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ANALYSIS OF MATHEMATICAL PROBLEM SOLVING SKILLS ON THE RELATIONSHIP AND FUNCTION MATERIAL OF GRADE VIII STUDENTS OF SMPN 6 PALU

Nur Mei Sakin Rahim[1], Nurhayadi[2], Muh Rizal[3], Mustamin Idris[4]
[1234]Mathematics Education Study Program, Faculty of Teacher Training and Education, Tadulako University
Soekarno Hatta Road km. 9, Palu, Central Sulawesi
[1]e-mail: nurmeisakin234@gmail.com

Abstract

This research aims to describe the mathematical problem solving abilities in relation and function material for class VIII students at SMP Negeri 6 Palu. This type of research is qualitative research. The research subjects were three students from 32 class VIII F students. Students were grouped into three categories, namely high ability students, medium ability students and low ability students. Each category is represented by one student. The results of this research are (1) Subjects with high abilities can understand problems, plan solutions, solve problems but the subjects do not carry out re-examination. (2) Subjects with moderate abilities can understand the problem, are still lacking in planning solutions, cannot solve the problem and the subject cannot carry out re-examination. (3) Subjects with low abilities cannot fulfill all the problem solving indicators used in the research.

Keywords: problem solving abilities, relations and functions

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan kemampuan pemecahan masalah matematis pada materi relasi dan fungsi siswa kelas VIII SMP Negeri 6 Palu. Jenis penelitian ini adalah penelitian kualitatif. Subjek penelitian diambil tiga siswa dari 32 siswa kelas VIII F. Siswa dikelompokkan dalam tiga kategori yakni siswa berkemampuan tinggi, siswa berkemampuan sedang dan siswa berkemampuan rendah. Setiap kategori diwakili oleh satu siswa. Hasil penelitian ini adalah (1) Subjek berkemampuan tinggi dapat memahami masalah, merencanakan penyelesaian, menyelesaikan masalah tetapi subjek tidak melakukan pemeriksaan kembali. (2) Subjek berkemampuan sedang dapat memahami masalah, masih kurang dalam merencanakan penyelesaian, tidak dapat menyelesaikan masalah dan subjek tidak dapat melakukan pemeriksaan kembali. (3) Subjek berkemampuan rendah tidak dapat memenuhi semua indikator pemecahan masalah yang digunakan dalam penelitian.

Kata kunci: kemampuan pemecahan masalah, relasi dan fungsi

INTRODUCTION

Mathematics is one of the subjects that has an important role in life, both in academic life and everyday life. In mathematics there are various problems or problems that must be solved by students. Most students still have difficulty solving problems in mathematics because they still do not understand (Khasanah et al., 2021). Mathematics is not only a thinking tool that helps students find patterns, solve problems, and draw conclusions, but also as a tool that gives students a clear understanding of different ideas (Khadijah et al., 2018). Based on 2016's Permendikbud Number 22 (Sofyan et al., 2021), one of the objectives of

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learning mathematics is to solve mathematical problems which include the ability to understand problems, develop solution models, solve models and provide appropriate solutions. As stated by the National Council of Teachers of Mathematics (NCTM, 2000) that there are five basic mathematical abilities including problem solving ability, reasoning ability, communication ability, connection ability, and representation ability (Pramuswara N.A & Haerudin, 2022).

Mathematical problem solving ability plays an important role in learning mathematics. The importance of mathematical problem solving is emphasized in NCTM Augustami which suggests that problem solving is an integral part of learning mathematics, so that problem solving and learning cannot be separated. Mathematical problem solving skills are important because: (a) problem solving includes the general objectives of teaching mathematics, (b) problem solving which includes methods, procedures, and strategies is a core and main process in the mathematics curriculum, and (c) problem solving is a fundamental ability in learning mathematics (Fariha & Ramlah, 2021).

The stages of problem solving according to Polya's strategy (Febrianti et al., 2023) are understanding the problem, making a solution plan, implementing a solution plan and evaluating. As for some indicators in the problem solving stages, namely: understanding the problem is 1) students can determine information from what they know, 2) students can determine what information is asked in the problem, and 3) students describe the original problem in their own language. The indicator for developing a plan is where students can find a way to solve the problem. Indicators at the step of carrying out student solutions can use the method or strategy used to get results. While at the step to check back are: 1) students can check whether the solution steps used are correct, 2) students can check whether the results obtained are correct in solving the problem.

Problem solving skills have not been in line with student achievement. This is in accordance with the survey results from The Trends International Mathematics and Science Study (TIMSS) 2015 and the Program for International Student Assessment (PISA) which show that the average score obtained by Indonesia is 397 and is ranked 44 out of 49 participating countries. While the 2018 PISA results ranked 72 out of 78 countries (Noviyana et al., 2018).

There are several factors that influence student success in learning mathematics, including internal factors which include initial ability, intelligence level, learning motivation,

learning habits, learning anxiety, learning motivation, and so on. In addition to internal factors, there are also external factors including the family environment, school environment, community environment, social and economic conditions and so on (Mawaddah & Anisah, 2015).

In connection with this, the researcher made initial observations and conversations with one of the mathematics teachers at SMP Negeri 6 Palu. From the results of the interviews conducted, the researcher obtained information that mathematical problem solving ability is influenced by, confidence, shyness, nervousness, group learning atmosphere and gender. In addition, students also lack discussion together, unable to write down the information in the problem, lack of focus in learning so that they do not understand the material taught and the difficulty level of the problem.

Seeing the things that must be mastered by students in the material of relations and functions, the mathematical problem solving ability of students becomes very important because students are required to be able to express an event from a relation and function problem into mathematical language or symbols, explain an idea in pictures, graphs, and algebra, compile mathematical models and their solutions, compile story problems, and be able to understand a mathematical presentation.

Based on the description presented, research will be conducted to find out how students' mathematical problem solving skills. To answer these problems, the researcher gave the title: "Analysis of Mathematical Problem Solving Ability on Relation and Function Material of Class VIII Students of SMP Negeri 6 Palu".

METHODS

The type of research used is descriptive with a qualitative approach. With the aim of knowing students' mathematical problem solving skills in relation and function material. This research will be conducted in class VIII of SMP Negeri 6 Palu, located at Jl. Dewi Sartika No. 81 Palu, South Birobuli, South Palu sub-district, Palu city, Central Sulawesi. This research will be conducted in the odd semester of the 2023/2024 school year.

The subjects selected in this study were three grade VIII students. The selection of subjects is based on the odd semester mathematics report card scores in the 2023/2024

school year. Based on the math report card scores, the subjects were grouped into high ability subjects, medium ability subjects and low ability subjects.

The instruments used in this research are written tests and interviews. The written test in this study is a description test in the form of test questions related to relation and function material. This test is used to obtain data from students with problem solving skills which are then analyzed, so that researchers can find out the ability of students to work on the tests given. while interviews are used to classify student answers.

RESULTS AND DISCUSSION

This research was conducted by researchers on January 22-24 2024. In this study the researcher asked three questions containing 4 indicators of problem solving for class VIII students at SMP Negeri 6 Palu. There are indicators of problem solving in the questions. The research provided is understanding the problem, planning a solution, resolve problems according to plan, and carry out inspections again. Based on the results. The results of the students' work can be seen in the following picture.

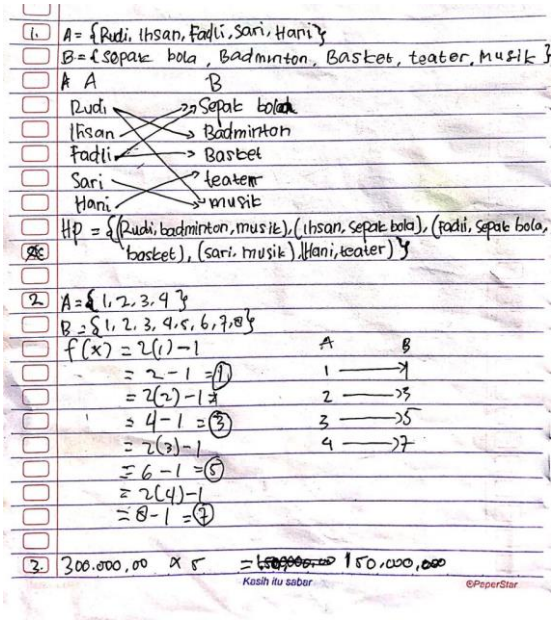

Figure 1. High Ability Subject Answers

Based on the picture above, at the stage of understanding the problem, in question number 1 and question number 2 the subject wrote down the information known in the question completely but did not write down the information asked, stating the information

known and asked in the question completely. In question number 3 the subject did not write down the information that was known and asked about in the question but was able to state the information that was known and asked about in the question completely. This shows that the AG subject can fulfill indicator 1, namely at the stage of understanding the problem.

At the stage of planning the solution, In the first question, the respondent is able to write and clarify how to describe an arrow diagram and state the complete set of ordered pairs. In question number 2, the subject wrote and explained how to determine the function f but was not precise in describing it in an arrow diagram. The subject does not add columns and points to connect relations in set A and set B. This shows that subject AG can fulfill indicator 2 at the completion planning stage.

At the stage of solving the problem according to plan, subject AG answered question number 1 but was not correct in the solution set. In question number 2 the subject answered correctly but was not precise in describing the arrow diagram. Furthermore, in question number 3 the subject answered correctly but did not use any symbols in his answer and did not provide a conclusion on the final result of his answer. This shows that AG subjects can solve problems but have not really mastered them.

At the re-checking stage, in question number 1 the subject did not re-check the answer so that the writing of the set of ordered pairs was still not correct. In question number 2, the subject also did not check the answer again so the arrow diagram was still correct but still lacking. Furthermore, in question number 3, the subject did not write a conclusion on the answer sheet. This shows that subject AG cannot fulfill indicator 4 at the re-examination stage.

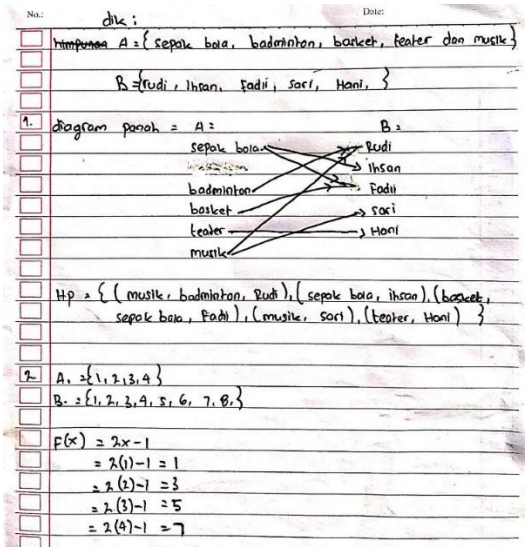

Figure 2. Medium Ability Subject Answers

Based on the picture above, at the stage of understanding the problem. In question number 1, the AI subject wrote the information he knew in the question but was inaccurate and did not write down the information asked. The AI subject did not pay attention to the meaning of the question properly so that set A and set B were reversed. Then in the interview excerpt, the AI subject can state the information he knows and is asked about the question, but the answer is not quite correct. In question number 2, the AI subject wrote down the information he knew and was asked about in the question. Then in the interview excerpt, the AI subject was able to state the information he knew and asked about in the question. Furthermore, in question number 3 the subject did not write down the information that was known and was asked about in the question, but in the interview excerpt the AI subject stated the information that was known and asked about in the question. This shows that the AI subject can fulfill indicator 1 at the stage of understanding the problem.

At the completion planning stage. In question number 1, the AI subject was able to write and explain how to draw an arrow diagram but it was not quite right because the subject was not careful in reading the question so that set A and set B were reversed. Then the subject stated the set of ordered pairs but it was not quite right because the arrow diagram was also not right. In question number 2, the subject can write and explain how to determine the function f but cannot draw the arrow diagram. This shows that the subject of AI is still not deep enough at the stage of planning a solution.

At the stage of solving the problem according to plan, on question number 1 the AI subject answered but it was not quite right. In question number 2, the subject was only able

to determine the function f but not draw the arrow diagram. In question number 3, subject AI did not answer on the answer sheet. This shows that the AI subject cannot fulfill the indicators at the stage of solving the problem according to plan.

At the re-checking stage, in questions number 1, 2 and 3 the subject re-checks the answer so that set A and set B in question number 1 are reversed. Furthermore, the subject also did not write down the answer to question number 3, let alone draw a conclusion. This shows that the AI subject cannot complete the re-examination stage.

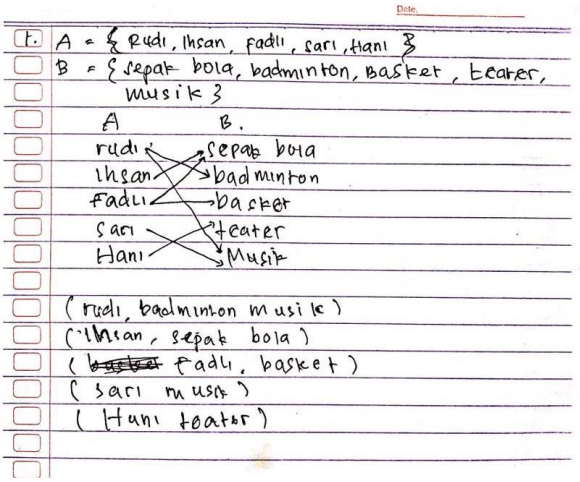

Figure 3. Low Ability Subject Answers

Based on the picture above, at the stage of understanding the problem, in question number 1 the subject wrote down the known information in the question but did not write down the information being asked, stated the information that was known and asked in the question completely. In question number 2, the subject stated the information that was known and asked about in the question was incomplete but did not write down the information that was known and asked about on the answer sheet. In question number 3, the subject did not write down the information that was known or asked about in the question and did not complete what was instructed in the question. This shows that the LD subject is still not at the stage of understanding the problem.

At the stage of planning the solution, in question number 1, subject LD was able to write and explain how to draw an arrow diagram and state the set of ordered pairs but it was still not quite right. The subject did not use columns or dots to connect the relation being asked, whereas in the set of ordered pairs the subject answered correctly but not quite correctly. In question number 2, the subject did not write it on the answer sheet because he did not

understand the meaning of the question. This shows that the LD subject cannot fulfill the planning stage for completion.

At the stage of solving the problem according to plan, in question number 3 the subject was unable to do it because he did not understand the concept and meaning of the question. This shows that the LD subject cannot fulfill the problem solving stage.

At the re-checking stage, from question number 1 to question number 3 the subject did not re-check the answer, so that question number 1 was not correct while questions number 2 and number 3 were not done on the answer sheet. This shows that the LD subject cannot fulfill the stage of re-examination.

Based on the analysis conducted in this study, the problem-solving ability of students in grade VIII of SMP Negeri 6 Palu is still low, this is in accordance with the analysis using indicators taken from Polya's opinion. This is because low ability of students in analyzing the questions given, as well as students tend to work on questions directly without complete work (Wahyuda et al., 2021).

CONCLUSION

Based on the research results, the subject's mathematical problem solving with high mathematical abilities includes, among other things, the subject can fulfill indicator 1, namely understanding the problem, the subject can fulfill indicator 2, namely planning a solution, the subject can fulfill indicator 3, namely solving the problem and the subject cannot fulfill indicator 4, namely doing re-examination.

Subjects with moderate mathematical abilities include, among other things, subjects who can fulfill indicator 1, namely understanding the problem. The subject still does not fulfill indicator 2, namely planning a solution, the subject cannot fulfill indicator 3, namely resolving the problem, and the subject cannot fulfill indicator 4, namely carrying out re-examination.

While subjects with low mathematical abilities cannot fulfill all the problem solving indicators used in the research.

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