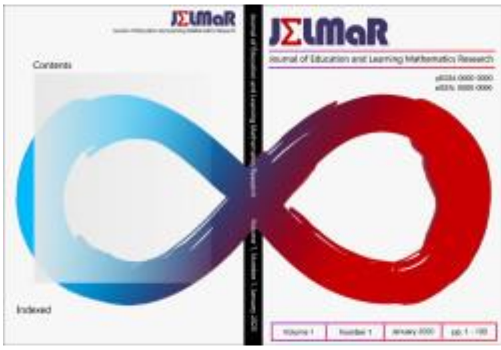

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Mathematics Problem-Solving Ability Of Elementary School Students In Solving Hots Type Of Mathematics Problems

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***Abstract**: Students should be trained to solve problems in mathematics so that they can do so in their studies also so that they can solve problems in their everyday lives, especially mathematical ones, with ease. This study aimed to learn how well students in grade five at SDN 26 in Rejang Lebong solved mathematical problems requiring higher-level critical thinking (HOTS). This study is an example of content analysis as a type of qualitative descriptive research. Students from Class 26 at VA SDN SDN in Rejang Lebong comprise the research sample. Testing members are used for data collection. The test questions are five multiple-choice HOTS problems. Research findings demonstrate students' varying abilities to solve arithmetic problems. The students have a good grasp of the issues from the perspective of problem understanding. Students aren't fully utilizing concepts and procedures while analyzing problems and developing solutions with mathematical tools, which is an issue with regard to problem-solving planning. Students have not fully written solutions to problems from both the planning and implementation perspectives, and from the perspective of looking back at previous solutions, they have not written those solutions down either.*

Keywords: Education Mathematics, HOTS, Problem Solving Skills.

INTRODUCTION

Mathematics is an important part of human life, especially in solving daily problems. Mathematics teaches students to think logically, critically, analytically, methodically, and creatively. Math helps develop logical, systematic, and critical thinking skills (Sulistiani & Masrukan, 2016). Mathematics is a subject that is best learned by applying it to real-world situations so that knowledge isn't only theoretical. Mathematics opens up career opportunities for a student who can master it. Mathematics helps citizens make good decisions. Mathematics can help a country's citizens compete economically (Ba'diah, 2017).

Improved student abilities in all areas of learning are highlighted by mathematics, especially in the area of problem-solving. Problem-solving is an educational goal that expects students to recognize a problem, formulate a plan for resolving it, put that plan into action, evaluate the effectiveness of their solution, and adjust their approach as necessary. Problem-solving skills encompass a wide range of abilities, from identification to the ability to locate, evaluate, sort, and weigh various options and pieces of data. Each person needs to be able to look in different places for answers in order to solve complex problems.

One of the primary goals of studying mathematics is to improve one's problem-solving abilities. Students need problem-solving skills to be globally competitive, to grow in self-confidence, to value and incorporate the perspectives of others when making decisions, and to think about issues from a variety of angles (Aka *et al.*, 2010; Ellison, 2009;

Temel, 2015). Problem-solving as a process is an activity that places greater emphasis on the procedure, the steps taken by students to solve a problem, and the strategies they use in order to find a solution rather than simply on the solution itself. (Sumartini, 2018). Moreno (Dewi, 2017) Problem solving involves identifying a problem, developing hypotheses for how to address it, testing those hypotheses, and selecting the most promising alternative. A good problem solver will identify the nature of the problem, the obstacles that must be overcome in order to solve it, and the likelihood that any proposed solutions will be effective. Problem solvers typically test out the first solution that comes to mind when confronted with an issue, but when faced with a more complex problem, the best problem solvers are able to prioritize solutions and compare their relative effectiveness.

Menurut NCTM (2000) mathematical thinking is taught through five core competencies: problem-solving, proof-writing, establishing and maintaining connections, communicating ideas, and representing concepts. (Hesti dan Styowati, 2016). In Indonesia, there are still five areas of mathematical thinking that have not been fully developed. The 2015 Trends in International Mathematics and Science Study (TIMSS) results show that Indonesian students' mathematical performance ranks 44th out of 49 countries with a score of 397 (Mullis et al., 2016). Kementrian Pendidikan Dan Kebudayaan Balitbang Pusat Penilaian Pendidikan (2019) data shows that 77.13 percent of Indonesian students' mathematical abilities fall into the "low" category, while 20.58 percent are in the "adequate" category, and 2.29 percent are in the "good" category. The results show that many students still fall into the lowest math category, which means that many students still struggle to solve mathematical problems.

Students' low math scores can be traced back to their inability to solve problems of a more complex nature, which typically appear in higher-level tests (Pratiwi, 2019). Widana (2017) states that activities including critical thinking, evaluation, and creativity are necessary for addressing students' academic difficulties. This represents a concrete example of the refinement of grading standards that take into account the cognitive level established by Anderson and Krathwohl in their revision of Bloom's taxonomy. Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS) are the two categories into which the Revised Taxonomy of Bloom divides the thinking process (HOTS). Students in the 2013 academic year should be able to solve problems by using critical thinking and high-level reasoning skills taught in the curriculum. Applying high-level thinking problems is the most effective method of improving students' critical thinking skills and problem-solving abilities (Rapih & Sutaryadi, 2018).

Students are given the opportunity to hone their critical thinking, creativity, and problem-solving skills by working on HOTS-type problems, which require them to think at a higher cognitive level (C4-C6) and incorporate oral communication skills. As a form of assessment, HOTS-style questions are useful since they are grounded in everyday phenomena while also focusing on contextual problems that arise in various spheres of life and providing training opportunities for students (Suyitno, 2013). In this study, we tested students' abilities to solve math problems by analyzing their solutions to HOTS-type problems. The purpose of this study is to analyze students' abilities to solve problems in HOTS-style mathematics.

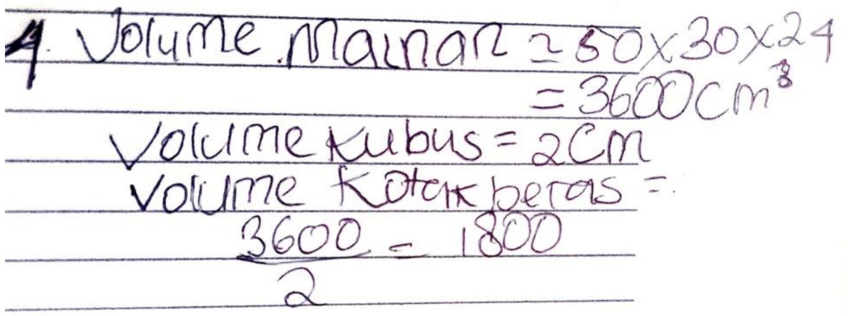
METHOD

This study employed a descriptive quantitative research strategy. In this study, we opted for a content-analysis research design. Content analysis is the study of a text in order to draw conclusions about it based on its context or the issues it addresses (Ahmad, 2018). In this survey, students from Class V at SDN 26 Rejang Lebong were assigned the survey's subject. The students' work output is converted into a Tes format and used as a data collection technique. This research documentation includes both teacher-approved HOTS-style mathematics questions and student work samples. Researchers determine a metric for measuring the solver's proficiency with mathematical problems in order to do the aforementioned analysis of the document. Researchers then created written tests with teacher-created HOTS-style mathematics questions and analyzed student performance. The research tools used in this study are HOTS-based uranium-based tests. For this study, we used descriptive quantitative analysis by adapting Miles and Huberman's methodology. Data reduction, data display, and data conclusion drawing/verification are all activities involved in data analysis. Students' test responses will be analyzed using statistical methods developed by academics.

RESULT AND DISCUSSION

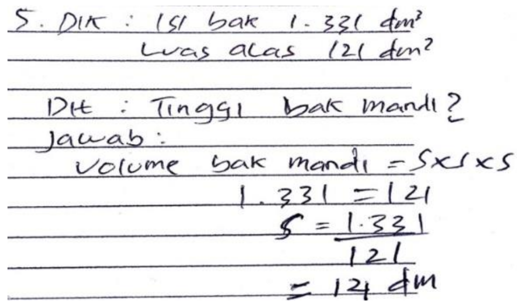
This study analyzes the results of students' work on mathematics homework assignments from a sample of three students. Data analysis was performed by classifying students' answers according to their problem-solving prowess in mathematics (NCTM, 2000). Afterward, students' answers are evaluated using a modified version of a grading rubric for problem-solving skills in mathematics.

Here is an example of how student number one solved the problem depicted in Figure 1.



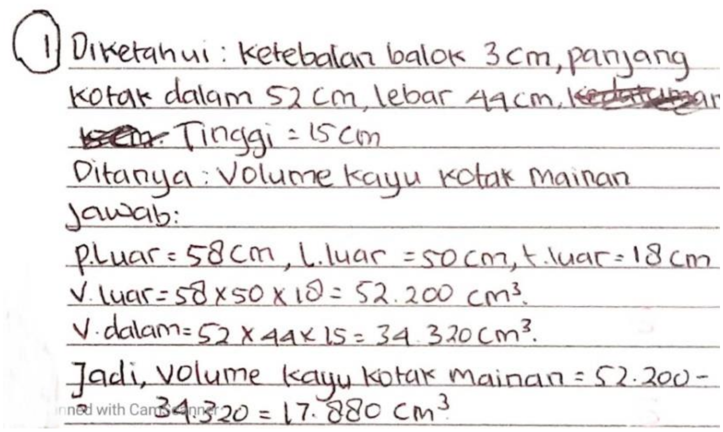
Examples of Students' Solutions to Problems 1

In Figure 1, we can see that Student 1 is able to recognize unknowns that are known, unknowns that are asked about, and unknowns that are lacking but is unable to write them down. Student 1 is able to conceptualize mathematical problems but struggles to apply solutions due to insufficient calculational sophistication. One of the students is unable to explain the root of the problem again. These findings are in line with prior research (Abdiyani et al., 2019) findings that indicate student 1 is unable to effectively apply problem-solving techniques such as analysis of the situation, formulation of a solution strategy, implementation of the strategy, and evaluation of the outcome show that the student is unable to effectively apply these techniques. After that, we'll look at how student 2 solved the problem by pressing button 5 in Figure 2.



Examples of Students' Solutions to Problems 2

In Figure 2, it is clear that the second-year students have the necessary knowledge and skills to correctly identify the resources they have been taught about, those they have been asked to research, and those they will need in order to solve the problem, all while using terminology that is appropriate to the situation at hand. So that they can find the best solution to a math problem, student number two might brainstorm several approaches by creating a proposal. This is evidenced by Student 2's written results, which successfully incorporate the relevant facts into the predetermined logical framework. Student 2 can explain the outcome of the problem-solving process but will not provide a detailed outline. And now, here is a sample of how student 3 solved the problem with button 1 by referring to the diagram on page 3.



Examples of Students' Solutions to Problems 2

As can be seen in Figure 3, Student 3 engages in problem-solving processes and is able to present them in written form using mathematical language, including the concepts they have learned and questions they have asked, as well as the arithmetic skills necessary to solve the problems they have encountered. Third-year students can think strategically by simplifying the problem and recording their findings in writing using their own words. Third-year students are able to apply strategies to solve problems by fitting information into hypotheses that have been established in a logical and accurate manner. Third-year students can report on the outcomes of their problem-solving efforts and their evaluation of their work in light of the original issues. Research findings in this area are consistent with previous studies (Hidayat & Sariningsih, 2018) that Grade Three Students Can Implement All Four Steps Necessary to Solve a Problem: Identify the Problem, Create a Plan to Solve the Problem, Implement the Plan to Solve the Problem; Evaluate the Plan's Success; and Draw Conclusions about the Problem's Resolution. Research Findings (Widyastuti, 2015) demonstrate that student 3 engaged in the assimilation thinking process at the stages of problem understanding, solution creation, problem resolution, and result evaluation.

From this data, we may conclude that Students in Categories 1, 2, and 3 have significantly different Problem-Solving Abilities. Those with A.Q. 2 or 3 have the ability to complete all steps in the problem-solving process, while students with A.Q. 1 are only able to complete the first three. The differences between students in grades three and four are not huge. For example, students in grade three can solve all the steps in the problem-solving process, but in grade four, they can only solve the problem in a piecemeal fashion. The differences between Students 1, 2, and 3 are presented in a tabular format below Tabel 3.

Table 3. Differences in Problem-Solving Abilities Students One, Two, and Three

Indicator	Students		
	1	2	3
Locating the resources you already know about, know how to ask for, and know what you need in relation to cubes and blocks.	It's possible, but I can't write it down in my own language, 's kalimat.	Capable and able to write	Capable and able to write
Problems involving cubes and blocks are discussed in order to determine possible solutions.	able to ponder issue at hand	able to ponder issue at hand	able to ponder the issue at hand
Implement effective methods for resolving issues related cubes and blocks volumes in everyday life.	Because of insufficient precision in calculations, poorly conceived strategies cannot be put into practice.	able to put into action strategies that have been discussed	able to put into action strategies that have been discussed
Provide an explanation or interpretation of the resolutions to problems involving cubes and blocks in everyday life.	Not able to provide a root-cause explanation for problems that have already been addressed	Capable of Reiterating Originary Problem Clarification but Lacking Detailed Outline	Capable of returning to root problems and providing detailed solutions

It is clear from Table 3 that each student has different problem-solving abilities. Student 1 can recognize unknowns that are known, unknowns that are asked about, and unknown unknowns that are needed but cannot write them down in their own words. The first-year student can think about mathematical problems, but she lacks the expertise to use a solution strategy in order to solve them. Student 1 is similarly unable to provide a root-cause explanation.

Students in the second year are able to correctly use their own terminology within the context of a given problem, identifying unknowns that have already been taught, those that have been asked about, and those that are still unknown to them. The second-year students can think strategically by creating a example and then use that to choose the best solution to the math problems they're facing. The written results of the second-year student who was able to successfully incorporate the data into the predetermined logical structure show that the second-year student had successfully applied the strategy necessary to solve the problem. Student 2 can explain the outcome of the problem-solving process but will not provide a detailed outline.

Third-year students engage in problem-solving processes and provide their findings in written form using mathematical jargon. This includes information on the concepts they've learned and questions they've asked, as well as the requisite arithmetic knowledge and skills. Third-year students can formulate plans by simplifying complex problems with their own words. Third-year students are able to apply strategies for solving problems by fitting information into hypotheses that have been determined in a rigorous and accurate manner. Third-year students may explain the outcomes of their problem-solving efforts and evaluate their work in light of the original challenges they faced.

CONCLUSION

Based on the discussion above, using HOTS-type math problems in math instruction can help students develop problem-solving skills. However, there is still insufficient and ineffective problem-solving; as a result, students' problem-solving abilities vary. Student 1 can recognize unknowns that are known, unknowns that are asked about, and unknown unknowns that are needed but cannot write them down in their own words. Students in the second year are able to correctly use their own terminology within the context of a given problem, identifying unknowns that have already been taught, those that have been asked about, and those that are still unknown to them. The third-year students have gone through the problem-solving process and are able to present their findings in the form of language mathematics writing, including a list of the concepts they've learned and questions they've asked about, as well as a breakdown of the essential concepts and their missing pieces.

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