

ANALYSIS OF JUNIOR HIGH SCHOOL STUDENTS' MATHEMATICAL PROBLEM SOLVING ABILITY ON PYRAMID MATERIAL REVIEWED FROM GENDER DIFFERENCES

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Abstract

This research has purpose for to find out the mathematical problem solving abilities of junior high school students on pyramid material in terms of gender differences. This research is a qualitative research with descriptive research type. The subjects in this study consisted of 6 students, consisting of 3 male students and 3 female students. The six students were categorized as high, medium and low students. Data were collected through written tests and interviews, then analyzed descriptively which included reducing data, presenting data and drawing conclusions. The results of the study were (1) Female and male subjects in the high category met all indicators of mathematical problem solving ability, but male subjects were less careful than female subjects (2) Female and male subjects in the medium category met three indicators of problem solving ability, and made mistakes in performing mathematical calculations, but male subjects made more mistakes than female subjects (3) Male and female subjects in the low category only met one indicator of problem solving ability.

Keywords: Analysis Mathematical Problem Solving Ability, Pyramid, Gender

Abstract

This study aims to find out the mathematical problem-solving abilities of junior high school students on pyramid material in terms of gender differences. This research is a qualitative research with a descriptive research type. The subjects in this study consisted of 6 students, consisting of 3 male and 3 female students who had high, medium and low students categories. Data were collected through written tests and interviews, then analyzed descriptively which included data reduction, data presentation and drawing conclusions. The results of the study were (1) female and male subjects in the high category fulfilled all indicators of problem solving ability, but male subjects were less thorough than female subjects (2) female and male subjects in the medium category fulfilled three indicators of problem solving ability problems, and made mistakes in making mathematical calculations, but male subjects made more mistakes than female subjects (3) Male and female subjects in the low category only met one indicator of problem solving ability.

Keywords: *Mathematical Analysis Problem Solving Ability, pyramid, Gender*

INTRODUCTION

Mathematics is a very important science to teach because it has a close relationship with various disciplines, underlies technological development and is able to develop human thinking skills (Mashuri, 2019). Therefore, it is undeniable that mathematics is very important in life, so that the Indonesian curriculum makes mathematics a subject that must be studied by all levels of education. One of the goals of learning mathematics is to train problem solving skills.

Mathematical problem solving ability is a student's ability to use their knowledge and skills to find a solution to a mathematical problem.(Davita and Pujiastuti, 2020). It is important for every student to have mathematical problem solving skills because with these skills, students can understand the problems that arise, so they can easily plan solutions and find solutions to a mathematical problem ((Cahyani and Setyawati, 2016). This shows that every student is expected to have mathematical problem solving skills, but the reality in the field shows that students' abilities in solving mathematical problems are not as expected.

The results of the study conducted by the Program of International Study Assessment (PISA) in 2018 showed that Indonesian students were still in the low criteria in problem-solving abilities. Indonesia was ranked 72nd out of 78 participants with a score of 379 which was still far from the international average, which was 489 (Schleicher, 2019).Oktaviana stated that in solving the questions tested by PISA, students need to have good mathematical problem-solving skills. With the low PISA score results of Indonesian students, it can be stated that the mathematical problem-solving skills of Indonesian students are still relatively low (Oktaviana, 2018). Therefore, it can be concluded that students' ability to solve mathematical problems is still in the low category.

The low mathematical problem-solving ability of students is also supported by data obtained by researchers from the results of a preliminary study conducted on February 5, 2022 in class VIII-3 of SMPN 16 Banda Aceh by giving mathematical problem-solving ability test questions to 25 students. Based on the test results, there were 6 students in the high criteria, 8 students in the medium criteria and 11 students in the low criteria. This shows that 44% of students have low mathematical problem-solving abilities.

The level of difficulty of each subject matter varies. One of the subjects considered difficult by students is the pyramid. Based on the results of the mastery of the National

Examination mathematics material, the percentage of students who can answer correctly on the pyramid material only reaches 22% (Ministry of Education and Culture). This is in line with research conducted by Maulin and Chotimah which shows that students still experience difficulties in solving problems on the pyramid material (Maulin and Chotimah, 2021).

Each student has different abilities in mathematical problem solving skills in pyramid material. One of them is differences based on gender. These gender differences have an impact on mathematics learning. According to Nur and Palobo when faced with problems based on problem solving, female and male students tend to have different ways of solving problems (Nur and Pabolo, 2018). Therefore, it is very important to analyze students' mathematical problem solving in order to find out how students' abilities are in solving problems and to see where students' inability to solve mathematical problems lies. Therefore, this study aims to analyze the mathematical problem solving abilities of junior high school students in solving pyramid problems based on gender.

RESEARCH METHODS

Types of research

This study uses a qualitative approach with a descriptive research type. This study aims to describe the mathematical problem-solving abilities of junior high school students related to pyramid material reviewed from gender differences presented in the form of text or words.

Time and Place of Research

This research was conducted at SMP Negeri 16 Banda Aceh in the odd semester of 2022/2023 starting from September 16, 2022 to September 26, 2022.

Research Subjects/ Population and Sample

The subjects of this study were 6 students from class IX-5 SMPN 16 Banda Aceh in the odd semester of the 2022/2023 academic year, consisting of 3 male students and 3 female students. The six students were categorized as high, medium and low students. The subjects were taken based on a mathematical problem-solving ability test and from the considerations of the mathematics teacher who taught the class.

Procedure

The initial activity in this study was that all students of class IX-5 SMPN 16 Banda Aceh were given a mathematical problem solving ability test sheet 1 (LTKPMM 1) in the form of 3 essay questions. After being given the test, the researcher analyzed the students' answers. Furthermore, the researcher selected 6 students to be interviewed, consisting of 3 male students and 3 female students. The six students were categorized as high, medium and low students. The next step was that the researcher gave LTKPMM 2 to the six students and interviewed the 6 subjects to check the validity or legitimacy.

Data Sources, Instruments, and Data Collection Techniques

The instruments used in this study were the researchers themselves, test questions in the form of Mathematical Problem Solving Ability Test Sheets (LTKPMM), and interview guidelines. The data collection technique used in this study was to provide a written test in the form of Mathematical Problem Solving Ability Test Sheets (LTKPMM) and interviews to explore how the subject's thinking process in answering the test questions given. To obtain the validity of the data in this study, data triangulation is needed. The triangulation used in this study is time triangulation.

Data Analysis Techniques

The data analysis technique used in this study is the Miles and Huberman model consisting of Data Reduction, Data Display, Conclusion Drawing/ Verification. In this study, the score obtained from the results of the mathematical problem-solving ability test used an assessment sourced from (Jedaus, Farida, and Suwanti, 2019) as follows:

Table 1

Scoring Criteria for Mathematical Problem Solving Ability Questions

Rated aspect	Score	Information
Understanding the problem	3	Write down what is known and asked in the question completely.
	2	Write down what is known and asked in the question but is incomplete
	1	Write down what is known and asked

			in the question but both are wrong
		0	Not writing down what is known and asked in the question
Planning	problem solving	3	Determine appropriate strategies to solve problems appropriately
		2	Determine the right strategy but only partially
		1	Determine a problem-solving strategy that is appropriate to the problem but wrong
		0	Unable to determine any problem solving strategy
Executing	the settlement plan	3	Solve problems with strategies that are formulated completely and correctly
		2	Solving problems with strategies that are formulated but are incomplete or contain several wrong steps
		1	Solving problems with formulated but wrong strategies
		0	Not writing down the strategy process in solving problems
Check Back		3	Recheck and conclude the answer correctly
		2	Conducting a check but no conclusion is given or no check but there is a correct conclusion
		1	Conclude the answer but wrong
		0	Not checking again and not concluding the answer

RESEARCH RESULTS AND DISCUSSION

Research result

The following presents the results of research on students' mathematical problem solving abilities.

Table 2
Mathematical Problem Solving Ability of Male Students

Aspects of Mathematical Problem Solving Ability	Male Students		
	Tall	Currently	Low
Understanding the Problem	Able to understand the questions well	Able to understand the questions well	Able to understand the questions well
Planning problem solving	Able to plan steps and determine the right formula to solve problems	Able to plan steps and determine the right formula to solve problems	Unable to plan step by step and write formulas but the formulas written are not correct
Executing the problem plan	Able to carry out each planned step by step	Able to carry out each step as planned but makes many mistakes in calculations	Unable to execute problem solving plan
Check back	Able to recheck the answers to obtain correct and precise results.	Not re-checking the solutions that have been obtained so that you are unable to draw a good and correct conclusion	Not re-checking the solutions that have been obtained so that you are unable to draw a good and correct conclusion

Table 3
Mathematical Problem Solving Ability of Female Students

Aspects of Mathematical Problem Solving Ability	Female Students		
	Tall	Currently	Low
Understanding the Problem	Able to understand the questions well	Able to understand the questions well	Able to understand the questions well
Planning problem solving	Able to plan steps and determine the right formula to solve problems	Able to plan steps and determine the right formula to solve problems	Unable to plan step by step and able to write formulas but incomplete
Executing the problem plan	Able to carry out each planned step by step	Able to carry out each step as planned but makes many mistakes in calculations	Unable to execute problem solving plan
Check back	Able to recheck the answers to obtain correct and precise results.	Not re-checking the solutions that have been obtained so that you are unable to draw a good and correct conclusion	Not re-checking the solutions that have been obtained so that you are unable to draw a good and correct conclusion

Discussion

1. High Category (NN) Female Students' Mathematical Problem Solving Ability

Subject NN in solving the problems contained in the test questions has fulfilled the indicator of understanding the problem, subject NN read and observed the questions given carefully so that no information was missed, so that subject NN could state what

was known and asked in the questions well, subject NN also drew an illustration of a pyramid on the question sheet to make it easier to solve the questions.

Subject NN also meets the indicators of planning problems, subject NN is able to estimate what steps must be taken and can use the appropriate formula to solve a problem. Subject NN is also able to carry out the plan that has been made well according to what has been planned so as to obtain correct, precise, complete and systematic results. Subject NN also re-checks the answers that have been obtained so as to be able to draw the right conclusions.

2. Mathematical Problem Solving Ability of Female Students in the Medium Category (IN)

Subject IN can understand the problem well by writing down what is known and asked in the question properly and correctly. Subject IN is also able to plan the steps that must be taken and what formulas must be used to solve the problem and has been able to carry out the problem-solving plan well, but makes some mistakes in performing mathematical operations so that they do not find the right solution. Subject IN also tends to ignore re-checking the solutions obtained.

3. Female Students' Mathematical Problem Solving Ability Category Low (RM)

Based on the results of the data analysis, female subjects with low categories only met the indicator of understanding the problem. Subject RM was able to state the information contained in the question correctly and completely. However, subject RM was unable to plan a solution to the existing problem, subject RM was confused about what formula to use to solve the problem. Subject RM was also unable to prepare a problem-solving plan, so that she was unable to solve the problem properly and was unable to draw conclusions based on the results of the solution carried out.

4. Mathematical Problem Solving Ability of High Category Male Students (MR)

Male subjects with a high category can meet the indicators of understanding the problem. Subject MR is able to make picture illustrations based on questions and is able to write down information that is known and asked even though the subject MR is less careful so that there is information that is not written on the answer sheet but is able to mention the information completely when interviewed.

MR subjects are able to plan problem solving well, are able to determine the steps that must be taken and what formulas must be used. MR subjects can also carry out problem solving well, completely and systematically based on the plan that has been prepared and MR subjects recheck the answers that have been obtained so that they are able to draw the right and correct conclusions.

5. Mathematical Problem Solving Ability of Male Students in the Medium Category (AS)

AS subjects are able to understand the questions very well, AS subjects are able to create picture illustrations based on the information obtained in the questions, and can write down any information that is known and asked in the questions correctly. AS subjects are also able to plan the steps and formulas that will be used to solve the problems given. AS subjects are also able to carry out the planned steps. However, AS subjects make several mistakes when calculating, resulting in incorrect solutions. AS subjects also tend to ignore rechecking the results of the answers.

6. Low Category of Male Students' Mathematical Problem Solving Ability

Based on the results of the data analysis, male subjects with low categories only met the indicator of understanding the problem. Subject FA was able to state the information contained in the question correctly and completely. Subject FA was unable to plan a solution to the existing problem, the subject wrote a formula but the formula that subject FA wrote was wrong so that subject FA was unable to solve the problem properly and was unable to draw conclusions based on the results of the solution carried out by subject FA also did not re-check the results that had been obtained.

7. Differences in Mathematical Problem Solving Abilities of Female and Male Students in Solving Pyramid Problems

Both female and male students in the high category have fulfilled all indicators of mathematical problem solving ability, namely indicators of understanding the problem, planning problem solving, implementing the problem plan and rechecking. However, there are differences in the processes that female and male students do. Female students tend to be neater and more careful than male students, female students read the questions several times so that no information is missed so that they can obtain a good, correct and complete solution, while male students only read the questions once then immediately

plan the solution and carry out their plan to solve the problem so that there is information that is missed which causes the solution given to be incomplete. Another difference between male and female students is that when faced with a problem, male students tend to translate the problem into a picture illustration, while female students only make a picture illustration if necessary. Both students also recheck all their answers so that there are no wrong answers.

Both female and male students in the moderate category have met the indicators of understanding the problem, but there are differences between female and male students, male students tend to translate the problem into picture illustrations to make it easier to solve the problem. However, female students only make illustrations when necessary. Both students are also able to plan problem solving and carry out the problem plan even though they make mistakes in doing mathematical calculations so that they get the wrong solution. Male students tend to rush in solving problems so that they make more mistakes compared to female students. Female and male students in the moderate category also tend to ignore rechecking the answers they have obtained even though in the completion process sometimes there are errors that are not realized.

Both female and male students in the low category have met the indicators of understanding the problem, but have not been able to plan the right solution to the problem. Female students are able to write a formula that matches the problem but are unable to plan the steps that must be taken to solve the problem properly. While male students are unable to plan the steps that must be taken to solve the problem and are unable to write a formula related to the problem given, The subject uses his own methods without any basis, so it seems careless in answering the question. Both students also made mistakes in performing mathematical operations and tended to ignore checking their answers.

CONCLUSION

There are differences between female and male students. Female students tend to be neater and more careful than male students so that no information in the questions is missed. In addition, male students tend to translate problems into picture illustrations more often so that it is easier for them to solve the questions, in contrast to female students who only make illustrations when necessary.

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