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Students' Mathematical Problem-Solving Ability on Social Arithmetic Material

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Abstract
This study aims to describe the ability of elementary school students in solving mathematical problems on social arithmetic material. This study uses a descriptive method with a qualitative approach about how students' mathematical problem solving abilities correlate with how students reduce and present data. In this study, the research subjects were six grade VI students, which were grouped into students with high, medium and low ability categories. The instruments used in collecting data are questions and interviews. The data collected were analyzed using four stages of mathematical problem solving skills, namely understanding the problem, formulating a problem plan, solving problems, and reviewing. The results showed that 16.67% of students had high mathematical problem solving abilities, 50% of students had moderate or intermediate abilities in solving mathematical problems and 33.33% had low mathematical problem solving abilities. Based on the results of the study, it can be concluded that grade VI elementary school students in Karawang Regency have moderate mathematical problem solving abilities in solving social arithmetic problems.

INTRODUCTION

Mathematics plays an important role in everyday life because it develops everyone's way of thinking. Education is expected to be a way to increase community competitiveness and increase student creativity to solve future problems well (Hakim & Daniati, 2014). Therefore, *National Council of Teachers of Mathematics* (2000) has five standard math skills, including skills. Mathematical communication skills, mathematical reasoning skills, mathematical connection skills, mathematical representation skills, and problem solving skills. One of them is problem solving skills or problem solving to prepare students well for their mathematical abilities.

Mulyati (2016) shows that problem solving is a skill that must be mastered by students after learning mathematics. This skill is very important for students to solve problems in everyday life. Problem solvers must be able to identify problems, find relevant information and data, and collect, analyze, evaluate and reflect on the results (Ramadhani & Hakim, 2021). Cooney (1985) suggests that problem solving is done by guiding students to think analytically when making decisions about their daily lives. So having problem solving skills is just as important as being a starting point for everyone to build and develop new ideas that are inseparable from everyone's life (Hedriana & Soemarmo, 2019).

Polya (1957) John suggests that problem-solving skills have four phases: understanding the problem, planning a solution, solving the problem and reviewing it. Based on these stages, students will focus more on thinking about the results they will get from each existing problem. However, several studies reveal the fact that students' mathematical problem solving abilities are still not satisfactory. Problem solving in mathematics has provided difficulties and frustrations for a large number of students (Bluman, 2004; Sharp & Shih Dennis, 2017; Verschaffel & De Corte, 1993). This condition was revealed from several previous research results, including research conducted by Arta et al. (2020), Amaliah et al. (2019) Kristianto &

Rahayu (2020), Lestari et al. (2020), Nikmah et al. (2020), Psycharis & Kallia (2017), Saygılı (2017), Sejati & Koeswanti (2020), and Sintawati et al. (2020).

One of the school materials that students can use to practice math problem solving is social arithmetic. Social arithmetic itself is a learning concept that can often be used in everyday life. Zuliyana (2018) John said that everyone's activities cannot be separated from social computing activities in everyday life. Students are recognized for their mathematical problem solving skills when they are able to answer and solve problems related to social arithmetic material. Because social arithmetic material is one that requires a mature thought process to determine the outcome of a solution, such as when solving problems such as calculating the percentage of profit and loss. Therefore, social arithmetic can be considered as a suitable material to measure students' mathematical problem solving ability.

Based on the description of the background above, this study aims to explain the ability of grade VI elementary school students in solving math problems using the polya indicator to solve problems on social arithmetic data. Therefore, this study also describes and explores the ability of elementary school students in solving the mathematical problems presented.

METHODS

This study uses qualitative and descriptive methods. This study, among others, describes the mathematical problem solving skills that students get from solving problems on social arithmetic material (Sugiyono, 2020). It is intended to describe students' mathematical abilities in solving social arithmetic problems. The research was conducted in one of the elementary schools in Karawang district. The subjects of this study were students of class VI with a total of six students who were grouped according to the category of high, medium, and low math problem solving abilities.

This study shows the ability of elementary school students to solve mathematical problems by using test tools to solve social arithmetic problems. The test given consists of five control questions that explain social arithmetic material, which is taken from the work of Putri (2019). One example of the problem is "A goat trader buys a goat for Rp. 1,200,000 Goats are then sold for Rp. 1.750.000,- How much profit do you get?". The questions used have been declared valid and reliable so that they are worthy of being used as research instruments.

To determine students' ability to solve mathematical problems, the data analysis method consists of three steps to determine students' ability to solve mathematical problems. Namely, the results of the analysis of answers, presentation of the analyzed data and drawing conclusions. The survey was conducted in one of the elementary schools in Karawang district, and was attended by a total of six sixth grade students. The answers that will be represented in this study are then taken from one student in each of the highest, medium, and lowest categories based on indicators of ability in mathematical problem solving. The mathematical problem solving indicators used include problem understanding, solution planning, problem solving, and reviewing.

RESULTS AND DISCUSSION

This study provides an explanation of mathematical problem solving abilities. The ability to solve mathematical problems is measured based on the Polya indicator. That is, understanding the problem, planning a solution, solving and reviewing the problem. The scoring guide or category table is used according to the method proposed by Arikunto (2010) to categorize mathematical problem solving abilities. Below are the results of the percentage of students in the high, medium and low categories in terms of their ability to solve mathematical problems.

Table 1. Percentage of Mathematical Problem Solving Ability Criteria

Category	Value Criteria	Total students	Percentage
High	$X \geq 60,89$	1	16,67%
Medium	$12,87 \leq X < 60,89$	3	50%
Low	$X < 12,87$	2	33,33%
Total		6	100%

Based on Table 1, students with mathematical problem solving abilities are in the high category, only 1 person with a percentage of 16.67% for the interval 60.89 and above. There are three students with mathematical problem solving abilities in the medium category, with a percentage of 50% between values greater than or equal to 12.87 or less than 60.89. Not only students with high mathematical problem solving abilities and moderate categories, but there were two students in the low category with a percentage of 33.33%, the interval between scores was less than 12.87. The results of student work in solving description test questions related to mathematical problem solving abilities in social arithmetic material are as follows.

High Category

The results of students' answers in the high category were measured based on all indicators of mathematical problem solving abilities, which can be seen in Figure 1.

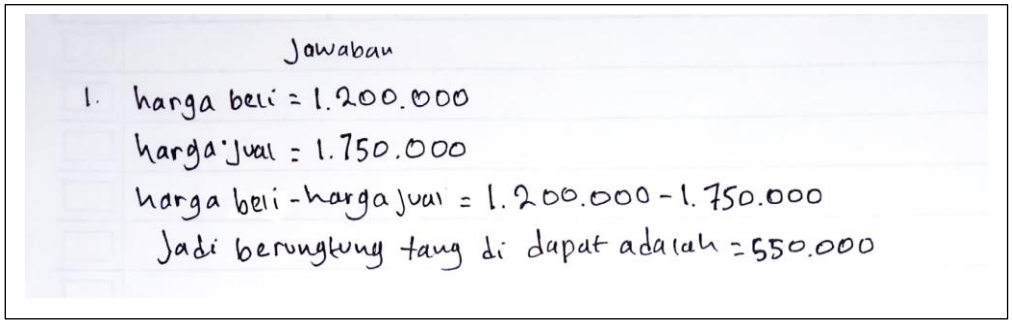

Figure 1. Answers of High Category Students

Based on the results of the answers that have been completed by students with high ability categories in question number 1 (see Figure 1), students are able to solve problem number 1 using the right steps and have been able to make a conclusion based on the problems given. However, in the first indicator, namely understanding the problem, students only write down the information where students determine the purchase price and selling price such as 1) purchase price = Rp. 1.200.000 and 2) selling price = Rp. 1,750,000, and does not include what is asked by the question, which is as asked: profit. Supposedly in solving a problem in mathematics, students must first understand and identify the elements that are known and asked and other information. This is in line with research conducted by Haryati & Warmi (2019) which shows a problem understanding level of as high as 25%, which is considered low because students often work on questions directly rather than writing down known and given items first. But in identifying questions with high categories, students have a better understanding of the models or strategies that must be used in solving problems, even if only with their own understanding.

Then in the second and third indicators, namely determining problem-solving plans and solving problems, students are able to write mathematical models that can be used to solve these problems, according to what they understand. Because plans or strategies must also be made in the form of mathematical models such as, "using calculations or arithmetic formulas regarding determining the amount of profit/profit, so the formula used is profit = selling price - purchase price". Students with high categories are able to develop plans or strategies correctly. Because the plan prepared is correct, it can be ascertained that the answers obtained are correct. Students may not really understand the mathematical calculation model, but students can already write down the model used to solve the problem because they already know how to solve the problem.

And on the fourth indicator, namely re-examination of the results obtained, students can draw conclusions based on the problems sought such as: so, the profit obtained is 550,000, based on re-checking the answers. This means that students with high categories have re-checked the concepts, procedures, and calculations used. This is in accordance with the research of Yuwono et al. (2018) dimana siswa dapat mengevaluasi informasi selama pada tahap pemerikasaan ulang dengan melihat where students can evaluate information during the re-examination stage by looking at deficiencies in the answers that are

applied. Thus, students with high category abilities can be said to understand the problem, even though they are still with their own understanding and can also draw conclusions.

Medium Category

The results of students' answers in the medium category were measured based on all indicators of mathematical problem solving abilities, which can be seen in Figure 2.

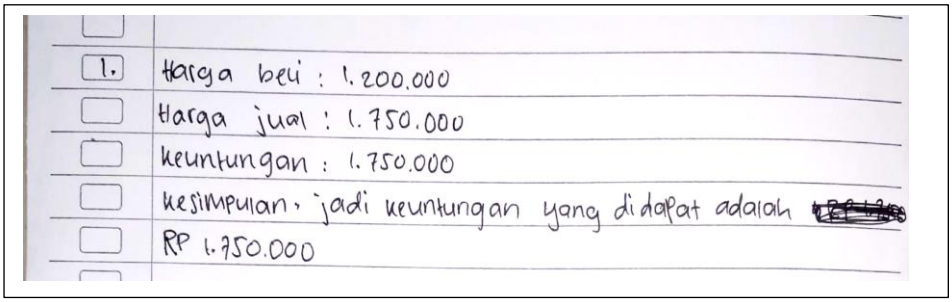

Figure 2. Students' Answers in Medium Category

Based on the results of the answers from the student's ability in the medium category, students have not been able to solve problem number 1 correctly (see Figure 2). There are still some shortcomings in the work carried out by students, but several indicators have been met, in the first indicator, namely understanding the problem, students only write down the information where students determine the purchase price and selling price such as purchase price = Rp. 1.200.000 and selling price = Rp. 1,750,000, and not including what the question asked, students only wrote profit = 1,750,000 and did not explain specifically what the statement meant. Where it should be in solving a problem in a mathematical problem, students must first understand and identify the elements that are known and asked and other information. Students cannot identify the problem correctly, because students have not fully mastered the arithmetic problems presented. Where the understanding of this problem will be closely related to the preparation of future plans because the information obtained by students will then be used to obtain solutions and concepts that are in accordance with the assigned tasks. Thus, it can be seen that there are still students who do not understand the problem in the problem-solving process (Ramadhani & Hakim, 2021).

Then for the second and third indicators, problem-solving and problem-solving plans, students can use models and strategies to solve them as needed. The results obtained are not in accordance with what was asked and asked, because students still make mistakes in preparing a settlement plan. The results obtained are not appropriate because students work with their understanding and do not describe or explain where the results come from. This is in line with the research of Bernard et al. (2018) evealed that the low percentage of student's ability to solve mathematical problems at the time of planning was due to the inability of students to apply the material in real conditions and create correct mathematical models. Then on the indicator of solving the problem, students still experience errors in identifying and making implementation plans. This affects the stages of problem-solving indicators and the results obtained are not as expected. One of the causes of students having difficulty in solving problems is because they do not provide the elements that are known and needed to understand the problem (Turrosifah & Hakim, 2019).

And for the fourth indicator, namely re-checking the results obtained, students did not re-check the results they made, and students did not draw conclusions when doing the work they were doing. Not re-checking, is in line with the research of Sulistiyorini & Setyaningsih (2016) where students have difficulty and cannot re-check their answers because they do not know how to re-check effectively, cannot manage time, and are slow in checking answers. This can be seen from the absence of conclusions, the procedures carried out are not checked, and other evidence is not used. Difficulty in drawing conclusions because students cannot form sentences that connect the information received, concepts, and responses (Ramadhani & Hakim, 2021). There is also no correct answer based on the analysis of the middle-class students, which means that the concepts, procedures and calculations used were not reviewed among the middle-class students. Students who find it difficult to consider relevant information from a question can result in

students not be able to draw the correct conclusion (Kurniasih & Hakim, 2019). This is also due to a lack of initiative or readiness of students, thus causing negative results in student responses. As a result, it can be said that students with moderate or intermediate category abilities are able to understand the problem, but cannot understand the models and strategies that will be used in the problem, so they cannot draw definite conclusions.

Low Category

The results of students' answers in the low category were measured based on all indicators of mathematical problem solving ability which can be seen in Figure 3.

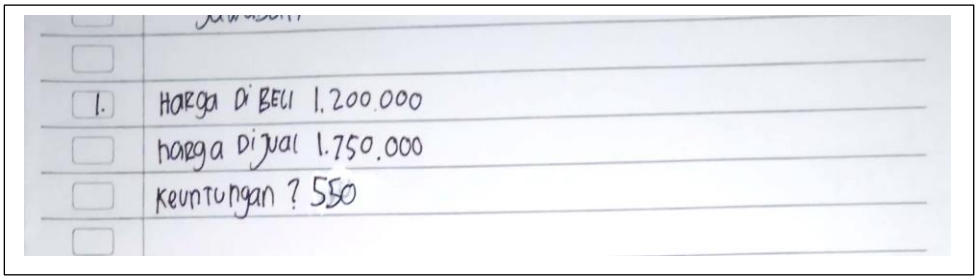

Figure 3. Low Category Student Answers

The first question is based on the answers that have been completed by students with low ability categories (see Figure 3). In the first indicator, namely understanding the problem according to what is written in the answer, students have not been able to identify the problem so they only write down simple information. Students also do not properly design a problem-solving plan to find a solution to the problem. Students must immediately write down the benefits accompanied by a "? " along with 550 without drawing conclusions and writing down the arithmetic operations specified in the problem. So that the second, third and fourth indicators in re-checking the problem are not met. Students in the low category cannot see the results of their work. This can be seen in the lack of drawing conclusions, the lack of validation of the procedures carried out, and the lack of use of other evidence by students. Difficulty in drawing conclusions because students cannot form sentences that connect the information received, concepts, and responses (Ramadhani & Hakim, 2021). There is also no correct answer based on the results of the analysis of low-level students, which means that the concepts, procedures, and calculations used are not re-examined by students in the low category. Students who find it difficult to consider relevant information from a question can result in students not be able to draw the correct conclusion (Kurniasih & Hakim, 2019). This is due to a lack of student initiative or desire, resulting in negative results for student responses.

Students with low abilities do not understand the problem, do not design and implement solutions, and are unable to conclude solutions from the truth of the answers. This is in accordance with research of Sumartini (2016) that 73% of students have relatively poor problem-solving skills. Meanwhile, according to Isnarto & Lestanti (2016), every student can gain an understanding of the process of solving problems and have the ability to identify situations and concepts that have relevance. Children have difficulty understanding and solving problems because students lack interest in learning mathematics and are not familiar with working on questions in the form of stories with problem-solving processes and indicator stages based on Polya.

CONCLUSION

students' ability to solve mathematical problems, it is known that there are still difficulties and errors in solving social math problems or social arithmetic. Students with mathematical problem-solving abilities are in the high category with a percentage of 16.67%, students in the medium category with a percentage of 50%, and students in the low category with a percentage of 33.33%. Based on the results of this study, it can be concluded that the mathematical problem-solving ability of elementary school students in the Karawang district to solve social math problems or social arithmetic is at a moderate or intermediate level. Therefore, to improve students' ability to solve mathematical problems, it is necessary to do proper teaching

by identifying the difficulties faced by students. Students also really need guidance and support from educators and teachers in the form of problem-solving guidance. Students should also be trained to look for other problem-solving methods as evidence of mathematical formulas and their impact and relation to everyday life.

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