THE INFLUENCE OF MATHEMATICAL LOGIC INTELLIGENCE AND STUDENTS' CONFIDENCE ON PROBLEM SOLVING ABILITY

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Abstract

This study aims to determine the influence of mathematical logic intelligence and students' confidence on problem-solving abilities. The method used in this study was a quantitative survey method by taking a sample of 34 students randomly. The data collection technique uses a questionnaire instrument for intelligence, logic, mathematics and self-confidence, while the test instrument for problem solving ability is in the form of a description question consisting of 5 questions. Testing the hypothesis of mathematical logic intelligence variables with problem-solving ability obtained t_{count} 2.750 > t_{table} 2.040 and Sig. value of 0.010 < 0.05 test criteria, it can be concluded that there is an influence of mathematical logic intelligence on problem solving ability. While the hypothesis of students' self-confidence with problem-solving ability was obtained t_{count} 2.529 > t_{table} 2.040 and Sig. value of 0.017 < 0.05 test criteria, it can be concluded that there is an influence of self-confidence on problem solving ability. Test the hypothesis of mathematical logic intelligence and students' confidence in problem solving ability obtained regression equation $Y = -41.487 + 0.508X_1 + 0.336X_2$ with a value of $F_{calculate}$ 17.206 > F_{table} 3.295 and Sig. values of 0.000 < 0.05 which means that there is a significant influence of mathematical logic intelligence and confidence on problem solving ability. The R Square value obtained is 0.526, which means that simultaneously the variables of intelligence, mathematical logic and self-confidence affect problem solving ability by 52.6%.

Keywords: mathematical logic intelligence, self-confidence, problem-solving ability

INTRODUCTION

Education has an important role for the creation of intelligent and characterful Human Resources which are prerequisites for the formation of a high civilization. Through education a person will gain insight into science both about information and things needed for the progress of his life, it will all be obtained through a learning process. One of the lessons in school is mathematics learning. Mukarromah (2019) stated that learning mathematics is very useful in everyday life because it will always be related to daily human behavior. Not only about numbers or formulas, activities such as buying and selling, saving or designing and building a building all involve mathematical concepts that can be obtained through learning mathematics.

Mathematics is a subject that has an important role. This is supported by Mashuri (2019) who states that mathematics is a universal science that has an important role in various disciplines and develops human thinking, as well as underlies the development of modern technology.

In mathematics learning activities, mathematical logic intelligence is needed. The reason for the intelligence of mathematical logic must be owned by every student is stated by Mukarromah (2019) that through the intelligence of mathematical logic students can more easily solve the mathematical problems given. In line with that, Zulkarnain & Nurbiati (2019) stated that when solving math problems, students need to understand the relationship between the information in the problem so that they have an idea of solving the problem and this skill can be done well by people who have mathematical logic intelligence.

In addition, the ability that is no less important needs to be possessed by every student to support his success in learning mathematics is self-confidence. Yulianto, Nopitasari, Qolbi, &; Aprilia (2020) suggests that with self-confidence in students, it will allow them to be able to believe in their abilities, not give up easily in facing every problem so that students are able to do all the tasks given independently and with maximum results. Therefore, this confidence needs to be instilled in students because it can bring students to be active and try optimally in solving all problems faced, including mathematical problems.

Because basically mathematics cannot be separated from various problems, it requires an ability called problem solving ability. Problem-solving ability is related to learning success in school, as Nurhasanah & Luritawaty (2021) said that the more students who can solve a problem, the higher the learning success rate.

Based on the results of an interview with one of the mathematics subject teachers at SMAN 5 Tangerang Regency that there are still some students who are not happy with mathematics so they find it difficult to solve math problems and tend to lack understanding of a problem and solve it properly. In addition, there are still some students who lack confidence in their ability to do a math problem so it is an additional task for the teacher to accompany and become a facilitator in the classroom to foster student confidence.

Based on this background, the author is interested in conducting research entitled "The Influence of Mathematical Logic Intelligence and Students' Confidence on Problem Solving Ability".

METHODS

The study used quantitative research methods of survey type conducted at SMAN 5 Tangerang Regency with a sample of 34 students using simple random sampling techniques.

The dependent variable in this study was problem-solving ability (Y) while the independent variable was mathematical logic intelligence (X_1) and students' self-confidence (X_2). The research design is as follows:

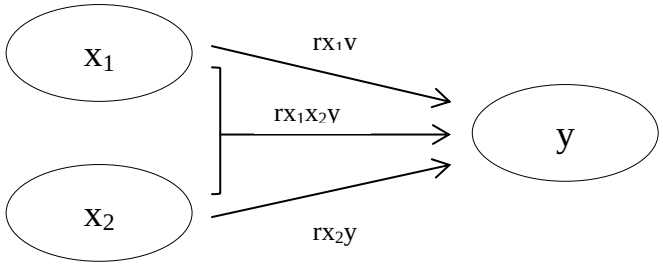

Figure 1. Research Design

In quantitative research, statistical analysis is carried out to answer the formulation of the problem and the submission of hypotheses proposed. In this study, the analysis aims to determine whether or not there is an influence of mathematical logic intelligence and students' confidence on problem-solving abilities.

Before analyzing the data, classical assumptions will be tested to qualify: normally distributed data, data is linear, free of multicollinearity, free of autocorrelation and free of heterokedacity. After testing classical assumptions as a prerequisite before data analysis, the next step is hypothesis testing. Hypothesis testing is performed by multiple linear regression analysis, which includes the F test and the t test. In addition, to find out how much the percentage of influence given using the coefficient of determination test.

RESULTS AND DISCUSSION

Based on the results of the research obtained, the descriptive data can be presented in the following table 1.

Table 1. Descriptive Statistics of Research Results

Statistics		MLI	SC	PSA
N	Valid	34	34	34
	Missing	0	0	0
Mean		71,00	84,32	22,94
Median		71,00	85,00	23,50
Mode		71	85	12
Std. Deviation		6,276	8,724	7,540
Variance		39,394	76,104	56,845
Range		27	39	24
Minimum		57	68	12
Maximum		84	107	36

After the data is analyzed statistically descriptively, then the next is inferential analysis which aims to test the research hypothesis. Before testing the research hypothesis, the researcher first tests the prerequisites for data analysis and determines the linear regression equation model.

Table 2. Data Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		34
Normal Parameters	Mean	,0000000
	Std. Deviation	5,19034472
Most Extreme Differences	Absolute	,077
	Positive	,057
	Negative	-,077
Test Statistic		,077
Asymp. Sig. (2-tailed)		,200[c,d]

Based on the table 2 above, it can be seen that the value of Asymp. Sig. (2-tailed) in the Kolmogorov-Smirnov test of 0.200 is greater than the significant level of 0.05 so that 0.200 > 0.050 which means H_0 is rejected and H_1 is accepted. Therefore, residual data can be said to be normally distributed so that it can be said that the data is normally distributed and can be continued with other classical assumption tests.

Table 3. Results of Linearity Test Data Intelligence Mathematical Logic with Problem Solving Ability

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Problem Solving Ability * Mathematical Logic Intelligence	Between Groups	(Combined)	1325,882	19	69,783	1,776	,138
		Linearity	803,449	1	803,449	20,451	,000
		Deviation from Linearity	522,433	18	29,024	,739	,731
	Within Groups		550,000	14	39,286		
	Total		1875,882	33			

Based on the table 3 above, it can be seen that the value of Sig. in the Deviation from Linearity line is 0.731 > 0.05. This shows that there is a significant linear relationship between the variable of mathematical logic intelligence and the variable of problem solving ability.

Table 4. Data Linearity Test Results Confidence with Problem-Solving Ability

ANOVA Table					
	Sum of Squares	df	Mean Square	F	Sig.

Problem-solving Ability * Self-Confidence	Between Groups	(Combined)	1352,549	19	71,187	1,904	,112
		Linearity	770,036	1	770,036	20,600	,000
		Deviation from Linearity	582,513	18	32,362	,866	,619
	Within Groups		523,333	14	37,381		
	Total		1875,882	33			

Based on the table 4 above, it can be seen that the value of Sig. in the Deviation from Linearity line is 0.619 > 0.05. This shows that there is a significant linear relationship between the confidence variable and the problem-solving ability variable.

Table 5. Data Multicollinearity Test Results

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-41,487	11,119		-3,731	,001		
	Mathematical Logic Intelligence	,508	,185	,423	2,750	,010	,646	1,548
	Students' Confidence	,336	,133	,389	2,529	,017	,646	1,548
a. Dependent Variable: Problem-Solving Ability								

Based on table 5 above, it can be seen that the Tolerance value obtained is 0.646 and the VIF value is 1.548. This shows that the Tolerance value > 0.100 and the VIF value < 10.00, so it can be concluded that between independent variables there are no symptoms of double collinearity or can be said to be free from multicollinearity.

Table 6. Heteroscedasticity Test Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	6,814	6,381		1,068	,294
	Mathematical Logic Intelligence	,073	,106	,151	,693	,494
	Students' Confidence	-,094	,076	-,268	-1,227	,229
a. Dependent Variable: RES_2						

Based on table 6 above, can be seen that the value of Sig. in the variables of intelligence, mathematical logic and self-confidence are 0.494 and 0.229 respectively, which means greater than 0.05. Based on this, it can be concluded that there is no heteroscedasticity in the regression model so that the regression model is feasible to use.

The regression models in this study are:

$$Y = -41{,}487 + 0{,}508X_1 + 0{,}336X_2$$

Hypothesis Testing

Knowing whether there is an influence of mathematical logic intelligence on problem solving ability

Table 6. Test Results t

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-41,487	11,119		-3,731	,001
	Mathematical Logic Intelligence	,508	,185	,423	2,750	,010

a. Dependent Variable: Problem-Solving Ability

Table 6 shows that the calculated value of mathematical logic intelligence is 2.750 with t_{table} of 2.040. Based on the test criteria that if $t_{calculate} > t_{table}$, H_0 is rejected and H_1 is accepted, and obtained Sig. values of 0.010 < 0.05, it can be concluded that there is a significant influence of mathematical logic intelligence on problem solving ability.

Knowing whether there is an influence of student confidence on problem-solving ability

Table 7. Test Results t

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-41,487	11,119		-3,731	,001
	Student's Cofidence	,336	,133	,389	2,529	,017

a. Dependent Variable: Problem-Solving Ability

Table 7 also shows that the value of calculating studens' confidence is 2.529 with ttable of 2.040. Based on the test criteria that if $t_{calculate} > t_{table}$, H_0 is rejected and H_1 is accepted, and obtained Sig. values of 0.017 < 0.05, it can be concluded that there is a significant influence of students' confidence on problem solving ability.

Knowing whether there is an influence of mathematical logic intelligence and student confidence on problem solving ability

Table 8. Test Results F

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	986,873	2	493,436	17,206	,000[b]

	Residual	889,009	31	28,678		
	Total	1875,882	33			
a. Dependent Variable: Problem-Solving Ability						
b. Predictors: (Constant), Students' Confidence, Mathematical Logic Intelligence						

From table 8 above, Fcalculate is 17.206 and F_{table} value is 3.295. Based on the test criteria that if $F_{calculate} > F_{table}$, H_0 is rejected and H_1 is accepted, and a Sig. value of 0.000 < 0.05 is obtained, which means that there is a significant influence of mathematical logic intelligence and students' confidence on problem solving ability simultaneously.

Table 9. Coefficient of Determination Test Results

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,725[a]	,526	,496	5,355
a. Predictors: (Constant), Students's Confidence, mathematical logic intelligence				
b. Dependent Variable: Problem-Solving Abiliy				

Table 9 above shows that the R Square value is 0.526 which means that simultaneously the variables of intelligence, mathematical logic and self-confidence affect problem solving ability by 52.6%, while 47.4% are influenced by variables not observed in this study.

CONCLUSION

1. The intelligence of mathematical logic partially has a positive and significant effect on problem-solving abilities. This is indicated by a calculated value of 2.750 and a ttable of 2.040 and a Sig. value of 0.010.
2. Students' confidence has a partial positive and significant effect on problem-solving skills. This is indicated by a calculated value of 2.529 and a ttable of 2.040 and a Sig. value of 0.017.
3. Students' mathematical logic intelligence and self-confidence simultaneously had a positive and significant effect on problem-solving ability by 52.6%. This is indicated by an Fcalculate value of 17.206 and an Ftable value of 3.295 and a Sig. value of 0.000.

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