ANALYSIS OF MATHEMATICS PROBLEM SOLVING ABILITY IN ELEMENTARY SCHOOL HOTS PROBLEM SOLVING

Siti Nur Isnaini¹, Nadra Hafizah², Yanti Fitria³

¹,² Pendidikan Dasar, Universitas Negeri Padang
Email: sitinurisnaini@student.unp.ac.id
Email: hafizahnadra@student.unp.ac.id
³ Universitas Negeri Padang
Email: yantifitria@fip.unp.ac.id

Abstract
The purpose of this study is to describe students’ mathematical problem-solving abilities when answering HOTS questions on the material scale. The research method is descriptive, qualitative, and quantitative. The subjects of this study were students, namely 32 students of SD Negeri 36 Payakumbuh who had been taught scale material. The data collected are the written responses of the students as well as the results of student interviews. Problem-solving ability is measured by referring to the indicators of the National Council of Teachers of Mathematics (NCTM). From the results of the written answer data analysis, the researcher determined 6 research subjects, namely 2 subjects each belonging to the upper, middle, and lower groups. The results of this study indicate the ability of group problem solving to be able to understand the problem and choose the right, systematic strategy. Middle-class problem-solving ability is defined as the ability to understand the problem, select the best strategy, and not be methodical. Lower-class problem-solving ability: unable to understand the problem, unable to choose the right strategy, and not systematic in solving the problem.

Keywords: problem-solving ability, HOTS, mathematics.

INTRODUCTION

The main reason for the importance of mathematics is that the ability of students to learn mathematics is the foundation and basic vehicle, which is an absolute requirement that must be mastered in order to be able to train students to think clearly, logically, systematically, and creatively, as well as have the personality and skills to solve problems in everyday life (Tanjung, 2018). Problem solving is the process of figuring out how to overcome a problem or question that is challenging in nature and cannot be solved by routine procedures that are commonly done or known (Indarwati et al., 2014). Problem-solving ability can be said to be a basic skill or life skill that must be possessed because every human being must be able to solve his own problems (Yustianingsih et al., 2017). This is consistent with the characteristics of the skills of 21st century society published by the Partnership of 21st Century Skills which identify that learners in the 21st century must be able to develop the competitive skills needed in the 21st century which focus on developing Higher Order Thinking Skills, such as: critical thinking, problem solving, communication skills, ICT literacy, information and communication technology (ICT, information and communication technology), information literacy, and media literacy (Wahid & Karimah, 2018).

Problem-solving ability is one of the goals of learning mathematics at school, namely to train ways of thinking and reasoning in drawing conclusions, develop problem-solving skills, and develop the ability to convey information or communicate ideas through speech, writing, pictures, graphs, maps, diagrams, and so on (Sumartini, 2016). Problem-solving abilities support a person's creativity, namely the ability to think critically and create new ideas, both original ones of their own creation and modifications of various pre-existing ideas (Monti et al., 2003).
Students' critical thinking skills are very important to be developed in schools, and teachers are expected to be able to create learning that can activate and develop students' critical thinking skills. The ability to think critically allows one to study problems faced systematically, face various challenges in an organized way, formulate innovative questions, and design original solutions (Happy & Widjajanti, 2014). Critical thinking skills can be improved through learning activities that encourage students to be active in seeking information from various sources, explaining information and situations encountered, finding appropriate solutions when faced with problems, and assessing and being responsible for all actions taken. Students' mathematical problem-solving abilities can be seen from the flow of students when solving problems (Tanjung, 2018).

Problem-based learning begins with presenting contextual problems to understand concepts and master all other mathematical abilities; students not only receive information but also participate in building extensive and detailed knowledge (Mulyana & Sumarmo, 2015). Problem-based learning objectives were developed to help students develop thinking skills, problem solving skills, and intellectual skills (Alan & Afriansyah, 2017). In problem-based learning, students start learning with the problems given so that they can think and have ideas to solve problems, which they then construct as new knowledge (Asmara, 2016). When students are solving math problems, they are faced with several challenges, such as difficulties in understanding the questions because the problems they face are not problems they have faced before (Cahyani & Setyawati, 2016). Higher Order Thinking Skills (HOTS) questions are one type of mathematical problem that necessitates problem-solving abilities.

Higher Order Thinking Skills (HOTS) are students' thinking skills in obtaining new information stored in their memory, then connecting and conveying it for the intended purpose (Wahid & Karimah, 2018). HOTS can be interpreted as the ability to process complex thinking that includes analyzing material, criticizing, and creating solutions to problems (Saraswati & Agustika, 2020). With high-order thinking, students will be able to distinguish ideas or concepts clearly, argue well, solve problems, construct explanations, hypothesize, and understand complex things more clearly (Dinni, 2018). In general, the purpose of this study was to determine students' mathematical problem-solving abilities in solving HOTS questions in elementary schools. Based on the background above, this research was carried out and is entitled "Analysis of Mathematics Problem Solving Ability in Elementary School HOTS Problem Solving".

METHOD

This type of research is qualitative and aims to determine students' mathematical problem-solving abilities in solving HOTS questions in elementary schools. This research was conducted in Class V of SD Negeri 36 Payakumbuh in the 2022/2023 academic year. In taking research subjects using the purposive sampling technique, namely, the researcher determines the research subject with considerations such as determining special characteristics that are in accordance with the research objectives. The subjects of this study were students, namely 32 students of SD Negeri 36 Payakumbuh who had been taught scale material. Written responses and student interviews were used to collect data. The determination of research subjects is based on the ranking of students in problem-solving skills on HOTS questions. The test results form the basis for grouping students into 3 categories: good ability, middle ability, and poor ability. The subjects of this study consisted of 2 students from the good ability group, 2 students from the middle ability group, and 2 students from the poor ability group, each of whom had the best ability of the group.

The instruments used in this study were documentation, tests, and interviews. In this study, qualitative data analysis was used to describe students' ability to solve mathematical problem solving on HOTS questions, the causes of student errors in problem solving on HOTS questions, and the characteristics of students in problem solving on HOTS questions.
RESULT AND DISCUSSION

Result

Scales are the learning materials that have been discussed. The implementation of the learning process is based on the lesson plan that has been prepared. In the learning process, researchers use the media HOTS question sheets, answer sheets, map pictures, thread to measure distances on maps, and laptops to find the information students need. The use of media can help students understand and solve complex problems. The researcher created HOTS questions so that students could discuss and explore their knowledge in order to figure out how to solve scale problems on their own.

Before beginning the trial, create HOTS questions that will be discussed and a solution must be found. The problem solved by V-class students is in a letter. The letter contains a problem that requires a solution. The problems that must be resolved:

Letter from Mrs. Nadra

I am Mrs. Nadra; I am a friend of Mrs. Isna. I live in Paraiaman. The plan for the semester break is that later I will take a trip to the city of Payakumbuh. I plan to ride a motorcycle. My motorcycle is an N-Max. But I have some confusion. Can you help me? I’d like to know how much it would cost to ride a motorcycle from Paraiaman City to Payakumbuh City one way. How much do I have to spend to buy fuel oil? I'm waiting for your help, and hopefully in December we can meet. Thank you for the help. I'm waiting for the answer.

After students read and analyze the contents of the letter, they are assisted by the teacher to find out what is known from the letter. Students are helped to stimulate their thinking about solving problems and finding solutions by asking several questions.

The test was given to all students, and then the data was analyzed. After checking the answer sheets, the lowest scores, highest scores, and average scores were obtained. The highest value is 100, the lowest is 30, and the average is 83.50. Of the 32 students, there were 11 good ability, 10 middle-middle ability, and 11 poor ability. Furthermore, researchers conducted interviews with research subjects. The interview was recorded using an audio recorder. The research subjects interviewed were 2 students from the good ability group, 2 students from the middle ability group, and 2 students from the poor ability.

1. Students from the good ability group

Figure 1. The results of the students' answers in the good ability group
Students have written down what is known and asked. The answers given are complete, clear, and correct. In solving problems, students can deduce the intent of the problem, compile steps for completion, and find the information needed to solve the problem themselves. Furthermore, students can determine the costs required in the HOTS questions, so that students can be said to be able to solve problems. Based on the interview results, students have understood the problem well. This was evidenced by students who were able to explain the purpose of the questions. In explaining the completion process again, students are able to choose the right strategy and do it correctly and systematically. In solving problems, students experience problems. Based on the data obtained through written tests and interview results, students were able to understand the problem well by writing down what was known and what was asked. In the process of solving problems, students use the right formula. Similarly, the calculations are done correctly.

2. Students from the middle ability group

**Figure 2.** The results of the answers of students in the middle ability group

Students have written down what is known and asked. The formulas and strategies used by students are correct, and the answers they produce are correct. However, the process of solving the problem is not clear and complete. In solving problems, students immediately conclude and give answers without explaining the steps for solving them. Furthermore, the questions allow students to calculate the costs required. Even though the problem-solving process is incomplete, students can be said to be capable of solving problems on HOTS questions.

Based on the results of the interviews, students have understood the questions well. This was evidenced by students who were able to explain the purpose of the questions. In explaining the completion process again, students are able to choose the right formula, and the calculations are also correct, so that the answers produced are correct. In solving the problems, students did not experience significant obstacles.

Based on the data obtained through written tests and interview results, students were able to understand the problem well by writing down what was known and what was asked. In the process of solving problems, students use the right formulas and strategies. The resulting answers are correct even though the problem-solving process presented is not clear and complete.
3. Students from the poor ability group

Figure 3. The results of the answers of students in the poor ability group

Students have written down the answers and solutions asked. However, students did not write down the strategies and steps to solve them. So that the resulting answer is also not quite right. So that students can be said to have not been able to solve HOTS problem solving properly.

Based on the results of the interviews, they were not able to understand the questions properly. Evidenced by students who have not been able to explain the purpose of the questions with pictures. In explaining the process of solving the problem again, students are not able to choose the right formula and strategy so that the answers produced are not quite right. In solving HOTS questions students experience problems in providing problem solving solutions.

Based on the data obtained through written tests and interview results, students have not been able to understand the problem properly. In the process of solving problems, the formulas and strategies used by students are not quite right so that the answers produced are not correct.

Discussion

In learning, researchers solve problems about higher-order thinking skills (HOTS). The researcher presented the problems, and then the students were grouped into several groups to discuss solving the problems presented. During the discussion, students are actively involved in discussing problems. They work together in groups to solve problems. Students discuss steps to take to solve the problem given regarding the scale material and find the information needed to solve the problem themselves. However, there is a deficiency in the discussion, namely that there are students who only depend on other group members to work on the questions. In addition, when the discussion time was up, there were still groups that had not solved the problem on the answer sheet.

In the stages of problem-based learning, students are allowed to discuss it to find key words in the problem. The teacher helps students reconcept by asking questions and formulating conjectures and analyses. Then students either individually or in small groups determine the problems they want to solve, the desired results, and formulate problems that are meaningful and relevant to the topic. Then the students solve the problem and are ready to display their work. At the end of the activity, students analyze, evaluate, and reflect on the processes and results of their work.

On the indicators of solving problems that arise in mathematics or in other contexts involving mathematics, the upper group shows that students are able to understand the questions well, students are able to choose the right strategy, and problem solving is carried out systematically. Whereas in the middle and lower groups, it showed that students were not able to understand the problem properly, they were not able to choose the right strategy, and problem solving was not systematic.
In the indicator of building new mathematical knowledge through problem solving, the upper group shows that students are able to understand problems well, but they are not able to choose the right strategy, and the problem-solving process is not systematic. While the middle and lower groups showed students were unable to understand the problem properly, they were unable to choose the right strategy, and the process of solving problems was not carried out systematically.

In the indicators of monitoring and reflecting on the process of solving mathematical problems, the upper group shows that students are able to understand problems well, are able to choose the right strategy, and that the process of solving problems is carried out systematically. The middle group shows students are able to understand the problem well and are able to choose the right strategy, but the problem-solving process is not systematic. While the lower group shows students are not able to understand the problem properly, they are not able to choose the right strategy, and the problem-solving process is not systematic.

CONCLUSIONS AND SUGGESTIONS

The results of the data analysis of HOTS problem solving abilities on indicators of applying and adapting various approaches and strategies to solve problems, the upper and middle groups show students are able to understand problems well, students are able to choose the right strategy, and the problem solving process is carried out systematically. However, students are only able to solve problems in one way. While the lower group shows students are able to understand the problem well and students are able to choose the right strategy. However, the problem solving process is not systematic and students are only able to solve it in one way.

REFERRERENCES


Saraswati, P. M. S., & Agustika, G. N. S. (2020). Kemampuan Berpikir Tingkat Tinggi Dalam


