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Analysis of Mathematical Problem-Solving Ability on The Pythagoras' Theorem

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***Abstract*:**

Since mastery of problem-solving techniques is one of the main objectives of studying mathematics, such techniques are very important in the field of mathematical education. With the help of the Pythagorean theorem, the problem-solving skills of eighth-grade students will be assessed. SM Muhammadiyah 01 Field, Class VIII-1 Integrated Facilities, is the location of this research. This research uses qualitative research methodology. The instruments used in this study are four and ten-question model questionnaires labeled Highly Agree (SS), Agreed (S), and Disagreement (TS). This research resulted in high categories whose presentation scores reached 57 to 60 were obtained by 2 students, a medium category where its presentation ratings reached 35 to 46 was achieved by 21 students, and a low category where the presentation value reached 2 compared to 31 was achieved by 5 students.

Keywords: Ability to solve math problems, Pythagoras.

Introduction

Problem solving is a skill that requires a higher level of thinking ability and students must solve complex problems. Students must acquire the ability to solve mathematical problems as part of developing their mathematical skills. In learning mathematics, the ability to solve problems. According to Nurmutia (2019), mathematics is an important skill that students need to develop other mathematics skills, such as critical, creative, analytical, and analytical thinking. According to Stanic and Kilpatrick (Purnamasari, 2017:21), problem-solving is a process of solving problems that involve methods and abilities. The ability to solve problems, Uriah said independently (Wijayanti & Suendarti, 2020:244) is the ability to use previously learned knowledge in new situations that require sharper thinking. On the other hand, Nuralam quoted his Polya (Indrawati, Wahyudi, Ratu, 2014:19). Emphasizes that problem-solving is the process of finding a way out of problems and achieving goals that cannot be achieved immediately. As a result, problem solvers must do certain things to solve the problem, such as understanding the problem, creating a solution

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plan, and implementing, and reviewing the solution plan. The ability to use this method shows that a person can solve problems.

Mastering these problem-solving skills is important, so classroom learning should focus on helping students master these skills. However, the facts show that students' ability to solve mathematical problems is still weak. This has been confirmed by several studies, such as the International Student Study Assessment Program (PISA). The results of the PISA survey over the last twenty to fifteen years show that the overall mathematics reading skills of Indonesian students have decreased and even decreased compared to students in other Asian and Southeast Asian countries. The highest level (OCED, 2019:3). Often, students' difficulty in completing problem-solving depends on the way they apply the problem-solving procedure. Sennen, Ndiung, and Supardi (2016: 262) also found a similar thing where in solving mathematics problems students generally (a) misunderstood the problem; (b) incorrectly found relationships between concepts; (c) made mistakes in creating mathematical models; (d) solving problems incorrectly; and (e) incorrectly determining the final result. According to Mariani & Susanti (2019; 15), students' low problem-solving abilities indicate that something has not been optimal in the mathematics learning process carried out so far.

It is increasingly important to study the problems that cause weak problem-solving abilities in students and to improve these abilities. In this context, this research aims to explain the problems of problem-solving learning in junior high schools in mathematics learning and try to improve students' problem-solving abilities in junior high schools.

Research Methods

The purpose of this research is to find out how students perceive their ability to solve mathematical problems when they solve problems using the theorem Pythagoras. Therefore, this research is descriptive because it requires additional analysis that requires researchers to express their perspectives about students' abilities to solve mathematical problems from a problem-solving perspective.

Table 1. Assessment Rubric Ability Solution Problem

Rated aspect	Reaction to Issues / Concerns	Score
Understand That	No response at all	0
	More understand the problem and incorrectly wrote the known model/models . If not , you don't will understand it The same very .	3
	Fully understand the problem	4

Rated aspect	Reaction to Issues / Concerns	Score
Designing solution For problem the	Use the right model or formula to get the correct answer	4
	Uses the correct strategy or visual model, but the problem solving is incomplete or the answer is incorrect	2
	Give the correct solution steps	4
For overcome problem This	There is no solution at all	0
	Use the correct specific rules and correct results	4
	Apply a rule if a particular rule is correct, but the answer is incorrect or partially incorrect due to a miscalculation.	2
Check results resolution	Edited incorrectly conclusion or process review , or incorrect editing only conclusion or review process	1
	Got it explain questions and answers	4
	Can explain , but No exactly as said	2
	No Can explain the answer	0

This qualitative research investigates the mathematics subjects of dual education students in the 2022/2023 semester. This research involved 35 students. Mathematical problem solving ability tests and learning style questionnaires were two tools used by researchers in this research. In this research, the material from Theorem Pythagoras is used to test. Method Polya is used by researchers. as a reference for solving mathematical problems, by starting with understanding the problem, planning, implementing, and checking results. The results of the mathematical problem solving ability test always determine the research material. However, only 28 students from that class were present during the lesson. Data analysis is used to produce analyses related to the classification of students' mathematical problem solving abilities. This analysis is carried out by testing problem-solving-based question sheets which have been adjusted to the problem indicators which will be calculated based on students' correct answers when solving the questions.

This qualitative research was conducted on mathematics subjects for dual education students in the 2022/2023 semester. 35 students were involved. Researchers used two tools in this research: a learning style questionnaire and a mathematical problem solving ability test. The material used for testing in this research is the Theorem material, Pythagoras. Researchers use Polya's steps as a reference for solving mathematical problems, starting from understanding the problem, planning, implementing the plan, and checking the answer. Descriptions of research material are always based on the results of mathematical problem solving ability tests.

The research began by asking students about the research subject. Then a questionnaire was carried out. After collecting all students' answers, the researcher reviewed their answers and grouped them into categories of their mathematical problem solving ability: high, medium, and low. After that, the data is reduced, presented, and conclusions are drawn.

Results and Discussions

The results of the test for students' mathematical solving abilities with a total of 28 students are as follows:

Table 1 . Categorization of Problem-Solving Abilities

Category	Value Interval	Number of students
Tall	$57 \leq Hasil\ Tes \leq 60$	2
Currently	$35 \leq Hasil\ Tes \leq 46$	21
Low	2 Test Results ≤ 31	5

From Table 1, the test results of 28 students show that 2 students have high mathematical problem-solving abilities, 21 students have moderate mathematical problem-solving abilities, and 5 students have low mathematical problem-solving abilities.

Below there are 2 PN students in the high category, 2 elementary school students in the medium category 1, and 5 RN students in the low category who solved the theorem questions. Pythagoras results of a test tool for students' mathematical solving abilities. Describe the data for indicators 1, 2, and 3, namely written descriptions and pictures of mathematical ideas.

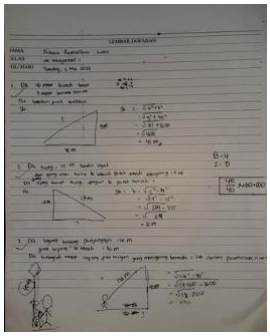

Figure 1. Test Results High Capability (TG)

From Figure 1 it can be seen answer respondents are in class tall reviewed from ability solution problem mathematical. From the picture seen students requested to explain mathematical ideas Good in word form or picture. From the picture the seen that target audience can fulfil existing metrics. Index 1 allows you to write what you learn from the question and Index 2 also allows you to write what you want to hear from question the. Indicator 3 also allows you to complete questions, including a description of the problem. With the finish, every about, TG subject will capable understand picture or questions given and capable in a way independent decide which formula will implemented To get correct answer.

It turns out TG's subjects are very advanced in mathematics, and he is capable enter and explaining the theory and formula-relevant mathematics For solution problems. This matter is based on research by Rosdiana (2021) who discovered that students who have ability good mathematics capable write and explain draft mathematics, as well as underlying formulas answer them, so they can understand the concepts used in mathematics. by eye TG lessons, got it said capable describe and write draft mathematics.

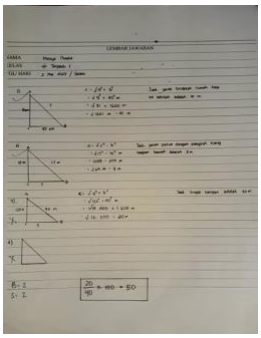

Figure 2. Test Results Medium Ability (SD)

Figure 2 shows the results of subject tests with intermediate-level mathematics problem solving abilities. As can be seen from the picture, students are asked to explain mathematical ideas both in writing and in pictures. From these pictures, examiners can fill in the existing indicators, but only a few can write down their

learning from the questions using pictures for indicator 1 and not for indicator 2. It turns out I couldn't write it down. We want to ask Ask in such a way that elementary school subjects can only determine the formula contained in index 3.

To show that subjects who have moderate mathematical solving abilities can combine and explain theories using correct formulas when solving problems, the elementary school subject was given a series of questions that he could not simply answer because he did not know them. Just a question, he has number 3 and number 4.

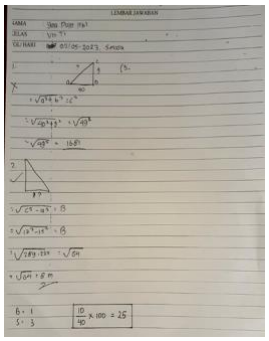

Figure 3. Test Results Ability Low (RN)

Figure 3 shows the results test eye lessons that show ability solution problem lack of mathematics Good. The student requested To explain draft mathematics in a way written or through image, as shown in the illustration. Subject No can fulfill the metrics listed in the figure. Indicators 1 and 2 do not write what is a known question. Use problem certain, index 3 can be finished known formula.

This matter shows that capable RN subjects are Not capable of entering and explaining theory and formula-correct mathematics in solution problems. This matter by study Rosdiana (2021) that students with low ability in mathematics low No capable write and explaining concepts and formulas in mathematics. There is a possibility that RN subjects did not explain draft mathematics with words or illustrations.

Conclusions and Suggestions

The results show that students at SMP Muhammadiyah 01 Medan have different abilities in communicating and solving mathematical problems. Students from upper, middle, and lower classes have different abilities in solving mathematical problems. Students who excel can interpret ideas from questions, apply problem-solving correctly, and draw conclusions or final results from tasks that are completed correctly. Intermediate students can interpret thoughts and ideas from problems and solve problems correctly. However, this answer is wrong because the student lacks detail regarding the conclusion or final result of solving the problem he is working on. Students in lower grades can interpret thoughts or ideas from questions, but they do not know how to apply solutions to a problem.

The results of this research can be used as a reference for further research on learning design. By choosing a learning approach that can be adapted to the problems faced by students in junior high school (SMP), this research can be used to make recommendations. The research results and conclusions show that teachers can help students solve mathematical problems by asking different questions.

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