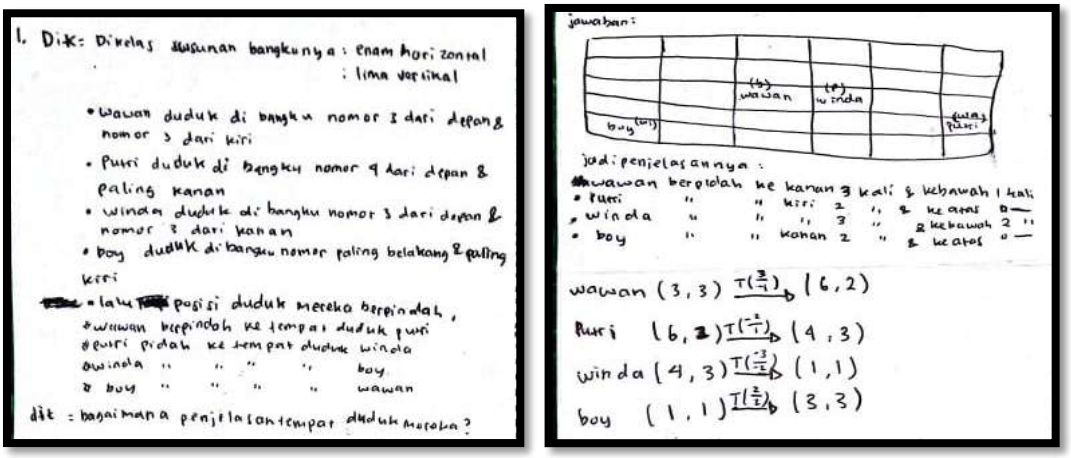
2. Indicators of developing a plan of completion

The problem-solving ability on this indicator is only S-1 who are able to formulate an appropriate solution plan for each question. However, in question 1, S-1 has made an error in understanding what is being asked in the question so that it is wrong to determine the right plan to solve the problem. S-2 is able to explain the plans drawn up to solve problems correctly in questions 1 and 2. While in questions 3 and 4 there are errors in planning. S-3 is able to explain the plan correctly only on question 1. While questions 2,3 and 4 there are errors in preparing the problem plan. Inappropriate planning occurs because students do not understand the meaning of the problem.

3. Indicators of implementing the lesson plan

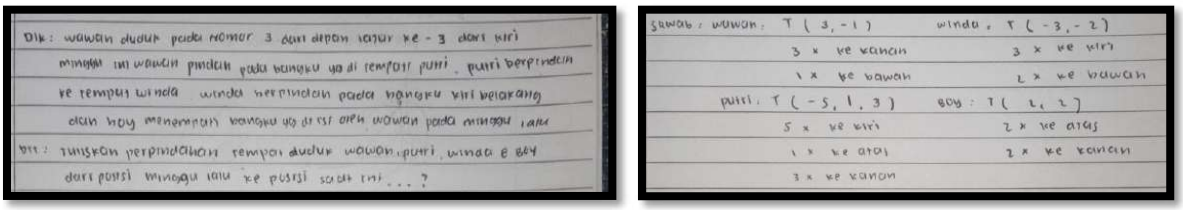
Problem solving ability on this indicator, students make a lot of mistakes. S1 was able to carry out the plans in questions 2,3 and 4 correctly, while in question 1 an error occurred as shown in Figure 1.

Figure 1. S-1 answer error on question 1



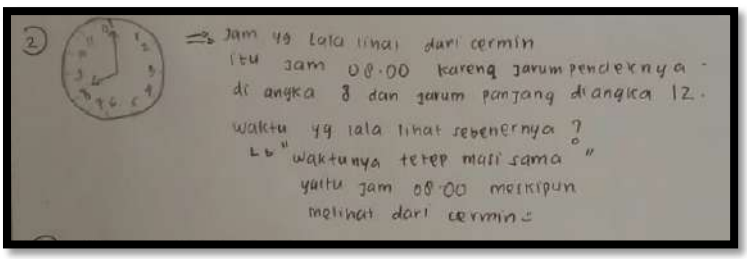
Based on the answers, there were errors when understanding the questions and determining the plan because S-1 was too fixated by the translation formula without understanding the concept of the translation. So that S-1 is not able to solve the problem properly. S-2 is able to carry out the plans in questions 1 and 2 but in question 1 there is an error in carrying out the plan as shown in Figure 2.

Figure 2. S-2 answer error on question 1



S-2 is able to explain in carrying out the plan prepared in question 1, namely calculating the displacements made by Wawan, Winda and Boy but when carrying out the plan an error occurred when calculating the transfer of the daughter because she did not understand it so it was not appropriate in calculating the displacement. S-3 is only able to carry out the plan correctly in question 1 while in question 2 there are errors as shown in Figure 3.

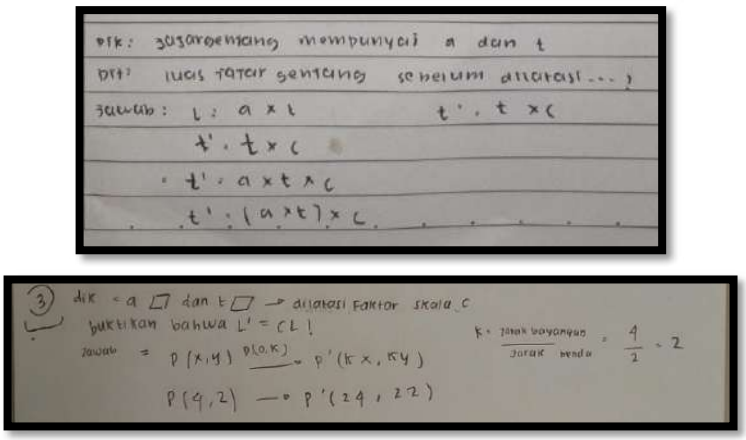
Figure 3. S-2 answer error on question 2



S-3 is able to understand what is meant by the question. However, there was an error in the plan that S-3 had prepared to do what was in the problem, namely looking at the clock in the mirror. But S-3 does not understand the picture of the clock in the problem because the clock does not have numbers while the S-12 practitioner has numbers, so when viewed in the mirror the number on the clock is still at 8. S-3 does not understand the concept of the reflection so determine incorrect results. S-2 and S-3 made

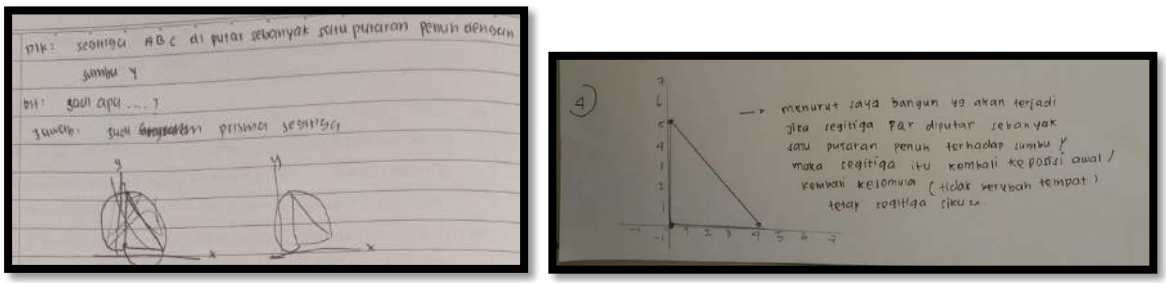
mistakes on questions 3 and 4 because they had experienced errors in the indicators of understanding the problem as shown in Figures 4 and 5.

Figure 4. S-2 answer error on question 3



S-2 and S-3 are not able to understand the problem because they do not understand the concept of geometric transformation material. so that S-2 and S-3 can only write answers according to the example questions given.

Figure 4. S-2 and S-3 answer error on question 4



Same as in problem 4, S-2 and S-3 are unable to understand the problem because they do not understand the concept of geometric transformation material. S-2 explains the illustration of the image made by depicting a triangle on the coordinate line and then the triangle is rotated one full circle with the y-axis as its axis. An error occurs. When drawn the shape does not look like a shape because S-2 assumes that the rotation does not exceed the y-axis. so that S-2 only guesses the shape that occurs is a triangular prism. While S-3 got the answer by imagining the triangle was rotated but S-3 made a mistake in the concept of rotation by linking it to other materials, such as rotational symmetry and then looking for material related to rotational symmetry on the internet to confirm the answer. On the Internet there is rotational symmetry in the isosceles triangle according to the picture in the problem, when rotated it will return to its original position.

4. Indicators re-examine processes and results

Problem solving ability on this indicator, only S1 re-examines the process and results by writing conclusions on each question. However, the conclusion in question 1 is not correct because the checks were carried out using the wrong concepts and formulas. S-2 and S-3 did not re-examine question 1 because they were sure of the answer given. Meanwhile, in question 2, indicators are re-examined by re-practicing the plans that have been prepared. On questions 3 and 4, S-2 and S-3 were doubtful about the answer so they could not draw conclusions.

CONCLUSIONS AND SUGGESTION

Based on the results of research on mathematical problem solving abilities, it can be concluded as follows:

1. Students who have very high problem solving abilities are able to fulfill 4 rare problem solving according to polya, namely: (1) Understanding the problem (2) compiling a solution, (3) implementing a settlement plan, (4) checking back on the results of the answer (Nurul , et al., 2020). However, in question 1, students do not understand what is meant by the problem so that they cannot produce the right solution.
2. Students who have sufficient problem-solving skills, are able to meet the indicators of understanding the problem, can write what is known and asked on the question using their own language according to their understanding, but there are some that are not quite right. Students are also able to plan and solve problems by asking questions in questions 1 and 2 but in question 1 there are some errors when carrying out the completion plan. While questions 3 and 4 students do not understand the meaning of the problem because students do not understand the concept of geometric transformation to solve the problem so students only estimate the answer. The re-checking done by students only mentions the answers they get.
3. Students who have poor problem-solving skills cannot fulfill the indicators of understanding the problem because they write down what is known and asked only partially and explain in the language used exactly like the language in the problem. Students can plan and solve problems only in problem 1, while for questions 2,3 and 4 students have difficulty understanding the meaning of the problem due to a lack of understanding of the concept of transformation material.

The student error factor is due to the lack of understanding of the concept of geometric transformation to take the test because the geometry transformation test questions given are non-routine, while the geometric transformations that are often encountered are simply substituting formulas without understanding the concepts of geometric transformations which include translation, reflection, rotation and dilation. related to everyday life so that students have difficulty what is meant by the questions, especially in questions 3 and 4. It can be seen from the analysis that mathematical problem solving ability is not something that is easily obtained by students so students must be able to develop these abilities. To develop this, it is hoped that in the future educators can create appropriate learning strategies that can help students understand a problem, develop plans for solving the problem, get problem solving and be able to draw conclusions from the problem.

REFFERENCE

Andayani, F., & Lathifah, A. N. (2019). Analisis Kemampuan Pemecahan Masalah Siswa SMP dalam Menyelesaikan Soal Pada Materi Aritmatika Sosial. Jurnal Cendekia : Jurnal Pendidikan Matematika, 3(1), 1–10. https://doi.org/10.31004/cendekia.v3i1.78

Nurrizbaeni, N., & Setiawan, W. (2018). Analisis Kemampuan Pemecahan Masalah Matematik Siswa Kelas X Pada Materi Persamaan Dan Pertidaksamaan Nilai Mutlak. Jurnal On Education, 01(03), 327–336. https://core.ac.uk/download/pdf/268404942.pdf

Nurul. A., Ani R., Subali, B., & Marwoto, P. (2020). Analisis Kemampuan Pemecahan Masalah Model Polya Materi Getaran, Gelombang, Dan Bunyi Siswa Smp. UPEJ Unnes Physics Education Journal, 9(1), 1–8. https://doi.org/10.15294/upej.v9i1.38274

Mariam, S., Nurmala, N., Nurdianti, D., Rustyani, N., Desi, A., & Hidayat, W. (2019). Analisis Kemampuan Pemecahan Masalah Matematis Siswa MTsN Dengan Menggunakan Metode Open Ended Di Bandung Barat.

Jurnal Cendekia : Jurnal Pendidikan Matematika, 3(1), 178-186. https://doi.org/10.31004/cendekia.v3i1.94

Mawaddah, S., & Anisah, H. (2015). Kemampuan Pemecahan Masalah Matematis Siswa Pada Pembelajaran Matematika dengan Menggunakag) di SMPn Model Pembelajaran Generatif (Generative Learning) di SMP. EDU-MAT: Jurnal Pendidikan Matematika, 3(2), 166–175. https://doi.org/10.20527/edumat.v3i2.644

Sadikin and A. Hamidah, "Pembelajaran Daring di Tengah Wabah Covid-19:(Online Learning in the Middle of the Covid-19 Pandemic)," Biodik, vol. 6, no. 2, pp. 214–224, 2020, DOI: https://doi.org/10.22437/bio.v6i2.9759

Amam, A. (2017). Penilaian Kemampuan Pemecahan Masalah Matematis Siswa Smp. Teorema, 2(1), 39. https://doi.org/10.25157/.v2i1.765

Sutrisno, S., Zuliyawati, N., & Setyawati, R. D. (2020). Efektivitas Model Pembelajaran Problem-Based Learning dan Think Pair Share Berbantuan Geogebra Terhadap Kemampuan Pemecahan Masalah Matematis. Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang, 4(1), 1. https://doi.org/10.31331/medivesveteran.v4i1.930

Solehah, A., Nindiasari, H., & Setiani, Y. (2020). Analisis Kemampuan Pemecahan Masalah Matematis dengan Menggunakan Pembelajaran Daring. Jurnal Inovasi Dan Riset Pendidikan Matematika, 1(2), 37–47. http://www.jurnal.untirta.ac.id/index.php/wilangan

Zulfah, Z. (2017). Pengaruh penerapan model pembelajaran kooperatif tipe think pair share dengan pendekatan heuristik terhadap kemampuan pemecahan masalah matematis siswa mts negeri naumbai kecamatan kampar. Jurnal Cendekia : Jurnal Pendidikan Matematika, 1(2), 1–12. https://doi.org/10.31004/cendekia.v1i2.23