

THE EFFECT OF SELF-CONFIDENCE ON THE MATHEMATICAL THINKING ABILITY OF JUNIOR HIGH SCHOOL STUDENTS

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Abstrak

Mathematical thinking ability is the ability to use reasoning to build mathematical arguments, the ability to develop strategies or methods, understand mathematical content, and the ability to communicate ideas. The mathematical thinking ability as a learning goal and at the same time as a way to learn mathematics is an important ability to be developed in solving problems. One of the factors that influence students' mathematical thinking ability is self-confidence. The purpose of this study was to analyze the effect of self-confidence on students' mathematical thinking ability. This research is quantitative research. The sample in this study was 72 students of VIIth grade junior high school students in Kudus Regency, Indonesia. The data collection technique consisted of a written test of mathematical thinking ability and a self-confidence questionnaire. The data analysis technique is a simple linear regression test. Based on the results of the study showed that self-confidence has a positive and significant effect of 25.5% on mathematical thinking ability.

Keywords: Mathematical thinking ability; junior high school; self-confidence; students.

Abstrak

Kemampuan berpikir matematis adalah kemampuan menggunakan penalaran untuk membangun argumen matematis, kemampuan mengembangkan strategi atau metode, memahami isi matematis, dan kemampuan mengomunikasikan gagasan. Kemampuan berpikir matematis sebagai tujuan pembelajaran dan sekaligus sebagai cara belajar matematika merupakan kemampuan yang penting untuk dikembangkan dalam memecahkan masalah. Salah satu faktor yang mempengaruhi kemampuan berpikir matematis siswa adalah rasa percaya diri. Tujuan penelitian ini adalah untuk menganalisis pengaruh kepercayaan diri terhadap kemampuan berpikir matematis siswa. Penelitian ini merupakan penelitian kuantitatif. Sampel dalam penelitian ini adalah 72 siswa kelas VII SMP di Kabupaten Kudus, Indonesia. Teknik pengumpulan data terdiri dari tes tertulis kemampuan berpikir matematis dan angket kepercayaan diri. Teknik analisis data yang digunakan adalah uji regresi linier sederhana. Berdasarkan hasil penelitian menunjukkan bahwa kepercayaan diri berpengaruh positif dan signifikan sebesar 25,5% terhadap kemampuan berpikir matematis.

Kata kunci: Kemampuan berpikir matematis; sekolah menengah pertama; percaya diri; siswa.



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INTRODUCTION

Mathematics becomes the pioneer of modern technology education development in Indonesia (Yaniawati et

al., 2019). Mathematics is very crucial for thinking, discussing, and solving daily life problems, real working problems, and science and technology

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(Bintoro et al., 2021; Genc & Erbas, 2019; Kenedi et al., 2019; Muhtadi et al., 2018; Sari & Mahendra., 2017).

Mathematics learning requires students to think mathematically (critically, systematically, logically, and creatively) (Kahar, 2017). Mathematical thinking is a mental activity that aims to study the world around and build patterns of relationships between various objects and phenomena of reality (Tran et al., 2017). Mathematical thinking ability is the ability to use reasoning to build mathematical arguments, the ability to develop strategies or methods, understanding mathematical content, and the ability to communicate ideas. The ability to think mathematically is needed by students, related to the needs of students to solve the problems they face every day (Schoenfeld, 2016).

In terms of this mathematical thinking process, there are 4 concepts related to mathematical thinking, namely: (1) mathematical abilities; (2) mathematical skills; (3) carry out mathematical processes (doing mathematics); (4) mathematical tasks. From the four, it can be identified that mathematical thinking can be assumed as an implementation in carrying out mathematical activities or processes (doing math) or mathematical tasks. The PISA results in 2018 and TIMSS results in 2015 showed low mathematics thinking skills of JHS students.

The results Survey Program for International Students Assessment (PISA) in 2018, Indonesia was ranked 7th from the bottom with 379 points (OECD, 2019). This shows a decline in PISA results in 2018. As a result of this achievement, Indonesia's PISA ranking dropped from 72 to 77 (OECD, 2019). The survey results of The Trends International Mathematics and Science

Study (TIMSS) Indonesia are also not much different from the results of PISA. The results of the 2015 TIMSS study got a score of 397 points, Indonesia is ranked 45th out of 50 countries. This proves that for math problems that require higher-order thinking skills, junior high school students are far below the international average, even with some neighboring countries, such as Malaysia, Singapore, and Thailand. This is because students are not confident in answering math problems (Ameliah et al., 2016).

Self-confidence is needed in learning mathematics because with confidence, students are confident in what they are doing and believe that solving the problem being solved is correct and in accordance with definitions, formulas and other reasons (Adharini & Herman, 2020). Self-confidence is very important for students to learn mathematics in order to succeed (Yates, 2002). So that students have high self-confidence while in the learning process in the classroom, it must start from within the students themselves. Because he is the only one who feels a lack of self-confidence, he must be able to overcome it by evaluating himself objectively, giving honest appreciation to himself, positive thinking, and having the courage to take risks (Afifah et al., 2019). The indicators of self-confidence are: believe in their own abilities, are optimistic in the face of difficulties, dare to express opinions, act independently in making decisions (Lauster, 2002).

From the problems, the researchers applied a study to analyze the effect of self-confidence on mathematical thinking ability at Junior High School learners.

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METHODS

This experimental research examined the effect of self-confidence on the mathematical thinking ability. Thus, the researchers must control other factors that might influence the outcome (Creswell, 2014). The applied design was one-shot case design without a comparison group and pretest. The researchers applied the design to analyze the effect of self-confidence (X) on students' mathematical thinking ability (Y).

The research population consisted of seventh graders at SMP 1 Kudus and SMP 1 Dawe Kudus. All school locations were in Kudus Regency, Central Java Province, Indonesia. The researchers took the sample randomly, consisting of 36 students at VII grades of SMP 1 Kudus and 36 students at VII grades of SMP 1 Dawe Kudus.

The techniques of collecting data were tests and non-tests. The test consisted of five item descriptions of mathematical thinking ability that have previously been tested for validity, reliability, level of difficulty, and discriminatory power. The non-test instrument was in the form of a self-confidence questionnaire.

The initial step in this research is to provide a self-confidence questionnaire. Next, the sample group is given a learning treatment that emphasizes students' self-confidence. After learning is complete, students are given a mathematical thinking ability test. The technique of analyzing the data

was simple linear regression. The regression was useful to analyze the effect of self-confidence on students' mathematical thinking ability.

RESULTS AND DISCUSSIONS

The researchers analyzed the self-confidence effect on students' mathematical ability. In this analysis, the researchers used SPSS. The results of the analysis would be SPSS output tables. At the beginning, the researchers determined the simple linear regression equation, $Y = \alpha + bX$. Table 1 shows the regression equation $Y = 2.625 + 1.262XX$.

Table 1. Simple linear regression equation

Model	Unstandardized Coefficients (B)
(Constant)	2.625
Self_confidence	1.262

Dependent Variable: math_thinking

The second step of regression testing is to determine the linearity test of the regression equation. This test step is carried out to determine whether the regression equation is linear or not. The research hypothesis is:

H_0 = non-linear regression equation

H_a = linear regression equation

The given significant level in this test was 5%. The result accepted H_0 if the sig-value was higher than 0.05. The results of the linearity analysis of the regression equation are presented in Table 2.

Table 2. Test regression significance

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	5269,892	1	5269,892	23,900	000 ^b
Residual	15435,094	70	220,501		
Total	20704,986	71			

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Table 2 shows the Sig-value is 0, lower than 0.05. The result denies H_0 but accepts H_a . The decision asserted that the model was linear.

After determining the linearity, the researchers examined the coefficient significant of the regression equation to ensure the data consistency and the effect of self-confidence toward

mathematical thinking ability. The condition of the data consistency and effect was a sig-value higher than 0.05 accepted H_0 and denied H_a .

H_0 = coefficient has no significant effect
 H_a = coefficient has significant effect.

Table 3 shows the results of the analysis of the significance of the regression equation coefficients.

Table 3. Significance test of regression equation

Model		Coefficients		t	Sig.
		Coefficients ^a			
		Unstandardized Coefficients	Standardized Coefficients		
	B	Std. Error	Beta		
1	10,404.802	2,625		.252	(Constant)
	self_confidence	.258	.505		1,262
		4,889	.000		

The data analysis results show a sig-value higher than the α -value, $0.802 > 0.05$. Therefore, H_0 is rejected and H_a accepted. That is the constant α is not significant. As for the coefficient of self confidence, the sig value is 0 lower than 0.05. The result denies H_0 and accepts H_a . Thus, the result shows self-

confidence positively influences the mathematics thinking ability.

The fourth step of the regression test was – determining the coefficient. This step was useful to examine the self-confidence effect on mathematical thinking ability.

Table 4. Results determination coefficient test

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.505 ^a	.255	.244	14,84929	

Table 4 shows the R-square 0.255 or 25.5%, indicating a 25.5% positive and significant effect on mathematical thinking skill. On the other hand, a percentage of 74.5% is influenced by other factors not examined in this study. This means that if self-confidence students is higher, the students' mathematical thinking abilities will also be higher. In line with (Çiftçi & Yildiz, 2019) that self-confidence has a very large influence on mathematical achievement. This is because self-confidence has become one of the most important variables that determine

students' mathematical achievement in recent years. This is also in accordance with the opinion of Hendriana et al. (2018) that there is a high relationship between mathematical ability and self-confidence. This means that high self-confidence will result in high mathematical ability or vice versa. Because the relationship between the two is positive, it is very likely that the development of students' self-confidence will increase their achievement (Miscevic-kadijevic, 2015).

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The impact caused by the lack of self-confidence will cause errors or errors in the learning process and in the process of solving problems (Widyanti et al., 2017). Errors in answering questions have an impact on students' low mathematical thinking skills (Fajri, 2017). The ability to think mathematically requires students to solve non-routine problems, in this case the ability to think mathematically contributes greatly to the development of students' capabilities in facing the realities of life in the future (Fajri, 2017). So, to improve students' mathematical thinking s ability, students' self-confidence also needs to be improved. However, self-confidence does not just appear in a person, there is a certain process in his personality so that the formation of self-confidence occurs (Afifah et al., 2019).

Self-confidence is an attitude that arises from the desire to manifest itself to act and succeed. Self-confidence can arise thanks to the recognition of the environment (Solihah et al., 2018). One that gets the greatest attention to the many variables of mathematics attitude is self-confidence. Self-confidence has a stronger correlation with achievement than other affective variables. In general, students who are confident in their abilities in mathematics are more comfortable when dealing with mathematical situations, so developing self-confidence is important in itself. Students who have high math confidence have low math anxiety and vice versa (Khasawneh et al., 2021). Increasing students' self-confidence is a continuous process, so the process of gaining self-confidence takes time. The way to increase students' self-confidence is that teaching and learning must be carried out in an integrated and sustainable manner, the teacher must

model the expected behavior; students are accustomed to showing the expected behavior, and make students recognize the understanding of the expected behavior (Hendriana et al., 2014).

Self-confidence can support one's success, including in learning mathematics. Self-confidence is one of the most influencing factors in learning (Al-Hebaish, 2012; Hannula et al., 2004). Self-confidence is defined as believing in one's own abilities, daring to express opinions, not depending on others, being optimistic, and taking responsibility for completing tasks (Amiyani & Widjajanti, 2019). Students who have low self-confidence in the learning process will most likely have an effect on their low ability to solve problems (Telbis et al., 2014). According to (Darmawan et al., 2018) there is a correlation between self-confidence and students' ability to solve problems, namely: 1) students who have a confident attitude in learning mathematics. mathematicians tend to be bolder in taking steps to solve problems, outside of general procedures; 2) students who have confidence in mathematics tend to have many ideas in solving problems or have more than one way to solve problems.

CONCLUSION AND SUGGESTION

Based on the results of the study, self-confidence has a positive and significant effect of 25.5% on mathematical thinking ability. The researcher suggests mathematics teachers develop lessons that facilitate increasing students' self-confidence and mathematical thinking through innovative learning models and media. Further research can analyzes the influence of other affective factors such as self-efficacy, mathematical disposition, and self-concept on students' mathematical thinking ability.

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