Analysis of the Effect of Self Confidence on Students' Mathematical Problem Solving Ability

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh self confidence terhadap kemampuan pemecahan masalah matematis siswa. Populasi dalam penelitian ini yaitu seluruh siswa kelas VIII SMP Negeri 2 Sewon Bantul tahun pelajaran 2024/2025. Sampel dalam penelitian ini yaitu kelas VIIIB yang dipilih dengan teknik purposive sampling dengan jumlah siswa sebanyak 29 orang. Data penelitian yang diambil berupa data kuantitatif yang diperoleh dari angket self confidence dan tes kemampuan pemecahan masalah matematis siswa. Berdasarkan hasil uji hipotesis menggunakan analisis regresi linier didapatkan diperoleh nilai 0,501, sehingga persamaan regresi linearnya adalah $\hat{Y}$ = 55,153 + 0,501X dan koefisien korelasi diperoleh kesimpulan bahwa *self confidence* berpengaruh terhadap kemampuan pemecahan masalah matematis siswa.
Keyword: pengaruh, kemampuan pemecahan masalah matematis, *self confidence*

Abstract

This research aims to determine the effect of self confidence on student's mathematical problem solving abilities. The population in this research was all eighth grade students of SMP Negeri 2 Sewon Bantul in the odd semester of the 2024/2025 academic year. The population in this study were all students in class VIII of SMP Negeri 2 Sewon Bantul for the 2024/2025 academic year. The sample in this research was class VIIIB which was selected using a purposive sampling technique. with a total of 29 students. Research data taken in the form of quantitative data obtained from self-confidence questionnaires and tests of student's mathematical problem solving abilities. Based on the results of hypothesis testing using linear regression analysis obtained diperoleh nilai 0,501, sehingga persamaan regresi linearnya adalah $\hat{Y}$ = 55,153 + 0,501X and correlation coefficient, it can be concluded that self-confidence has an effect on student's mathematical problem solving abilities.
Keyword: effect, mathematical problem solving, self confidence

INTRODUCTION

Mathematics is very important in technological development and needs to be given to students to face new situations, one of which is the digitalization of 21st century society (Gravemeijer et al., 2017; Ünal, 2017). From a theoretical perspective, Krutetskii (1976, as quoted in Karsenty, 2014) defines mathematical ability as the acquisition, processing and storage of mathematical information, or as the capacity to learn and master new mathematical ideas and skills. Meanwhile, from an evaluation perspective, mathematical ability defined as the ability to perform mathematical tasks and solve given mathematical problems (Karsenty, 2014)

Problem solving is one of the mathematical skills that students need to master. As stated by the National Council of Teachers of Mathematics (NCTM, 2000), mathematical abilities consist of five components, namely: (1) mathematical communication, (2) mathematical reasoning, (3) mathematical problem solving, (4) mathematical connections, and (5) representation. The problem solving described by Hesse et al. (2015) as an individual activity to respond to or overcome obstacles when the solution or method for finding the solution provided is not yet clear. Obstacles occur when individuals feel a discrepancy between the current state and the desired goal state.

The importance of problem solving skills in mathematics learning and everyday life requires students to become good problem solvers. Some of the characteristics of someone who is said to be a good problem solver were expressed by (Scusa, 2008) who stated that good problem solvers when given an unusual problem, they know what to do and can change strategies because they have a list of simple problem solving strategies. However, facts in the field show that students' mathematical problem solving abilities are still relatively low. This is proven in the survey results from the Trends International Mathematics and Science Study (TIMSS) and Program for International Student

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Assessment (PISA) surveys. The 2015 TIMSS results which measure students' understanding, representation, reasoning and mathematical problem solving show that Indonesia is ranked 44th out of 49 countries with an average score of 397. The results of the 2015 PISA study also show that students' mathematical abilities are still low, where Indonesia only ranked 61st out of 69 countries with a score of 386. The TIMSS and PISA results reflect that the mathematics abilities of Indonesian students are still at a low level. Reflections on the TIMSS and PISA results show that students in Indonesia are still lacking in solving problem solving questions that have the same characteristics as the questions on TIMSS and PISA. Research conducted by Ramon Muhandaz also shows that students' problem solving abilities are still relatively low. This is manifested in students' inability to answer questions in a problem-solving format.

Several studies have revealed that mathematics learning is strongly influenced by students' mathematics-related beliefs, especially self-confidence (Hannula & Malmivuori, 1997; Hannula et al., 2004). However, these studies have not specifically addressed the integration of digital teaching aids, such as QR Code-assisted modules, in enhancing both students' confidence and their numeracy skills in solving mathematical problems, particularly in the context of SPLDV material. Self-confidence is the belief a person has in their abilities, talents and potential. Everyone has beliefs that can be seen from their behavior or emotions. Students who have self-confidence will tend to be more interested in studying mathematics, so that in the end it is hoped that their mathematics learning achievement will also be more optimal. This is in line with the results of research conducted by Septiani, D. R., & Purwanto, S. E. (2020), TIMSS revealed that there is a positive relationship between self-confidence in learning mathematics and mathematics learning outcomes. Based on the problems that have been mentioned, researchers are interested in conducting mini research with the title "Analysis of the Effect of Self Confidence on Student's Mathematical Problem Solving Ability".

METHOD

This research uses a causal comparative research design (Causal Comparative) with a quantitative approach. Comparative causal research can test the influence of one variable on other variables. According to Sulfemi & Supriyadi (2018) quantitative methods are methods for research through obtaining interpreted numerical data. This research uses the Bivariate type of significance, namely significance that includes one each of the independent variables and the dependent variable in a study. The independent variable here is self-confidence and the dependent variable is mathematical problem solving ability. So this research will determine whether or not there is and how much significance there is between self-confidence and mathematical problem solving abilities.

The location of this research was carried out at one of the junior high schools in Yogyakarta, namely SMP Negeri 2 Sewon Bantul. The time for conducting the research is November 2024. The population in this research is all students in class VIII of Sewon 2 Public Middle School, Bantul, academic year 2024/2025. The sample in this research is class VIIIB. Sampling was carried out using a purposive sampling technique by asking for the opinion of class teachers who understand students' cognitive and affective conditions.

This research uses two types of research instruments, namely test instruments and questionnaires. The test instrument is used to measure students' mathematical problem solving abilities with indicators, namely:

a. Write down what you know and what is asked about the question,
b. Choose the right strategy and create a mathematical problem model,
c. Resolving problems,
d. Concludes the results of the correct answer and can reflect on the entire process that has been carried out in solving the problem.

Meanwhile, questionnaires are used to measure students' self-confidence with indicators:

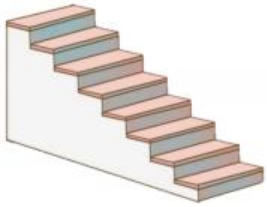
a. Believe in your own abilities,
b. Act independently in making decisions,
c. Have a positive self-concept,
d. Dare to express your opinion.

The form of test instrument used in this research is in the form of essay questions with straight line equations. The test instrument consists of 2 questions as follows:

1. Initially Fajar's workplace was close to his house. If depicted in the Cartesian plane, the old workplace is at the coordinate point (2,1) and Fajar's house is at the coordinate point (3, 1). Two

months later, Fajar was transferred to a new place of work, which was located further from his house. If the coordinates of the new workplace are (4,6), what is the equation of the line connecting Fajar's house with the new workplace?

2. Sandi wants to make a staircase in his house to connect the 1st floor and 2nd floor. The staircase he wants to make is 3 meters high. What slope will the stairs have from top to bottom if the bottom end of the stairs is 5 meters from the wall?



And the questionnaire instrument in this research contains statements regarding the achievement of self-confidence indicators. The self-confidence questionnaire instrument consists of 15 statements containing 3 statements, namely 1 positive statement and 2 negative statements for indicators of confidence in one's own abilities. 4 statements, namely 2 positive statements and 2 negative statements for indicators of acting independently in making decisions. 4 statements, namely 2 positive statements and 2 negative statements as indicators of having a positive self-concept. 4 statements, namely 3 positive statements and 1 negative statement as an indicator of daring to express an opinion.

In this research, the data to be analyzed is quantitative data consisting of students' mathematical problem solving ability test scores and self-confidence questionnaire scores. The data was analyzed using a simple linear regression test to determine the effect of self-confidence on students' mathematical problem solving abilities. Data analysis aims to test the truth of a hypothesis. Before carrying out statistical tests, prerequisite tests need to be carried out, namely normality tests and linearity tests. This prerequisite testing is carried out to determine the hypothesis test that will be used.

RESULTS AND DISCUSSION

Results

1. Data Description

The research data used is data on students' mathematical problem solving abilities and self-confidence questionnaires for class VIIIB SMP Negeri 2 Sewon Bantul. Data description is presented in Table 1.

Table 1. Data description of students' mathematical problem solving abilities and self-confidence

Ability	N	Average	Maximum Score	Minimum Score	Standard Deviation	Variance
Self Conidence	29	64,72	88	53	9,54	90,92
Mathematical Problem Solving	29	87,59	99	74	6,54	42,82

2. Normality Test

The data was first tested for normality to determine whether the residual data on students' mathematical problem solving abilities and self-confidence were normally distributed or not. The test statistic used was Kolmogorov-Smirnov using SPSS 16. In this research, the normality test was carried out based on the variables of students' mathematical problem solving ability and self-confidence. The hypothesis in this research is as follows. $H0$: residual data sample comes from a normally distributed population. $H1$: residual data sample comes from a population that is not normally distributed. With the test criteria, accept Ho if Sig. > 0.05 and vice versa. The results of the data normality test are presented in Table 2.

Table 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		29
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	4.56288137
Most Extreme Differences	Absolute	.144
	Positive	.126
	Negative	-.144
Kolmogorov-Smirnov Z		.776
Asymp. Sig. (2-tailed)		.584

a. Test distribution is Normal.
b. Calculated from data.

From the One-Sample Kolmogorov-Smirnov Test table, the value of Sig is known. 0.584 > 0.05, so $H0$ is accepted. Residual data on students' Self Confidence and mathematical problem solving abilities come from a normally distributed population.

3. Linearity Test

After the normality test is carried out, a linearity test is carried out to find out whether the variables self-confidence and students' mathematical problem solving abilities have a linear relationship or not. The linearity test was carried out using SPSS 16. The hypothesis in this research is as follows. H0: there is a linear relationship between self-confidence and students' mathematical problem solving abilities H1: there is no linear relationship between self-confidence and students' mathematical problem solving abilities. With the test criteria, accept Ho if Sig. > 0.05 and vice versa. The results of the data linearity test are presented in Table 3.

Table 3. Linearity Test Results

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Kemampuan Pemecahan Masalah Matematis * Self Confidence	Between Groups	(Combined)	920.468	15	61.365	2.644	.043
		Linearity	639.244	1	639.244	27.541	.000
		Deviation from Linearity	281.224	14	20.087	.865	.605
	Within Groups		301.733	13	23.210		
	Total		1222.201	28			

From the results of the linearity test, sig. the Deviation from Linearity is 0.605 with 0.605 > 0.05, so $H0$ is accepted. And it was concluded that there was a linear relationship between self-confidence and students' mathematical problem solving abilities.

4. Hypothesis Test

After carrying out normality and linearity tests, the next step is to carry out hypothesis testing to prove the truth of the data that has been collected. The hypothesis tested in this research is whether or not there is a significant influence of student self-confidence (variable X) on students' mathematical problem solving abilities (variable Y). Based on the prerequisite test, the data is normally and linearly distributed. So a simple linear regression analysis test was carried out and continued with an F test of variance analysis to see whether or not there was an influence of student self-confidence (variable X) on students' mathematical problem solving abilities (variable Y).

a. Simple linear regression analysis

Simple linear regression analysis is used to measure the magnitude of the influence that occurs on the dependent variable (variable Y). The value of the dependent variable is based

on the value of the independent variable (variable X). Using a simple linear regression formula according to Sudjana (2016: 312) is as follows:

$Y = a + bX$

Information:

Y = Dependent variable value (student's mathematical problem solving ability)

X = Independent variable value (student self-confidence)

a = Regression constant number for X = 0

b = Regression direction coefficient which shows the rate of increase or decrease in variable Y if it increases or decreases by 1 unit

The regression equation is useful for predicting the value of variable Y if X is known and estimating the average change in variable Y for each change in Table 4.

Table 4. Simple Linear Regression Equation

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	55.153	6.023		9.157	.000
	Self Confidence	.501	.092	.723	5.441	.000

a. Dependent Variable: Kemampuan Pemecahan Masalah Matematis

The linear regression equation is $\hat{Y} = a + bX$. In the coefficients table in column B, the constant (a) value is 55.153, while the value of self-confidence (b) is 0.501, so the linear regression equation is $\hat{Y} = 55.153 + 0.501X$. Based on this equation, the regression coefficient value (b) is positive (+), so it can be interpreted that self-confidence (X) has a positive effect on students' mathematical problem solving abilities (Y).

b. F Test

After obtaining the linear regression equation, this test is carried out to find out whether variable X has an effect on variable Y. The F test is used to test the significance of the regression. The hypotheses that will be tested in this research are as follows.

H0: self-confidence has no influence on students' mathematical problem solving abilities.

H1: self-confidence has an influence on students' mathematical problem solving abilities.

Test criteria with a significance level of $\alpha = 0.05$, namely accept H0 if $Fhitung < Ftabel$ with $Fhitung < (1-\alpha)(1,n-2)$ while for the other prices H0 is rejected. F Test calculations are carried out using SPSS 16 as follows.

Table 5. F Test Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	639.244	1	639.244	29.607	.000[b]
	Residual	582.957	27	21.591		
	Total	1222.201	28			

a. Dependent Variable: Kemampuan Pemecahan Masalah Matematis

b. Predictors: (Constant), Self Confidence

Based on the calculated F table = 29.607 and the F table value = 4.21. The value of $Fhitung > Ftabel$. Because 29.607 > 4.21, then H0 is rejected. The ANOVA table explains whether there is a real (significant) influence between the self-confidence variable on students' mathematical problem solving abilities. Because H0 is rejected, self-confidence has an influence on students' mathematical problem solving abilities.

c. Coefficient of Determination

The formula used to determine the correlation coefficient in this research is the Product Moment correlation test. The results of r calculations using SPSS 16 are as follows:

Table 6. R value and coefficient of determination

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723[a]	.523	.505	4.647

a. Predictors: (Constant), Self Confidence
b. Dependent Variable: Kemampuan Pemecahan Masalah Matematis

From the table above, it is obtained that the correlation/relationship value R is 0.723 and the coefficient of determination is 0.523 or 52.3%. So, the influence of Self Confidence on problem solving abilities is 52.3% while the remaining 47.7% is explained or influenced by other factors. So, Self Confidence influences problem solving abilities by 52.3%.

Discussion

Based on the research results obtained, it is known that self-confidence influences students' mathematical problem solving abilities with the linear regression equation, namely $\hat{Y} = 55.153 + 0.501X$. With this regression equation, it can be seen that the regression coefficient is positive, meaning that students' self-confidence has a positive influence on students' mathematical problem-solving abilities, which means that the higher the students' self-confidence, the higher the students' mathematical problem-solving abilities. Furthermore, based on the variance analysis of the F test carried out, it was found that self-confidence had an effect on students' mathematical problem solving abilities. This means that the better the self-confidence, the better the students' mathematical problem solving abilities. These results are in line with the research results of Mustika, Yurniwati and Hakim (2018), which stated that the better self-confidence, the better students' mathematical problem solving abilities.

The correlation coefficient between self-confidence and students' mathematical problem solving abilities is 0.723. The coefficient of determination obtained was 52.3%. This means that students' mathematical problem solving abilities are influenced by self-confidence by 52.3%. Meanwhile, 47.7% was influenced by other factors, one of which was student creativity, namely students' various ways of answering to get the correct answer. This is supported by the results of research conducted by Lestari, Noer and Gunowibowo (2019) that creativity influences students' mathematical problem solving. So self-confidence has an influence but has a small effect on students' mathematical problem solving abilities, especially in class VIIIB students at SMPN 1 Sewon. These results are in line with research by Nurhayatun (2021) which shows that self-confidence influences students' mathematical problem-solving abilities with an influence of 23.7%. while the remaining 76.3% is influenced by other variables outside those studied.

CONCLUSION

From the results of the calculations and discussion above, it can be concluded that based on the results of the research and discussion, it can be concluded that self-confidence has an influence on students' mathematical problem solving abilities in class VIIIB SMPN 1 Sewon odd semester of the 2024/2025 academic year. Based on the results of this research, suggestions that can be put forward are:

1. Teachers are advised to create innovations in mathematics learning that can encourage students to increase their self-confidence so that in the end they can improve students' mathematical problem solving abilities.
2. Other researchers who will conduct research on self-confidence are advised to look for other factors that have a big influence.

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