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Self Confidence and Mathematical Problem Solving Ability in Junior High School

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Abstract

Self-confidence is very important in solving mathematics problems, because with self-confidence students feel capable of achieving their goals, so they will try harder to be able to solve the mathematics problems given by the teacher. This research aims to determine whether there is a relationship between self-confidence and the mathematical problem-solving abilities of class VIII students at SMPK Ignatius Slamet Riyadi Jakarta. This research uses a quantitative approach through correlational techniques and survey methods. The sample for this research was 29 class VIII students selected using a random cluster technique. The instruments used are questionnaires and tests in the form of descriptions. Hypothesis testing using the product moment correlation test is supported by testing the significance level using the t test. The prerequisite test meets normal and linear data distribution. The results of the hypothesis test obtained r count > r table, it is proven that there is a relationship between self-confidence and mathematical problem-solving abilities. The coefficient of determination value = 0.1681, meaning that 16.81% of students' mathematical problem- solving abilities are influenced by self-confidence. The results of this research conclude that there is a positive relationship between self-confidence and students' mathematical problem-solving abilities.

Keywords: Geometry, problem solving ability, self confidence, SMPK Ignatius Slamet Riyadi

1 INTRODUCTION

Mathematics is one of the subjects that must be implemented at every level of education from elementary school to college (Sulistyaningrum, D. E., Karyanto, P., & Sunarno, W., 2015). Mathematics is also an important subject because it has benefits that are much needed in everyday life (Hudoyo, 2003). This can be seen in all human activities that cannot be separated from mathematics, for example when buying and selling, measuring quantities, calculating profits and losses, and so on. Learning mathematics is a way or method of thinking and reasoning, with mathematics humans are trained to think, reason, analyze, before making conclusions or making decisions (Sukardjono, 2008; Muhalimah, A. P., Lestari, R., & Riswari, L. A., 2023).

Thinking is a cognitive activity that involves the brain in processing information, such as when we make decisions, form concepts, and engage in reasoning (Ramadanti, M., Sary, C. P., & Suarni, S., 2022). According to Schoenfeld (1992), mathematical thinking is the process of developing a mathematical perspective-appreciating the process of mathematization and having a strong desire to apply it. Additionally, mathematics is a language that is precisely, clearly, and accurately defined, and its representations are conveyed through the use of symbols (Isrok'atun & Amelia R., 2018).

In learning mathematics, mathematical problem solving abilities are very important (Mariam, S., et.al., 2019; Pradita, U., & Yuni, Y., 2019). Several reasons why problem solving is necessary in mathematics learning include: 1) problem solving underlies the development of students' mathematical knowledge based on the knowledge they currently

have; 2) problem solving is an interesting and fun way to learn mathematics; 3) and problem solving is an effective method for learning new concepts in mathematics with a deeper understanding. Problem solving can shape students' positive character in mathematics, as well as encourage them to become novice researchers in the field of mathematics. In addition, problem solving teaches reasoning, flexibility, and creativity in thinking. In general, problem solving helps students utilize their abilities to solve various problems in life. Problem solving also encourages the development of collaborative skills, and is a very effective method for practicing math skills (Nissa, I.C., 2015). Mathematical problem solving ability is an attempt to find a way out of a difficulty and achieve a goal that cannot be achieved immediately (Yuni, Y., Kusuma, A. P., & Huda, N., 2021) . In other words, problem solving ability is the process of finding a solution to a challenging problem or question that cannot be achieved immediately (Wahyudi & Anugraheni, 2017).

Problem solving is a process that begins when students encounter a problem until they succeed in finding a solution and testing the effectiveness of that solution (Jakson P. Maring, 2018). In the context of mathematics learning, students' problem solving abilities are not only measured by whether they can find answers, but also from how they follow systematic steps in problem solving. These steps include: 1) understanding the problem, where students need to identify key elements and goals to be achieved; 2) planning a solution, namely determining the most appropriate strategy or approach to solve the problem; 3) carry out the planned method, by utilizing the knowledge and skills possessed; and 4) interpreting the solution, which involves analyzing whether the resulting solution is correct and relevant in the context of the problem (Hidayat, W. & Sariningsih, 2018).

Problem-solving abilities are not only important in the academic realm, but are also an essential life skill. This process trains students to think critically and analytically, test hypotheses, and learn from mistakes in an effort to reach optimal solutions. Therefore, problem solving in mathematics learning not only aims to understand mathematical concepts, but also to develop high-level thinking skills that can be applied in various real life situations.

However, the reality on the ground shows that there are still many students who have low problem solving abilities, even though they have studied mathematics for many years. One example is at SMPK Ignatius Slamet Riyadi Jakarta. Based on the results of initial trials carried out to measure mathematical problem solving abilities during observations, it was found that several class VIII students still had mathematics scores that were below the Minimum Completeness Criteria (KKM), which was set at 73. Of the 29 students tested, 13 students scored below the KKM, while only 16 students achieved or exceeded the KKM.

This situation raises concerns, especially because problem solving ability is a core skill in mathematics learning which should be more mature in students at this level. Through interviews with several students at SMPK Ignatius Slamet Riyadi, several factors were revealed that contributed to their low mathematics learning outcomes. One of the main factors is a lack of confidence in facing and solving mathematical problems. When students feel doubtful or unsure of their abilities, they tend to have difficulty implementing problem-solving strategies effectively. Another factor that is often mentioned is a lack of in-depth understanding of the material taught by teachers. Some students admitted to having difficulty following explanations in class, which resulted in their inability to apply mathematical concepts to problem solving.

This condition indicates the need for evaluation of the learning approach used, as well as strategies to increase student self-confidence. Teachers need to provide more personal support and a variety of teaching methods so that students can more easily understand the material. Apart from that, familiarization with varied practice questions and providing constructive feedback can help students develop critical thinking skills and solve problems better. Building a learning atmosphere that supports and strengthens collaborative skills among students can also help them share problem-solving strategies with each other, resulting in more confidence in facing mathematical challenges.

In developing mathematical problem solving abilities, students must have confidence and self-confidence (Jackson & Mairing, 2018). Self-confidence in learning mathematics

allows students to learn better, not give up easily, and be able to think realistically. Therefore, self-confidence needs to exist in students so that their mathematics learning abilities can be applied effectively. If students understand mathematical concepts, they tend to have high self-confidence in solving problems (Putra, 2018). Therefore, self-confidence is very important in solving mathematical problems, where self-confidence has many benefits in increasing students' enthusiasm for learning, especially in learning mathematics (Napitupulu, et al., 2020).

Students who have self-confidence tend to be calmer and able to think clearly in any situation. Apart from that, they also appear confident in expressing their talents and abilities in mathematics and are able to face every challenge. Therefore, self-confidence is needed by students in solving mathematical problems. If students have high self-confidence, then their ability to solve mathematical problems will also be high. Conversely, if self-confidence is low, their ability to solve mathematical problems will decrease.

Self-confidence is assumed to have a positive effect on problem-solving abilities. In this case, researchers try to find out how self-confidence relates to mathematical problem solving abilities. Apart from that, the aim of this research is to prove whether there is a positive relationship between self-confidence and students' mathematical problem solving abilities, especially in class VIII middle school students.

2 RESEARCH METHODS

This research uses a quantitative approach with survey methods and correlational techniques (Sugiyono, 2016; Arikunto, S., 2019). The research was conducted in class VIII of SMPK Ignatius Slamet Riyadi, East Jakarta. The sampling technique used was random sampling, with a total sample of 29 students selected.

Research data was collected through questionnaires and tests in the form of descriptions. The questionnaire instrument is used to measure self-confidence data, while the description test instrument is used to measure mathematical problem solving ability data. The instrument for collecting data on variable self-confidence consists of 25 statement items, while variable mathematical problem solving ability is measured with 6 essay test items.

The research instrument has gone through validity and reliability tests. The validity test for variables X and Y was carried out using the product moment correlation coefficient formula, while the instrument reliability test used the Cronbach's Alpha formula. The data analysis technique is carried out through several stages, starting with prerequisite tests, namely normality tests, linearity tests, and research hypothesis tests. Statistical hypothesis testing was carried out to determine whether there was a relationship between self-confidence and students' mathematical problem solving abilities using the product moment correlation coefficient formula from Pearson (Sudjana, 2013).

3 RESULT AND DISCUSSION

The research findings and detailed discussion will be explained as follows. In this section, each result obtained from data processing will be described carefully to provide a clear picture of the relationship between student self-confidence and mathematical problem solving abilities. Each finding is supported by relevant statistical analysis and in-depth theoretical explanations.

3.1 Self confidence

Based on data collected from the results of the student self-confidence questionnaire, of the 30 statements given, there were 25 statements that were valid and reliable. And of

the 25 valid statements, the highest score was 92, the lowest was 57, with an average score of 71.82, median 70.75, mode 70.5, standard deviation 10.23. Complete student self-confidence data can be presented in Table 1.

Table 1. Frequency distribution of student self-confidence

Interval Kelas	xi	fi	fk	fi.xi	$(xi-\bar{x})^2$	$fi(xi-\bar{x})^2$
57 -62	59	6	6	354	164,3524	986,1144
63 – 68	65	7	13	455	46,5124	325,5868
69 – 74	71	4	17	284	0,6724	2,6896
75 – 80	77	4	21	308	26,8324	107,3296
81 – 86	83	5	26	415	124,9924	624,962
87 - 92	89	3	29	267	295,1525	885,4575
Jumlah		29		2083	658,5144	2932,1399

It can be seen clearly in the data table for the frequency distribution of self-confidence for class VIII students, the highest frequency is in the 1st and 2nd class intervals. These two groups are students with medium and high self-confidence. Meanwhile, students with low self-confidence also have low self-confidence. The data in Table 1, when presented in graphical form, can be seen in Figure 1.

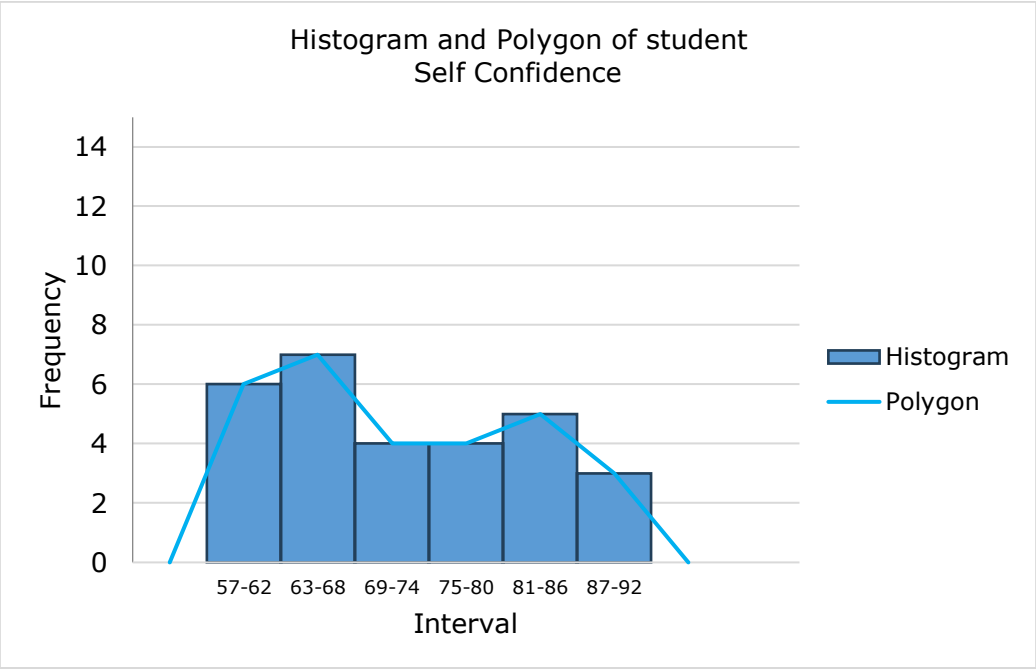

Figure 1. Histogram and Polygon graph of student self-confidence

If attention to the polygon formed, it shows that the student self-confidence data is normally distributed and the skewness is skewed towards the right (because the mean is greater than the median and mode), this means it is positively skewed. The normality of the self-confidence data was also proven by calculating the normality test using the Liliefors test. After carrying out the calculations, the calculated L is 0.125 when consulted with the Liliefors table at a significance level of 5% or α = 0.05 and N = 29, the L table is 0.151. Because L count < L table (0.125 < 0.151), it can be concluded that the self-confidence from a normally distributed population.

3.2 Mathematical Problem Solving Ability

The results of the test of students' mathematical problem solving abilities were obtained from 6 questions in the form of descriptions that were valid and reliable. The highest score was 93, the lowest score was 52, with an average score of 75.53, median 75.4, mode 93.5 and standard deviation 9,671. Complete data is presented in Table 2.

Table 2. Frequency distribution of students' mathematical problem solving abilities

Interval Kelas	xi	fi	fk	fi.xi	$(xi-\bar{x})^2$	$fi(xi-\bar{x})^2$
52 – 58	55,5	2	2	111	401,20	802,4018
59 – 65	62,5	2	4	125	169,78	339,5618
66 – 72	69,5	8	12	556	36,36	290,8872
73 – 79	76,5	6	18	459	0,94	5,6454
80 – 86	83,5	8	26	668	63,52	508,1672
87 – 93	90,5	3	29	272	224,10	672,3027
Jumlah				2191	895,91	2618,966

The highest frequency of mathematical problem solving abilities for class VIII students was in the 3rd and 5th class intervals. If the data on students' mathematical problem solving abilities is presented in graphical form, it can be seen in Figure 2.

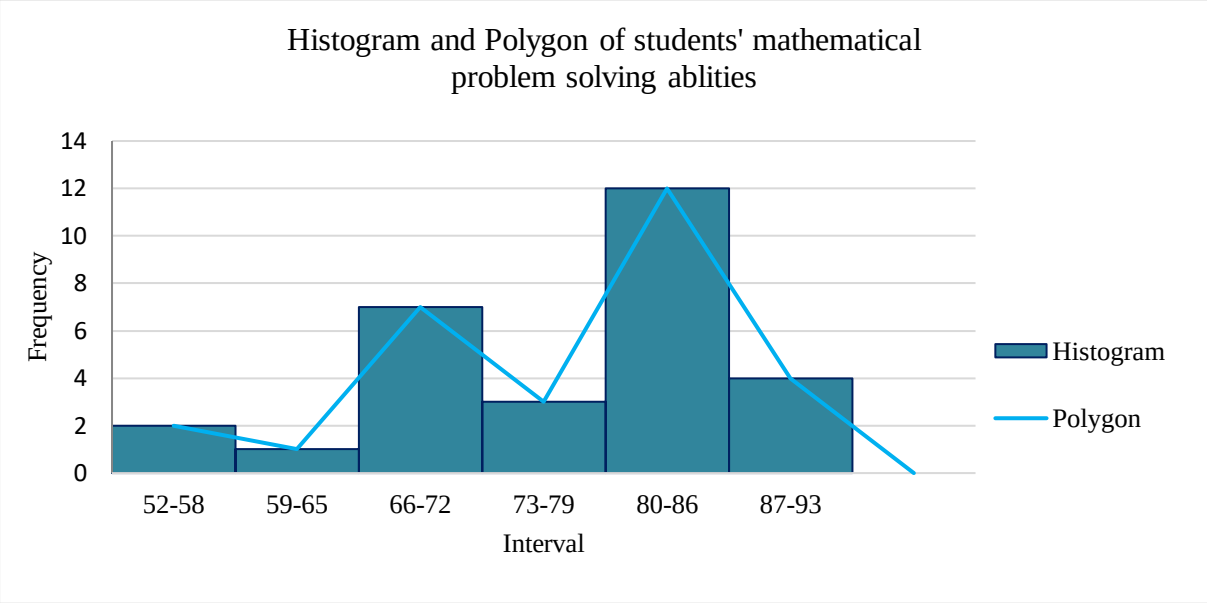

Figure 2. Histogram and Polygon graph of students' mathematical problem solving abilities

The data obtained as shown in Table 2 and Figure 2 comes from a normally distributed population. Proven by a normality test using the Liliefors test. The test results obtained a calculated L of 0.133 when consulted on the Liliefors table with a significance level of 5% or α = 0.05 and N = 29 obtained an L table of 0.151. Because L count < L table (0.133 < 0.151). So it can be concluded that the problem solving ability comes from a normally distributed population as well.

3.3 Discussion

The data on self-confidence and mathematical problem solving abilities found in this research both meet the normal requirements, so that it can be continued with a linearity test to find out whether the two or more variables tested have a linear relationship or not significantly (Sugiyono, & Susanto, A., 2015). Based on the calculation results of the regression equation test, the value a = 46.73, and the value b = 0.386, so the regression equation is $\hat{Y}$ = 46.73 +0.386X. The regression equation test can be seen in Table 3.

Table 3. The Linear Regression Equation

Sumber	JK	DK	RK	F obs	F table	p
Regression	408,34	1	408,34	-	-	-
Tuna Cocok	35,722	18	1030431,8	0,782	2,46	p < 0,05
Galat Murni	2283,2	9	253,7	-	-	-
Total	2727,26	28	-	-	-	p ≥ α

Based on the data in Table 3, F obs = 0.782. If we consult the F table (0.05; 18; 9), the significance level of 0.05 is 2.46, because F obs < F table or 0.782 < 2.46, then self-confidence and mathematical problem solving abilities in this study have a relationship which is linear and positive.

The hypothesis test in this study was calculated using Pearson's product-moment correlation, yielding an rxy value of 0.410. Based on the interpretation of the correlation coefficient, which indicates a moderate relationship, and a contribution of 16.81%, it can be concluded that there is a positive relationship between students' self-confidence and their mathematical problem-solving abilities in flat-sided spatial construction material at SMPK Ignatius Slamet Riyadi Jakarta. This suggests that students with higher self-confidence tend to show improved mathematical problem-solving abilities.

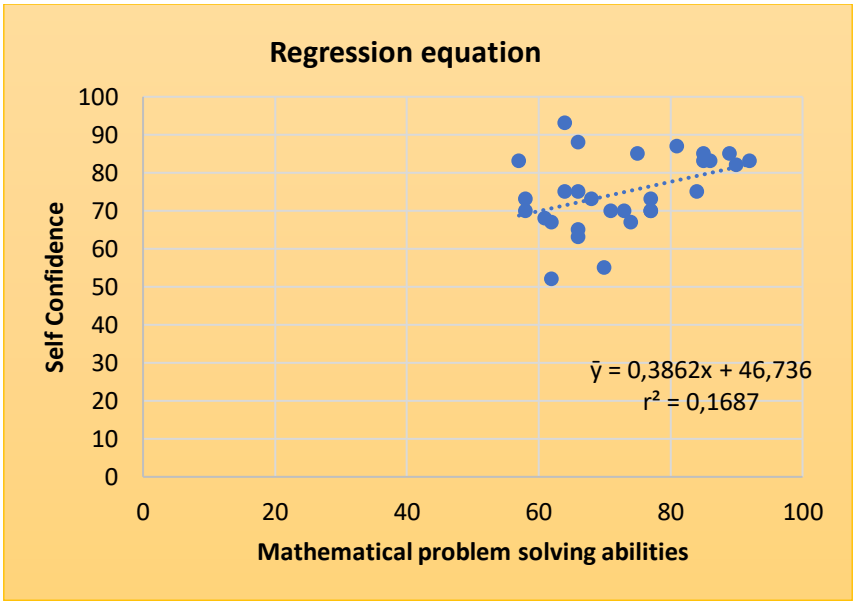

Figure 3. Linearity & correlation graph of self-confidence with mathematical problem solving abilities

The results of this research are strengthened by relevant research (Dewi and Minarti, 2018) entitled: The Relationship between Self-Confidence in Mathematics and Students' Mathematical Problem Solving Ability in Circle Material which states that students' self-confidence in mathematics significantly influences students' mathematical problem-solving abilities. So that students who have good self-confidence will have good mathematical problem solving abilities. Conversely, students who have low mathematical problem solving abilities also have low self-confidence.

There are differences with the research results of Putra, H. D., et al. (2018), Their research using a qualitative approach with descriptive analysis methods. The conclusion of their research is that students' problem solving abilities are still low. Most students have difficulty understanding problems, only half of students can plan solutions, solve problems, and interpret solutions. Students' self-confidence in mathematics is relatively good. Even though students' problem solving abilities are still low, this does not weaken their confidence in finding solutions to problems.

4 CONCLUSION

Based on the results of statistical analysis, this research successfully demonstrates a positive relationship between self-confidence and mathematical problem-solving abilities in flat-sided geometry. The higher a student's self-confidence in learning mathematics, the greater the impact on their ability to solve mathematical problems.

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