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Analysis of Students' Mathematical Problem Solving Ability Based on Self-confidence

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Abstract: The purpose of this study was to analyze the ability to solve mathematical problems of students in terms of self-confidence. This type of research is quantitative with a descriptive approach. The data in this study were obtained from tests and questionnaires. The results of the questionnaire were used to classify student's self-confidence. The test results of the problem solving were then analyzed based on the student's self-confidence. As a complement to the data on problem solving skills of students, interviews were conducted at each level of self-confidence. The results showed that students with high level of self-confidence have excellent problem solving skills with an average value of problem solving skills of 91. Student's with moderate level of self-confidence have good problem solving skills with an average value of problem solving skills of 74, and student's with low level of self-confidence have fairly good problem solving skills with an average value of problem solving skills of 51.

Keywords: problem solving skill, mathematics, self-confidence.

Abstrak: *Tujuan dari penelitian ini adalah untuk menganalisis kemampuan pemecahan masalah matematika peserta didik ditinjau dari self-confidence. Jenis penelitian ini adalah deskriptif dengan pendekatan kuantitatif. Data dalam penelitian ini diperoleh dari tes dan angket. Hasil angket digunakan untuk mengelompokkan self-confidence peserta didik. Hasil tes kemampuan pemecahan masalah matematika kemudian dianalisis berdasarkan self-confidence peserta didik. Hasil penelitian menunjukkan bahwa peserta didik yang memiliki tingkat self-confidence tinggi memiliki kemampuan pemecahan masalah yang sangat baik dengan nilai rata-rata kemampuan pemecahan masalah sebesar 91. Peserta didik yang memiliki self-confidence sedang memiliki kemampuan pemecahan masalah yang baik dengan nilai rata-rata kemampuan pemecahan masalah sebesar 74, dan peserta didik yang memiliki self-confidence rendah memiliki kemampuan pemecahan masalah yang cukup baik dengan nilai rata-rata kemampuan pemecahan masalah sebesar 51.*

Kata kunci: *kemampuan pemecahan masalah, matematika, self-confidence.*

▪ INTRODUCTION

Education is one of the efforts to increase the ability of human intelligence, so as to improve the quality of life (Sugiharto, 2020). Education is the most important thing for the development of a nation's civilization. In preparing a stable education system, it certainly requires a long and tiring process to achieve high quality standards (Junifran, 2020). Education in every discipline helps students to think, also helps students to be responsible for their thinking. Attitudes and ways of thinking can be developed through the process of learning mathematics, because mathematics is a means of thinking, a method of logical thinking, a strong and clear structure and linkages between concepts. (Lubis, 2017).

Mathematics cannot be separated from problem solving (Ulya, 2014). Mathematical problem solving is a basic ability in learning mathematics, thus helping

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individuals to develop their analytical thinking, helping students become critical and creative, and improving other mathematical abilities (Jones, 2015; Novita, 2016; Hidayat & Sariningsih, 2018)). This can be seen in the Basic Competencies contained in the Basic and Secondary Education Content Standards which state that students are expected to be able to apply their knowledge in certain fields of study to solve problems according to their talents and interests (Permendikbud, 2016). Mathematical problem solving is a major part of learning objectives in mathematics, even the heart of mathematics (Pujiastuti, 2014; Surya, 2017).

Problem solving is a process in which an individual uses their knowledge, skills and understanding to solve problems in an unknown situation (Hendriana, 2018; Hendriana, 2017; Hidayat & Sariningsih, 2018; Isnaeni & Maya, 2014). Problem solving abilities are actions to solve problems or processes that use the strengths and benefits of mathematics in solving problems for solutions through problem solving steps (Hobri, 2018). Polya (1973) suggests that problem solving is an attempt to find a solution to achieve a goal that is not easy to achieve. In addition, Lesh and Zawojewski (in Kuzle, 2013) define "Mathematical problem solving as a process of interpreting a situation mathematically, which is usually done repeatedly to reveal, test, and revise mathematical interpretations and sort, integrate, modify, improve or refine mathematical concepts. of various topics inside and outside of mathematics. The ability to solve mathematical problems in this study is a skill possessed by a person in using the knowledge, skills and understanding that has been obtained to find solutions or solutions to unfamiliar mathematical problems.

One form of task in mathematics that can be used to determine students' problem-solving abilities is story problems. To improve students' skills in connecting mathematics that has been studied with real-life situations, one of which is by using word problems in learning mathematics (Angateeah, 2017). According to Hamzah (in Amelia, 2018) the skills that must be developed by students in solving word problems are understanding problems, making mathematical models, solving problems and interpreting the solutions. Material at the junior high school level that often presents story problems is a system of two-variable linear equations (SPLDV). This material can be found in everyday life (Helmiati & Irvan, 2013).

However, in reality, in the process of learning mathematics, students experience difficulties in solving problems related to the two-variable linear equation system material (Nurhayati, 2021). Based on the results of Novitasari's research (in Hidayanti, 2019) states that there are still many students who experience difficulties in solving mathematical problems related to the application of two-variable linear equation system material in everyday life. According to the results of research conducted by Juliana, it showed that the difficulties of students in solving problems related to a system of linear equations with two variables were that on average some students were unable to change the question sentences into mathematical symbols and there were some students who were unable to understand the components of the questions. if given in the form of word problems (Juliana & Basir, 2017).

Furthermore, the factors that influence problem-solving abilities are the self-confidence that exists in students which creates self-confidence and confidence in their own abilities (Kosim, 2019). Confidence has a strong effect on learning achievement (Khairiah, M, & Hartini, 2015). With self-confidence, students have the ability to take

appropriate and effective actions in various situations, even when challenges arise from themselves or from others (Burton in Irhamna 2020). Yates (in Hendriana, 2018) also explained that self-confidence is very important for students to be successful in learning mathematics. Selden (in Maya, 2011) also expressed his opinion that in solving a student problem, which students find difficult in this problem, it is caused by a lack of confidence in themselves to be able to solve situations such as these problems. Students who believe in their own abilities will find it easier to strategize in solving mathematical problems, while students who lack confidence will feel that they are unable to solve mathematical problems properly even if it is only a simple mathematical problem (Sumarmo, 2018; Tresnawati , 2017). By having a sense of trust, students will be more motivated and prefer to learn mathematics so that in the end it is hoped that the mathematics learning achievement achieved will also be more optimal.

Self-confidence can be defined as a person's view of himself that is able to direct him to his motivation and expertise to act in accordance with the task requested (Bandura in Hendriana, 2014). Confidence is a belief in one's own abilities, so that the individual concerned is calm in every action taken, feels free to do things he likes and is responsible for whatever he does, is warm and polite when interacting, and has the will or drive to excel. accept and respect others, and be aware of one's own strengths and weaknesses (Lauster, 2012; Casey in Hendriana, 2018). Reddy (2014) argues that self-confidence is an attitude that allows a person to have a positive view of themselves and the situations they face. Confidence in this study is belief in one's own ability to solve problems in mathematics in order to get the expected solution.

Based on the description above, the ability to solve mathematical problems is very important and must be possessed by students. One of the supporting factors for students in solving mathematical problems is self -confidence. Therefore, teachers need to know how far their students' mathematical problem-solving skills and self-confidence are so that teachers can organize learning in their classes in a better and more interesting way. Thus, students will be more confident and have a high appreciation of mathematics, making it easier to understand the mathematics being taught.

▪ METHOD

This study aims to analyze mathematical problem solving abilities in terms of self-confidence. The research was conducted at Dawarblandong Public Middle School 1 for the 2021/2022 academic year. The subjects in this study were 32 students in class VIII-1. Sampling in this research using purposive sampling technique.

This research uses a quantitative descriptive approach. The procedure in this study consisted of preparing research instruments; performing validation; giving self-confidence to students; administering problem solving ability test questions to students; analyzing data from self-confidence results and problem-solving ability test results. The research was conducted from 31 May to 10 June 2022.

The instruments used in this study were a test used to determine students' mathematical problem solving abilities and a questionnaire used to determine students' self-confidence. The test instrument consists of two questions. The questions used are questions for the SMP Mathematics national exam because these questions have been tested throughout Indonesia and each item is standardized. The questions in the national exam have been changed from a choice form to a description form and have been

validated. The questionnaire instrument in this study was adopted from previous research conducted by (Hidayah, 2019). The questionnaire instrument consisted of 16 statement items consisting of positive and negative statements.

Solving steps and indicators of problem solving abilities used in this study are steps and indicators from Polya (1973), namely: 1) understanding the problem (determining what information is known), 2) planning a solution (using a strategy that can help solve the problem), 3) carry out a solution plan (implement the planned problem-solving method to find results), and 4) re-check (check whether the steps used are correct). Meanwhile, the self-confidence used in this study refers to the indicators put forward by Lauster (in Hendriana, 2017), namely: 1) Believe in one's own abilities; 2) Act independently in making decisions; 3) Have a positive self-concept; 4) Dare to express opinions.

The data analysis technique in this study used descriptive statistical analysis which included the frequency of the average score and the standard deviation for the self-confidence. The criteria self-confidence are divided into 3 categories quoted from Arikunto (2016), i.e: $x \geq (\bar{x} + 1.SD)$, $(\bar{x} - 1.SD) \leq x < (\bar{x} + 1.SD)$, and $x < (\bar{x} + 1.SD)$ for high, moderate, and low, respectively. In addition, $\bar{x}$ and SD is mean and deviation standard. From the results of these calculations, an average of 53 is obtained and a standard deviation of 5, so that the criteria for self-confidence, namely: 1) students with a score of more than or equal to 58 included in the category self-confidence; 2) students with scores between 48-57 are included in the self-confidence; and students with a score of less than 48 are included in the self-confidence. For data analysis the results of the problem-solving ability test of each student were then corrected and given a score according to the scoring guidelines. Then calculate the value of students' problem-solving abilities on each indicator with the following formula.

$$P_k = \frac{r}{n} \times 100$$

where P_k is score of mathematical communication ability for each indicator, r is total score for each indicator and n is maximum score for each indicator. Then the score of each student is added up and the value of each student is calculated in the following formula.

$$Score = \frac{sum\ of\ students' score}{sum\ of\ maximum\ score} \times 100$$

Then the value of each student is categorized according to the assessment criteria. Criteria for assessing problem-solving abilities quoted from Arikunto (2010), namely: 1) students who score between 81-100 are included in the criteria for very good problem-solving abilities; 2) students who score between 61-80 are included in the criteria of good problem solving ability; 3) students who score between 41-60 are included in the criteria of a fairly good problem-solving ability; 4) students who score between 21-40 are included in the criteria of poor problem solving ability; and 5) students who score less than 21 are included in the criteria for very low problem solving abilities.

After doing the calculations on the problem-solving ability test data and self-confidence, then an analysis of problem-solving abilities is seen from self-confidence.

▪ RESULT AND DISSCUSSION

Data on self-confidence students self-confidence that had been carried out by students in class VIII-1. The results of calculating the score of the questionnaire for each student were grouped according to the self-confidence they had, so that the result was that the self-confidence of students in class VIII-1 SMP Negeri 1 Dawarblandong namely as many as 4 students (12%) had self-confidence with the category high, 22 students (69%) who have self-confidence with categories moderate, and 6 students (19%) who have self-confidence in the low category.

As for the data on the test results of the problem-solving ability of each student, the average value of problem-solving ability based on self-confidence showed that students in class VIII-1 SMP Negeri 1 Dawarblandong totaling 32 students, there were 4 students (12 %) who have self-confidence with an average value of 91 have very good problem solving abilities. There are 22 students (69%) who have self-confidence with an average value of 74 have good problem-solving abilities. Furthermore, there were 6 students (19%) who had self-confidence with an average value of 51 and had fairly good problem-solving abilities. then this is in accordance with research conducted by Hidayah (2019) which shows that students who have a high level of self-confidence have high mathematical problem solving abilities, while students who have a low level of self-confidence have high mathematical problem solving abilities. low too.

For problem solving abilities on each indicator the results are presented in the following table.

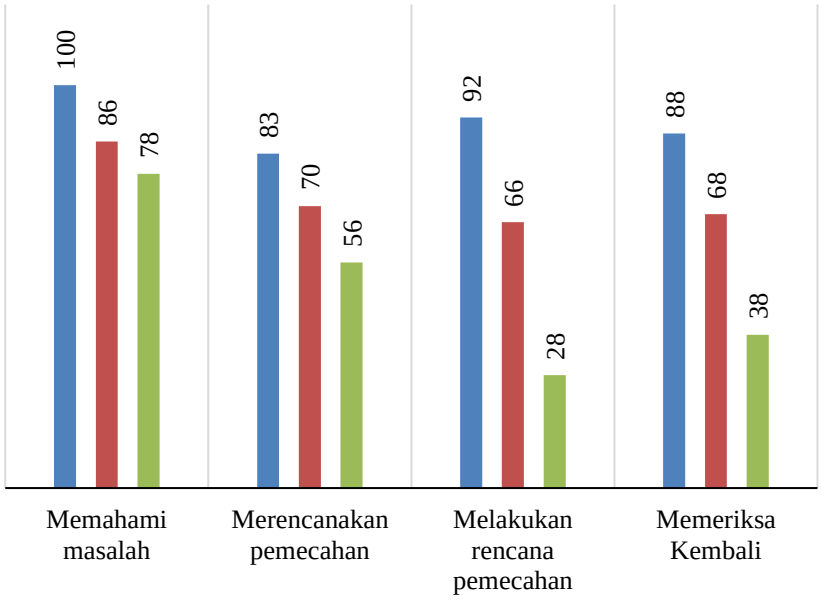

Figure 1. Mean score of problem solving ability for each indicator. high, moderate, and low self-confidence are presented in blue, orange, and grey color, respectively

From the data presented in Figure 1, it can be explained that students with a high level of self-confidence in the first indicator, namely understanding problems, have very good abilities with a problem-solving ability value of 100, meaning that students with a high level of self-confidence are able to write down information that is known and asked

completely and precisely. The problem planning indicator has very good ability with a problem solving ability score of 83 meaning that students with a high level of self-confidence are able to write down the mathematical model and steps to be used completely and accurately. The indicator of carrying out a solving plan has a very good ability with a problem solving ability value of 92, meaning that students with a high level of self-confidence are able to perform calculations to find the correct results, and on the re-checking indicator they have very good abilities with a problem solving ability value of 88 means that students with a high level of self-confidence are able to write conclusions completely and accurately. It was confirmed from the interview results that students who have a high level of self-confidence are able to fulfill the four indicators. This is in accordance with the results of research conducted by Febriana (2018) which shows that students who have self-confidence are able to understand problems by writing down and mentioning what is known and asked correctly, are able to make plans with the right strategy, are able to carry out strategies according to plan and able to look back and draw conclusions.

Students with a moderate level of self-confidence in the first indicator, namely understanding the problem, have very good abilities with a problem-solving ability value of 86, meaning that most students with a moderate level of self-confidence are able to write down information that is known and asked in a complete and precise manner, but there are some who only write down the information that is known. The problem planning indicator has good ability with a problem solving ability value of 70 meaning that students with a moderate level of self-confidence are able to write only mathematical models, but are unable to write down the steps to be used. The indicator of carrying out a solving plan has good ability with a problem solving ability value of 66 meaning that most students with a moderate level of self-confidence are able to carry out calculations to find the correct results, but some do calculations but only partially. On the re-checking indicator, they have good abilities with a problem-solving ability score of 68, meaning that most students with a moderate level of self-confidence are able to write complete and precise conclusions, but some cannot conclude at all. If related to previous research, this is not in accordance with research conducted by Febriana (2018) which shows that students with a moderate level of self-confidence are only able to master 2 of 4 indicators. From the results of the students' work it shows that students who have a moderate level of self-confidence are able to fulfill the four indicators of Polya problem solving but lack detail in the second indicator, namely planning a solution.

Students with a low level of self-confidence in the first indicator, namely understanding the problem, have good abilities with a problem-solving ability value of 78, meaning that most students with a low level of self-confidence are able to write down information that is known and asked in a complete and precise manner, but there are some who only write down only the information that is known. The problem planning indicator has a fairly good ability with a problem solving ability value of 56 meaning that most students with a low level of self-confidence are unable to write down the model or steps to be used correctly. The indicator of carrying out a solving plan has poor ability with a problem solving ability value of 28 meaning that students with a low level of self-confidence are unable to perform calculations until they find the correct results, and on the checking indicator again they have poor ability with a problem

solving ability value of 38 means that most students with a low level of self-confidence are not able to write conclusions at all.

▪ CONCLUSION

Based on the results of data analysis on problem solving abilities in terms of the self-confidence of students in class VIII-1 SMP Negeri Dawarblandong, it can be concluded that students with a high level of self-confidence as many as 4 students (12%) have an average problem solving ability very good. Students with a moderate level of self-confidence as many as 22 students (69%) have an average good problem-solving ability, and students with a low level of self-confidence as many as 6 students (19%) have an average sufficient problem-solving ability good.

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