

## THE CORRELATION BETWEEN SELF REGULATED LEARNING TOWARD MATH WITH MATHEMATICAL LOGICAL THINKING SKIL

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### Abstract

The present research aims to analyze the correlation between mathematics Self regulated learning and mathematical-logical thinking skills. The design of the research is survey correlation analysis as it is suitable to validate the relation of the two quantitative variables. To retrieve the data, 60 seventh grade students of two classrooms were sampled through cluster random sampling in SMP PGRI Pameungpeuk. The instruments employed to gather the intended data were logical-mathematical intelligence test consisting of 4 questions and self regulated learning scale consisting of 25 statement. Further, the data were analyzed in a quantitative manner modeled to logical-mathematical thinking skills data and self regulated learning scale using SPSS 20. The analysis revealed that students' mathematical Self regulated learning significantly affects students' logical-mathematical thinking skills.

**Keywords:** Mathematical Logical Thinking Skill, Self Regulated Learning

### Abstrak

Penelitian ini bertujuan untuk menganalisis hubungan antara kemandirian belajar matematik dengan kemampuan berpikir logis matematik. Desain penelitian ini adalah survey dengan teknik korelasi. Teknik korelasi digunakan dikarenakan pada penelitian ini penulis akan mencari hubungan antara dua variable yang bersifat kuantitatif. Pada penelitian ini penulis menggunakan sampel 60 siswa kelas VII sebanyak dua kelas yang dipilih secara *cluster random sampling* yang dilakukan di SMP PGRI Pameungpeuk. Instrumen penelitian yang digunakan dalam penelitian ini berupa tes kemampuan berpikir logis matematik dan skala sikap kemandirian belajar siswa, yaitu digunakan 4 soal kemampnan berpikir logis matematik dan 25 pernyataan mengenai kemandirian belajar. Analisis data dilakukan secara kuantitatif yang dilakukan terhadap data kemampuan berpikir logis matematik dan skala sikap kemandirian belajar. dalam perhitungan statistik menggunakan SPSS 20, hasil penelitian menunjukkan bahwa kemandirian belajar matematik siswa mempengaruhi kemampuan berpikir logis matematik siswa.

**Kata Kunci:** Kemampuan berpikir logis Matematik, kemandirian belajar.

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## INTRODUCTION

Mathematics is a very important science in forming thinking patterns and being able to solve problems independently and responsibly (Hajar & Sari, 2018). Education is one of learning processes affecting human thinking pattern when facing changes in life. According to Rahmi, Nadia, Hasibah, & Hidayat (2017) state that "Education is an important aspect that can measure the quality of an individual's life and a nation". Furthermore, mathematics is one of the subjects taught at all school's levels since mathematical knowledge has an important role in people's life (Purnamasari & Herman, 2016). However, in this present time, learning mathematics only directs students to memorize the formulas. According to Harris (Rahman, 2012) formal mathematics education only emphasizes analytical skills that teach students in how to understand claims, follow or create logical arguments, describe answers, eliminate the incorrect paths, and focus on the right path. Whereas, students should also be taught to understand the formulas they have learned in order to be able to use and apply them in their daily life.

The mathematical-logical thinking skills is one of the mathematical skills that have to be mastered by students. The ability to think logically is one of the characteristics that have to be possessed by students because it can affect the effectiveness of the teaching and learning process in the classroom. Mathematical thinking ability of students at the junior high school level is still very low (Hendriana & Fadhillah, 2019). Mathematical-logical thinking skills can be interpreted as the ability to think logically where the truth depends on arguments and cannot be measured by the natural law to obtain a knowledge based on a certain pattern. Capie dan Tobin (Hidayat & Sumarmo, 2013) state that logical thinking skills includes five components, namely: controlling variables, proportional reasoning, probabilistic reasoning, correlational reasoning, and combinatorial thinking.

Furthermore, Saragih (Fitriana, Ihsan, & Annas, 2015), reveals that logical thinking has a difference with memorization. Memorization only refers to the achievement of how one can memorize as well as possible. While logical thinking refers more to understand the essence of knowledge or the ability to understand the knowledge, the ability to apply the knowledge, the ability to analyze the knowledge, and the ability to synthesize the knowledge, even the ability to evaluate to form the new skills. In an effort to develop students' mathematical-logical thinking skills, teachers have to guide students to solve mathematical problems rationally and draw logical conclusions from the problems given.

In mathematics learning, there are two things that must be pursued by the students, namely *hard skills* and *soft skills*. The ability to think logically is included in hard skills while one of the mathematics' soft skills is self-regulated learning. Hargis and Kerlin (Hidayat & Sumarmo, 2013) define self-regulated learning as a careful self-design process and monitoring the cognitive and affective processes in completing an academic task. In addition, (Suhendri, 2011) defines self-regulated learning as a learning activity carried out by students without relying on help from others, both friends, and teachers in achieving learning goals, such as mastering the material or knowledge with their own awareness and applying their knowledge in solving the problems in their daily life. Thus, self-regulated learning is an active learning activity that can be achieved by designing students' cognitive and affective aspect, therefore, they can solve the problems with the knowledge they have been possessed and realized them through the real and independent action.

Self-regulated learning is a mental attitude that exists in students mind that direct them to do things without relying on others (Ningsih, Mardiyana, & Iswahyudi, 2014). The success of students in learning mathematics is determined by self regulated learning of each individual (Fadhillah & Hernawati, 2019). The strategy of self-regulated learning includes some activities, such as self-evaluating, regulating and transforming, setting goals and designing, seeking information, taking note and monitoring, compiling the environment, finding consequences, repeating and memorizing, seeking social assistance, and reviewing records (Hidayat & Sumarmo, 2013). Self regulated learning will require them to be active both before and after the learning process takes place, so that students who apply independent learning will be able to solve their own problems (Amalia, Syafitri, Sari, & Rohaeti, 2018). Furthermore, self-regulated learning leads students to be aware to study and solve the problems they faced independently. Therefore, the student who becomes a self-regulated learner will have full responsibility to the entire of learning process.

## **METHOD**

Research design used in this study were survey and correlation technics. The correlation technics was used because this study aimed to find relations between two quantitative variables. Sample was coming from 60 8th grade students from two different classes in SMP PGRI Pameungpeuk chosen by cluster random sampling. Mathematical test used was logical thinking ability test arranged into 4 essay problems. Essay test was aimed to push student to organize their own answer so they could rationally answer problems and drew conclusions from the given problems. For testing self-regulated learning development, sample was given 25 points of statements provided with 4 answer choices. Author used Likert scale with the answer 'SS' for obviously agree, 'S' for agree, 'TS' for disagree, and 'STS' for totally disagree. Assessment was done by scoring 'SS' =4, 'S' = 3, 'TS' = 2, and 'STS' = 1 for positive statements. While, scoring matrix 'SS' = 1, 'S' = 2, 'TS' = 3, and 'STS' = 4 was used for negative statements. Logical thinking instrument was consulted to supervisor and self-regulated learning instrument was consulted to guidance and counselling teachers at school. After that, the instruments were tested to measure their validity, reliability, differing power, and difficulty index to gain empirical validity.

The steps done to prepare the instruments were:

- 1) Determining the problem that would be tested
- 2) Creating problems based on mathematical logical thinking ability
- 3) Creating scoring guidelines
- 4) Doing validity test to instruments prepared
- 5) Revising
- 6) Scoring matchiness between materials, indicators, and test problems.

## **RESULTS AND DISCUSSION**

### **Results**

In order to find out how strong the relationship between self-regulated learning of mathematics and mathematical-logical thinking skills, Pearson correlation tests were used with the criteria: If  $N\text{-sig.} > 0.05$  then,  $H_0$  is accepted

**Table1.** Guildford's Correlation Criteria

Threshold	Criteria
.01 to .20	Very weak
.20 to .40	Weak
.40 to .70	Moderately strong
.70 to .90	Strong
.90 to 1.00	Very strong

**Table 2.** The Result of the Correlation between Self-regulated Learning and Mathematical-Logical Thinking Skills

		Self-regulated Learning	Post-test
Pearson Correlation	Self-regulated Learning	1.000	.476
	Post-test	.476	1.000
Sig. ( <i>One-tailed</i> )	Kemandirian Learning	1.000	.000
	Postes	.000	1.000
N	Self-regulated Learning	70	70
	Post-test	70	70

According to results in Table 2., correlation value between self-regulated learning and mathematical logical thinking was .476 with .000 significant value (sig). While, as shown in Table 1., the gained correlation value indicating that self-regulated learning was strongly correlated to mathematical logical thinking. As the significant value was less than .05,  $H_0$  was rejected. Therefore, self-regulated learning was correlated to mathematical logical thinking.

To measure the effect of self regulated learning to mathematical logical thinking directly, linear regression test from coefficient regression was used. The following hypotheses were tested:

$H_0$  : student's self-regulated learning does not affect mathematical logical thinking

$H_1$  : student's self-regulated learning affects mathematical logical thinking

With the following criteria: If  $N\text{-sig.} > .05$  then  $H_0$  was accepted. The results of the analysis are shown in Table 3.

**Table 3.** The Regression Analysis of Students' Self-regulated Learning and Mathematical-Logical Thinking Skills

Model	Non-standardized Coefficient	Standardized Coefficient	T	Sig.
	B	Std. Error	Beta	
1 (Constant)	35.420	2.616		.000
Post-test	.151	.116	.476	.000

Based on Table 3, it can be seen that the regression equation  $Y = 35.420 + .151x$  defines that the greater the value of students' self-regulated learning of mathematics, the greater their mathematical-logical thinking skills, and vice versa. Since the significant value of .000 is smaller than  $= .05$ , it can be concluded that  $H_0$  is rejected. Thus, students' self-regulated learning of mathematics affects their mathematical-logical thinking skills significantly.

## Discussion

The research activity was only conducted once by giving students a test that measured their mathematical-logical thinking skills, the test consisted of four essay questions. While to find out students' development in self-regulated learning of mathematics, they were given 25 points of statements equipped with four answer choices. These tests were carried out after the teaching and learning activities were completed, so both teacher and students were not disturbed.

After the test, students' answers were analyzed and processed by *SPSS 20*. Based on the data analysis of the hypotheses, the result revealed that students' self-regulated learning of mathematics, generally could influence their mathematical-logical thinking skills. This was shown by the positive value of the regression coefficient; thus, it could be said that self-regulated learning of mathematics influences students' mathematical-logical thinking skills. Because the greater the value of students' self-regulated learning of mathematics, then their mathematical-logical thinking skills improved, and the strong relationship between the two variables also affected in it. Supporting the result, (Ningsih et al., 2014) state that self-regulated learning is a mental attitude in students where they are required to do something without relying on others. Additionally, Monk, dkk (Haerudin, 2013) propose that self-regulated learners would show an explorative behavior, be able to make decisions, become more confident, and creative. Moreover, self-regulated learning could make students think more actively and creatively because they are required to solve problems themselves without or with just a little help from the teacher (Azka & Santoso, 2015). In addition, the research conducted by Suhendri (2011) presents that there is a significant positive effect between mathematical-logical intelligence and students' self-regulated learning on their mathematics learning outcomes.

## CONCLUSION

Based on the analysis, it can be concluded as follows: (1) there is a relationship between the students' self-regulated learning of mathematics and the mathematical-logical thinking skills. (2) students' self-regulated learning of mathematics affects their mathematical-logical thinking skills.

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