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ANALYSIS OF MATHEMATICAL PROBLEM SOLVING ABILITY OF JUNIOR HIGH SCHOOL STUDENTS ON SPLDV MATERIAL

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ABSTRACT
This study aims to analyze the mathematical problem-solving ability of junior high school students in solving problems in the material of the two-variable linear equation system (SPLDV). This will obtain a description in the form of an overview of students in solving problems, namely understanding problems, making plans, completing plans, and rechecking. In this study, several subjects will be taken on three grade VIII students in one of the junior high schools in Subang Regency with high, medium, and low provisions. In this study, it is studied descriptively using a qualitative approach. Based on the results of this study, it was obtained that students with a high category could solve all indicators of problem-solving ability, students with a medium category could not complete one indicator of problem-solving ability, namely the step to solve the problem, then students with a low category could not complete three indicators, namely understanding the problem, making a plan and rechecking
Keywords: ability, problem-solving ability, SPLDV

ABSTRAK
Penelitian ini bertujuan untuk menganalisis kemampuan pemecahan masalah matematis pada siswa SMP dalam menyelesaikan soal pada materi sistem persamaan linier dua variabel (SPLDV) . Hal ini akan memperoleh deskripsi berupa gambaran siswa dalam melakukan pemecahan masalah yaitu memahami masalah, menyusun rencana, menyelesaikan rencana, dan memeriksa kembali. Pada artikel ini akan diambil beberapa subjek yang dilakukan pada tiga orang siswa kelas VIII di salah satu SMP di Kabupaten Subang dengan ketentuan tinggi, sedang, dan rendah. pada artikel ini dikaji secara deskriptif dengan menggunakan pendekatan kualitatif . berdasarkan hasil pada artikel ini diperoleh bahwa siswa dengan kategori tinggi dapat menyelesaikan semua indikator kemampuan pemecahan masalah, siswa dengan kategori sedang hanya menyelesaikan tiga indikator kemampuan pemecahan masalah dan siswa dengan kategori rendah hanya dapat menyelesaikan satu indikator kemampuan pemecahan masalah.
Key words: kemampuan, kemampuan pemecahan masalah, SPLDV

Introduction

Mathematics is a basic science that is needed to support the success of every level of education, starting from primary, secondary to tertiary education levels. In everyday life, there are various things that are found related to mathematics. One of the goals of mathematics learning is so that students have the ability to solve problems, make mathematical patterns, solve patterns and conclude solutions found. Comparable to this opinion, it states that one of the learning objectives of

learning mathematics is that students can solve problems which include the ability to understand problems, design mathematical models, solve models and interpret the solutions obtained. comparable to the previous opinion, according to Hamapinda et.al. (2021) This goal is very important to build new knowledge as well as develop ideas that students have in solving problems (Utami et al., 2023.) (Kamarullah, 2017)In line with Permendiknas Number 58 of 2014 that mathematics is universal that is useful for human life and also underlies the development of modern technology, as well as discipline and advances human thinking.

One of the mathematical skills that students must have is the ability to solve problems. The ability to solve mathematical problems is one of the basic skills that students must master because it is considered the heart of mathematics (Dwi Putra et al., 2018). Mathematical problem-solving skills refer to a person's efforts to achieve a goal because they do not have an automatic solution that can solve the problem. Comparable to the opinion states that mastery of mathematical problem-solving skills is very important for students to have because students can think logically and critically. A problem has a purpose, that is, what is tried to be obtained in the problem solver to achieve the goal (Suryani et al., 2020). This is in line with the opinion of Rambe & Afri (2020) that mathematical problem-solving ability is the ability of students to solve complex and non-routine problems, students can understand these complex problems and develop a problem-solving plan so that finally students can determine the solution to complex problems. As stated by Polya in Nuralam (Ristiana et al., 2015), problem solving is an effort to find a way out of a difficulty to achieve a goal that is not so easy to achieve. Problem solving, especially in story problems, requires steps in the process. (fadillah & Haerudin, 2022)

There are four steps to solve problems in mathematics according to Polya, namely a) understanding the problem; b) make a plan; c) implement the plan; and d) re-examine the results obtained. In the learning process, students often face problems in the form of problems related to the material, causing low mathematical problem-solving skills. Many students experience difficulties in solving mathematical problems for teaching and learning activities, as well as in the implementation of tasks. Students are sometimes lazy to solve problems due to the lack of knowledge they have to solve them. However, in its implementation, teachers have difficulty applying it, this is in line with Suryadi's opinion (Suraji et.al., 2018) stating that problem-solving skills are considered difficult in mathematics, both for students in learning it and for teachers in teaching it. This is in line with research conducted by Dwi Putra et al (2018) in one of the secondary schools in Cimahi obtained the result that the ability to solve mathematics was relatively low and got a percentage result of 58.82%, out of 34 students only 1 student could solve the problem well. (Lestari & Yudhanegara , 2015)

In line with the research conducted by Arlen Parulian et al (2019), a study conducted at one of the junior high schools in Karawang found that the level of mathematical problem-solving ability is still relatively low, this is because in the indicator of identifying the correctness of the solution, a percentage of 0% was obtained. The previous opinion was comparable to the research conducted by Rahayu & Aini (2021) stating that the student mathematical problem-solving ability test given to 7th grade junior high school students at one of the schools in Karawang on integer material was classified in the low category, because the results of the

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study showed that the percentage of students in the low category got a result of 27.78%, this resulted in students not reaching the minimum score (KKM).

Based on this background, that problem-solving skills are very important for students to have, this is because mathematical problem-solving skills require students to solve problems whose solutions require planning by relating the real world or daily life. One of the materials that can examine mathematical problem-solving skills is the material of the two-variable linear equation system. Based on this background, the researcher analyzed the mathematical problem-solving ability of junior high school students on the material of a two-variable linear equation system.

Research Methods

The approach taken in this study is a qualitative approach. Cresswell (Murdiyanto, 2020) defines a qualitative approach as a research and understanding process based on a methodology that investigates a social phenomenon and human problems.

In this study, the method used is a descriptive qualitative method. The purpose of this study is to determine the mathematical problem-solving ability of students who will be carried out in one of the State Junior High Schools in Subang district. The sample to be used in this study is 3 junior high school students in grade VIII, namely 1 student with high ability, 1 student with medium ability, and 1 student with low ability. The instrument used in this study is a 4-question mathematical problem-solving ability description test question regarding integer material by containing problem-solving indicators in each problem.

The data collection carried out in this study is by giving questions to each sample that is done individually, then the test results of each sample will be analyzed by the researcher with reference to the indicators of students' mathematical problem-solving ability which are categorized into high, medium, and low categories. The following categories of students' mathematical problem-solving skills are grouped based on criteria according to Arikunto (in Amila et al., 2023)

Table 1. Criteria for mathematical problem-solving ability

Capability categories	Score acquisition
Tall	$x > \bar{x} + s$
Keep	$\bar{x} - s \leq x \leq \bar{x} + s$
Low	$x < \bar{x} + s$

Based on Table 1, criteria for mathematical problem-solving ability. The following are the results of the validity of the problem-solving ability test instrument are presented in Table 2.

Table 2. Validation of mathematical problem-solving ability test instruments

Mathematical problem solving problems	r table	Calculate	Criterion	Interpretation
1	0,37	0,69	Valid	Keep
2		0,75	Valid	Tall
3		0,77	Valid	Tall
4		0,79	Valid	Tall

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Results and Discussion

The following data obtained from the results of the students' mathematical problem-solving ability test is presented in Table 3.

Table 3 Test Results on Students' Mathematical Problem Solving Ability

Number of students	Maximum value	Minimum value	Average	Standard deviation
27	80	15	49,3	17,25

Based on Table 3, the minimum score is 15, the maximum value is 80, then the average is 49.3 and the standard deviation is 17.25. To determine the category of mathematical problem-solving ability, students are grouped based on criteria according to Arikunto (in Amila et al., 2023), the following are the results of the percentage of high, medium, and low categories of mathematical problem-solving ability:

Table 4. Results of Percentage Criteria for Students' Mathematical Problem-Solving Ability

Category	Value Criteria	Number of students	Percentage
Tall	$67 - 100$	5	19%
Keep	$32 - 67$	17	63%
Low	< 32	5	19%
Total		27	100%

Based on Table 4, the criteria for categorizing students with a score of 67-100 get a high group, many students in the high category are 5 people with a total percentage of 19%. The category of students with a score of 32-67 is in the medium group with a large number of students in the medium category totaling 17 people with a total percentage of 19%. The category of students with a score of less than 32 is in a low indicator with the number of students in the low category amounting to 5 people with a percentage of 19%. After conducting a problem-solving ability test.

The instruments used in this study are mathematical problem-solving ability description test questions as many as 4 description test questions about SPLDV material by containing problem-solving ability indicators in each question. The data collection was carried out by giving questions to each sample that was done individually, then the test results of each sample were analyzed for each student's answers by the researcher with reference to the indicators of students' mathematical problem-solving abilities which were categorized into high, medium, and low categories. The following are the test questions given to students and the results of the answers of the three students:

1. **High Category Student Answer Results**
   The question that will be analyzed is about the number of portions of chicken noodles and meatballs. Where in the question it is known the sales turnover of the Bu Eneng stall and the price of chicken noodles and meatballs as well as the number of sales of chicken noodles and meatballs. Next, students will

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be asked to determine how many buyers order meatballs and chicken noodles.

Figure 1 of the student's answer sheet (high category)

Based on the picture of the answer sheet, students with high categories can understand the problem well, it is proven when students write down the information completely. Then for indicators to make a plan, students can write down a mathematical model and write what is known on the problem, namely how many buyers order meatballs and chicken noodles. In the indicator of completing the plan, students can complete the plan well, namely by substituting equation 1 to equation two so that the results of the problems that occur are obtained, namely the number of buyers who buy meatballs as many as 150 portions and the number of buyers who buy chicken noodles as many as 350 portions. Then for the indicator of re-checking, students can only give conclusions without re-checking the answers. Based on this analysis, it can be said that students can meet all indicators of problem-solving ability. This is in line with the research conducted by Bhayangkari et al (2020) saying that students do not write conclusions because they cannot solve the problems posed. This opinion is in line with research conducted by Sulistyoningsih & Setyaningsih (2016) stating that students' difficulties when looking back at the answer or on the indicator of checking the answer again, students do not know how to check the answer correctly, students cannot manage the time to work properly and students are lazy to check the answer. This is in line with the opinion that problem solving is the process of how to overcome a problem or statement that is challenging that cannot be solved with routine procedures that are usually carried out. (Wahyudi & Anugerahi, 2017)

The results of the students' answers in the medium category

The question that will be analyzed is about paying money to buy books and pencils. Where in the question it is known the number of buyers carried out by rahayu and melia. Then in the question it is asked how much 4 books and 2 pencils cost when the values of x and y have been determined .

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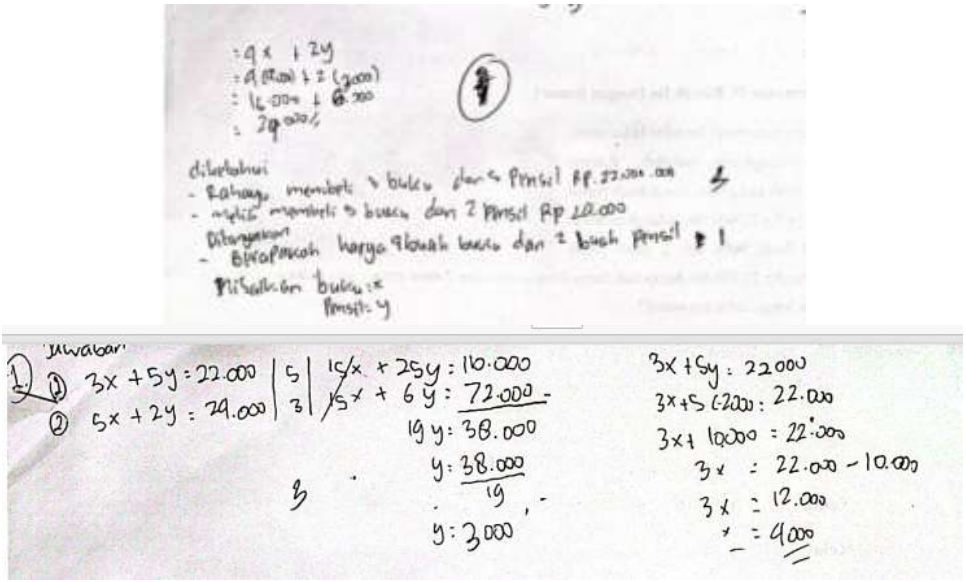

Figure 2. The answers of students in the medium category

Furthermore, in Figure 2 for students in the medium category, they can understand the problem well, this is proven by writing down the information that has been obtained, namely Rahayu who bought 3 books and 5 pencils at a price of Rp. 22,000 then Melia bought 5 books and 2 pencils at a price of Rp. 24,000. On the Make a Plan indicator, students can write the reasoning of the book as X and the pencil as Y and then make a mathematical model. In the indicator of completing the plan, students can solve problems quite well, by eliminating equations one and two, then substituting the results of elimination. So that the value of x = 4000 and y = 3000 is obtained. Then for the Re-examination stage, students do not write down the Recalculation or give a conclusion at the end of the answer. So it can be said that students with the medium category can only meet three indicators of problem-solving ability, namely understanding problems, making plans and completing plans. This is in line with research conducted by Aini et al (2019) saying that students do not understand the steps taken because students are not thorough when carrying out the work process. Comparable to the research conducted by Utami & Wustqa (2017) stated that most students do not pay attention to the commands in the questions for the Re-examination stage, students feel satisfied with the final result without analyzing the Re-examination and also many students are confused to substitute the obtained results, let alone to look for other formulas. Comparable to the previous opinion, it shows that the purpose of re-checking is to minimize calculation errors so that answers can be concluded based on considerations. (kurniawan & Kadrisma , 2020)

Results of Analysis of Low-Category Student Answers in Question Number 3

The question that will be analyzed is about how old the father and brother are. Where in the question it is known the age difference between father and sister and the number of the two five years ago. Then in the question, each of their ages was asked.

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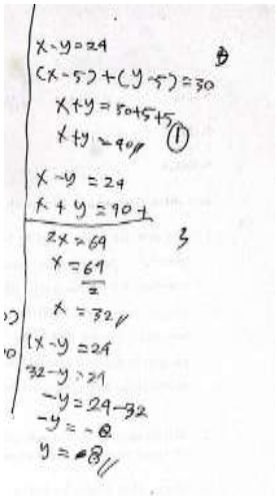

Figure 3. of the low-category student's answer

Then in Figure 3, the answers of students in the low category can only complete one indicator of mathematical problem-solving ability, namely at the stage of completing the plan. Students can solve the problem by eliminating the value first and then get the result, after getting the value of x then the student substitutes x into the equation and gets the result which is y = 8. So it can be said that students with low categories can only complete one indicator, namely completing the plan. This is in line with the research of Aini et al (2019) saying that students do not understand the steps taken because students are not thorough when carrying out the work process. This is also in line with research conducted by Pertiwi et al (2022) saying that students know the plan to be used but for questions that are not understood, students cannot solve them. This is comparable to the opinion that students will find it difficult and give up with makeshift answers, in other words the student does not have the persistence in finding solutions. $x - y = 2x + y = 40x = 32x - y = 24$(Syarifah F.D, Nuraidah , Riajanto , & Maya, 2018)

Based on the results that have been described, it was obtained that students who had high problem-solving skills were able to complete the four indicators of the problem-solving ability test. The results of this study are in line with the research conducted (Sapitri et al., 2019) stating that students with a high category in solving mathematical problem-solving story problems have met all indicators of problem-solving ability even though they have not been able to completely. This is in line with research (Farida & Hakim, 2021) which states that students have been able to meet all indicators.

Then students who have a category of moderate problem-solving ability, they are able to complete only three indicators, namely understanding the problem, making a plan and completing the plan. This is because students are not careful in doing the questions. This is comparable to research (Kurniasih & hakim, 2019) which states that this is because students are still incapable of making a conclusion. Then in line with research (Holidun 2017; Sapitri et al., 2019) stated that students with the medium category were able to complete the mathematical problem-solving description test questions and were able to meet all indicators of problem-solving ability, but it was still not systematic.

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Furthermore, students with low problem-solving skills can only solve one indicator, namely understanding the problem. This is because students have difficulty in doing math problems. This is in line with research (Sapitri et al., 2019) stating that students with low categories in solving mathematical problem-solving story problems have been able to complete the stages of understanding the problem and planning the problem even though the other stages have not been maximized.

Conclusion and Suggestion

Based on data, information, data analysis and discussion conducted by the researcher, this study on the Analysis of Mathematical Problem Solving Ability of Junior High School Students on SPLDV Material obtained the following conclusions:

1. Students who are in a high category are able to understand problems, make plans, solve problems well but to draw conclusions, sometimes students are less thorough and in a hurry at the stage of re-examining.
2. Students who are categorized are able to complete the stage of understanding the problem and re-checking, at the stage of making plans and solving problems, students are sometimes less thorough, so that the results obtained are not correct.
3. Students who are in the low category are only able at the stage of understanding the problem but at the stage of making a plan, solving the problem and re-examining the student feels difficult, hasty and not thorough in doing it

Based on the conclusion, the researcher gave suggestions for educators to start getting used to students to complete answers by containing mathematical problem-solving skills and the suggestion from the researcher was to find a research place that had already implemented problem-solving steps in their schools.

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