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THE INFLUENCE OF CONCEPTUAL UNDERSTANDING OF MATHEMATICS AND SELF REGULATED LEARNING ON LITERACY MATHEMATICAL AT JUNIOR HIGH SCHOOL STUDENTS IN THE REGENCY TANGERANG

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ABSTRACT

The purpose of this research is to investigate the impact of comprehending mathematics concepts and developing self regulated learning skills on the mathematical literacy of junior high school students in Tangerang district, all at the same time. The research methodology used is correlation-based, employing a quantitative approach. The research sample consists of 280 students, with one study group selected per school, specifically class VIII. The validity and reliability of the research statements were assessed using the Pearson correlation test, which demonstrated that all prepared statements were valid. Furthermore, after undergoing reliability testing, all the statements were deemed reliable. The classical assumption tests included normality testing using the one-sample Kolmogorov Smirnov test, a multicollinearity test, a heteroscedasticity test using Spearman correlation, and an autocorrelation test using Durbin-Watson. The research results show that the F-count value is greater than the F-table value with a correlation value of 0.429. It can be concluded that there is a substantial positive relationship between understanding mathematicss concepts and self-regulated learning on the mathematical literacy of junior high school students in Tangerang Regency.

Keywords : Understanding mathematics concepts, Self regulated learning, Mathematics Literacy, Tangerang Regency.

INTRODUCTION

Many students struggle with learning mathematics in school. One key factor contributing to their difficulties is the overemphasis on memorizing numerous mathematical formulas, which leads them to neglect understanding underlying concepts and focus solely on calculations (Pramesti & Prasetya, 2021). These factors cause students to experience difficulties when facing real-life contextual mathematical problems, because to be able to solve these mathematical problems they are required to understand the concept of the problem first (Ulpa, Marifah, Maharani, & Ratnaningsih, 2021). Thus, to effectively solve such problems, students need to engage in problem analysis first, provide reasoning, and communicate their ideas clearly (Masjaya & Wardono, 2018). Therefore, rather than simply memorizing formulas, students should aim for developing logical and critical thinking skills to solve every day mathematical problems—this is known as mathematical literacy.

The mathematical process is the most crucial aspect of mathematical literacy. It involves grasping the core of a problem, defining the problem, applying mathematical knowledge and skills to solve problems, and assessing problems in diverse real-life situations (Sari, 2015). Given the pressing need, students must master mathematical literacy skills. However, the reality is that students in Indonesia still have low mathematical literacy. In a global assessment, Indonesian students ranked 72nd out of 79 countries. The test results revealed that students scored on average 371 in reading, 379 in mathematics, and 396 in science. These scores are still lower than the PISA standard averages: 487 for reading, 489 for mathematics, and 483 for science. In essence, based on the 2018 OECD assessment of mathematical literacy, Indonesia is ranked 7th from the bottom (OECD, 2019).

The low mathematical literacy skills of students in Indonesia are caused by several factors. Factors that influence students' mathematical literacy levels are factors that are within and factors that are outside of students (Wardhani, 2016). One of the factors

within students that influences mathematical literacy abilities is the ability to understand concepts. The ability to understand concepts and interest in reading influences students' mathematical literacy by 43% (Naziliati, Mutaqin, & Ihsanudin, 2022). The ability to understand a mathematical concept is a student's cognitive ability. Understanding this concept makes it easier for students to solve mathematical problems. To be able to learn, process, or obtain further concepts, students must first understand the basic concepts of mathematics. This must be mastered because to solve a problem of course students need to know the relevant rules and these rules are based on the concepts they get, namely through understanding the concepts (Kharis, Salsabila, Haeruman, 2021).

In addition to other factors, students' ability to learn independently also plays a significant role in influencing their mathematical literacy. The self-regulated learning that each student has an influence of 50.2% on their mathematical literacy abilities. In the direct learning process, students' lack of focus can impede their understanding of the material. This lack of understanding may lead to a reluctance to ask questions about unclear material, and a failure to recognize the importance of revisiting previously taught material, ultimately hindering their problem-solving abilities (Hidayat & Marlena, 2023). Therefore, it is crucial for students need to repeat the material again and study independently to be able to understand material they do not understand to be able to solve mathematical problems. Self regulated learning in students has a good influence on mathematical literacy, where the influence of independence on mathematical literacy is 52.8%. Students with high levels of self-regulated learning are adept at identifying problems and information in questions, devising suitable strategies to solve said problems, and providing rationale to support their answers as well as concluding their findings (Agustiani, Agustiani, & Nurcahyono, 2021).

It can be concluded that the mathematical literacy abilities of each student are determined by their conceptual understanding and self-

regulated learning. To provide empirical evidence of how these factors influence mathematical literacy simultaneously, further research is needed. The proposed research is titled “The Influence Of Conceptual Understanding Of Mathematics And Self Regulated Learning On Literacy Mathematical At Junior High School Students In The Regency Tangerang”.

RESEARCH METHODS

The research design in this study is correlational. Correlation research is used to describe the relationship between variables. The relationship between these variables can be explained by correlation coefficient values and statistically significant values (Hamdi & Bahruddin, 2014). The purpose of correlation analysis is to find out whether there is a relationship between two or more variables. To predict the extent of the influence and determine the direction of the relationship, regression analysis is used (Gunawan, 2020). Regression analysis is used to determine whether the pattern of the dependent variable can be predicted through the independent variable (Supardi, 2017). The sampling technique in this research used a simple random sampling technique. The number of students used in the sample was calculated first using the Slovin formula, and 280 were chosen for the sample size. Eight schools were selected for research sampling. The study group chosen was class VII of junior high school. Below is presented the school data that will be used as sampling, namely:

Table 1 Research Sampling School Data

No.	School Name	Number of Students
1.	SMPN 1 CIKUPA	33
2.	SMPN 2 CIKUPA	44
3.	SMPN 3 CURUG	35
4.	SMPN 5 CURUG	33
5.	SMPN 1 KELAPA DUA	34
6.	SMPN 1 PANONGAN	37

7.	SMP BINONG PERMAIN	35
8.	SMPN 2 KELAPA DUA	31

The procedure for obtaining data in this research uses test questions and questionnaires. A research instrument is a tool used by researchers to collect data to make the work done easier and the results good, accurate, complete, and systematic so that it will be easier for the data to be processed and conclusions drawn. A good research instrument used to collect data in a study is an instrument that has been validated both theoretically and empirically (Arikunto, 2019).

The data analysis techniques used in this research are 1) classical assumption test, 2) hypothesis test consisting of correlation test, F significance test, cofficient of determination and multiple regression test. Meanwhile, the data analysis techniques used in test questions and questionnaires are 1) a validity test using the Pearson correlation coefficient test and 2) a reliability test.

RESULTS AND DISCUSSION

Upon completion of the validity test, it was determined that all questions in the mathematics concept understanding test, the self regulated learning questionnaire, and the mathematical literacy test were valid. Valid questions were then moved on to the next testing stage, which is the reliability test. In the reliability test, the conceptual understanding test questions scored 0.75, indicating high reliability. The self regulated learning questionnaire scored 0.985, indicating very high reliability, and the mathematical literacy test questions scored 0.464, indicating sufficient reliability.

Based on the power tests of the questions, all 10 questions in the understanding mathematics concepts and self regulated learning tests were classified as sufficient. In terms of difficulty level, the mathematical literacy test questions were categorized as difficult for items 1, 2, 5, 6, and 7, and moderately difficult for items 3, 4, 8, 9, and 10. The understanding mathematics concepts test questions were categorized as having a medium level of difficulty.

Then, the instruments that have been tested can be used to collect data. Once the data is collected, classical assumption testing must be conducted. Since this research involves inferential statistics, it is important to carry out classical assumption tests. The test requirements include normality, multicollinearity, heteroscedasticity, and autocorrelation. The one-sample Kolmogorov-Smirnov test is applied to assess the normality of a distribution. The normality test utilizes the Kolmogorov-Smirnov test. The table below presents the results of the normality test. The following data is presented in the form of normality test results which can be seen in the table below.

Table 2 One-Sample Kolmogorov-Smirnov Test

Statistic		Unstandardized Residual
N		282
Normal Parameters	Mean	0.00
	Std. Deviation	16.75
Most Extreme Differences	Absolute	0.050
	Positive	0.050
	Negative	-0.030
t-Test		0.050
Sig.		0.087

Based on the previous hypothesis, if the resulting significance is greater than 0.05, then the tested data is considered normally distributed. In this case, the significance value is 0.087, which is greater than 0.05, indicating that the data is normally distributed. Following the normality test, the next step is to conduct a multicollinearity test to determine whether there is correlation among the independent variables. The results of the multicollinearity test between the mathematical conceptual understanding ability variables and the self regulated learning variables are presented in the table below.

Table 3 Multicollinearity Test

Statistic	Collinearity Statistics	
	Tolerance	VIF
Conceptual Understanding of Mathematics	0,993	1,007
Self Regulated	0,993	1,007

Based on the results above, we found that the tolerance value for both the conceptual understanding variable and the learning independence variable was 0.993, and the VIF value was 1.007. If the tolerance value is above 0.10 and the VIF value is below 10, we can conclude that there is no correlation between the independent variables or that multicollinearity does not occur. After conducting the multicollinearity test, proceed with the heteroscedasticity test. The heteroscedasticity test is used to determine if there is unequal variance in the residual values of one observation compared to others. If the data variance differs from other observations, it indicates symptoms of heteroscedasticity. A regression model is considered good if symptoms of homoscedasticity are present. Below are the results of the heteroscedasticity test, which will be shown in the table below.

Table 4 Heteroscedasticity Test

Statistic		Conceptual Understanding of Mathematics	Self Regulated Learning	Literacy Mathematical
Conceptual Understanding of Mathematics	Correlation Coefficient	1.000	0.125	0.339
	Sig. (2-tailed)	.	0.035	0.000
	N	282	282	282
Self Regulated Learning	Correlation Coefficient	0.125	1.000	-0.142
	Sig. (2-tailed)	0.035	.	0.017
	N	282	282	282

Upon reviewing the results, it appears that the significance value is below 0.05. This indicates an absence of heteroscedasticity in the regression model.

Following the last heteroscedasticity test, the next step is to conduct an autocorrelation test. The purpose of the autocorrelation test is to determine if there is a correlation between different periods in the linear regression model. The output results

from the autocorrelation test are shown in the image below.

Table 5 Durbin-Watson Test

R	R square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
0.429	0.184	0.178	16.81273	1.570

As per the results mentioned above, the Durbin-Watson (DW) value is 1.570. The dL and dU values, with 282 respondents and 2 independent variables, are 1.79690 and 1.81123. If the DW value is less than dL or greater than (4-dU), it indicates autocorrelation. In this case, the DW value of 1.570 is smaller than dL, suggesting the presence of autocorrelation. Hence, the data will undergo additional testing. The Cochrane-Outcutt method will be used for autocorrelation testing. This method is utilized to address autocorrelation issues in regression models (Aprianto et al., 2020).

After applying the Cochrane-Outcutt method, the resulting DW value is 2.127. The values of dL and dU, considering 282 respondents and 2 independent variables, are 1.79690 and 1.81123. The DW values fall within the dU and (4-dU) range, indicating the absence of autocorrelation.

Next, correlation analysis is carried out to provide an overview of the close relationship between variables and provide an overview of the direction of the relationship that occurs. Double correlation or multiple correlation is a correlation between two or more independent variables together with one dependent variable. Multiple correlation analysis was calculated to determine the degree of relationship between the variables conceptual understanding of mathematics, self regulated learning and mathematical literacy. Below is presented data related to the correlation between variables X1 and X2 and Y simultaneously which can be seen in the table below.

Table 6 Correlation Test

Statistic	Value
R	0.429
R Square	0.184

Adjusted R Square		0.178
Std. Error		16.81
Sig.		0.00

Based on the output results above, it was found that between the variables of mathematical conceptual understanding ability and self regulated learning towards mathematical literacy simultaneously there is a positive correlation where the correlation value is 0.429. The hypothesis testing will proceed using the F-test. The F-test assesses the significance of the influence of mathematical conceptual understanding ability and self regulated learning on mathematical literacy abilities. To determine significance, the calculated F-count value needs to be compared with the F-Table value. The table F values for comparison are provided in the following table.

Next, the hypothesis testing will proceed using the F-test. The F-test assesses the significance of the influence of mathematical conceptual understanding ability and learning independence on mathematical literacy abilities. To determine significance, the calculated F value needs to be compared with the table F value or evaluated using a significance test to obtain the significant value. The table F values for comparison are provided in the following table.

Table 7 F-Test

Statistic	Degree of Freedom	F	Sig.
Regression	2	31.470	0.00
Residual	279		
Total	281		

Based on the preceding results, it is evident that the F-count value obtained is 31,470. Then the F-table value from which 282 respondents were taken was 3.04, therefore it can be concluded that the calculated F-count value is greater than the F-table value. Meanwhile the resulting significance value is less than 0.05. Thus, there is a significant positive influence between the variables of conceptual understanding of mathematics and self regulated learning on students' mathematical literacy abilities simultaneously.

This indicates a substantial correlation between students' mathematical literacy abilities and both their mathematics conceptual understanding ability and self regulated learning. Next, a partial correlation significance test is calculated to determine the independent variable of conceptual understanding or self regulated learning which influences the dependent variable. Partial correlation calculations are used to determine the influence of each independent variable separately on the mathematical literacy variable.

Based on the correlation significance test calculation, it states that mathematics conceptual understanding of mathematical literacy has a significant correlation where the significance value is 0.00 and the correlation value is 0.383. If the correlation value is more than 0.05 and the significance value is less than 0.05, it can be concluded that there is a significant influence between the variable understanding of mathematics concepts on students' mathematical abilities. literacy skills.

There is a significant correlation between self regulated learning and mathematical literacy, where the significance value is 0.007 and the correlation value is -0.161. To see the magnitude of the relationship, you can look at the correlation value, while to see the direction of the relationship, you can look at the sign. If the correlation value is more than 0.05 and the significance value is less than 0.05, it can be concluded that between these variables there is a significant correlation. However, the direction of the relationship between the influence of self regulated learning on mathematical literacy is "reverse", where seen in the output the sign has the symbol "-". So, it was concluded that there was a significant influence between self regulated learning on mathematical literacy which had a negative value.

Next, the coefficient of determination is calculated. This analysis was carried out to provide an overview of the extent of the influence of the partial independent variables on the mathematical literacy variable. that the contribution of the variable factor

of mathematical conceptual understanding ability to mathematical literacy ability is 14.6% while the other 86% is determined by other factors. The contribution of the self regulated learning factor to mathematical literacy skills is 2.6%, while the other 97.4% is determined by other factors.

Multiple linear regression analysis can be used to quantify the extent of influence and ascertain the cause-and-effect relationship between these variables.

The following multiple linear regression equation is used for three variables:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

From the output produced above, the following regression equation can be obtained.

$$Y = 49{,}201 + 0{,}504 X_1 - 0{,}421 X_2 + \varepsilon$$

From the equation above the constant value (a) in the equation is 49.201, and its positive sign indicates a one-way influence between the independent variables of conceptual understanding of mathematics and self regulated learning and the dependent variable of mathematical literacy. If the independent variables remain unchanged (X = 0), a mathematical literacy value of 49.201 is obtained. Additionally, the value of β_1 is 0.504, meaning that a 1% increase in mathematical conceptual understanding leads to a 0.504 increase in mathematical literacy. The value of β_2 is 0.421, indicating that a 1% increase in self regulated learning results in a 0.421 decrease in mathematical literacy.

In addition to the research findings mentioned by the researchers, other studies have yielded similar results. For example, Khandria, Jumini, and Sugiyanto conducted a study titled "The Relationship between Numeracy Literacy and the Ability to Understand Mathematics concepts in Grade 5 Students at MIN 3 Banjarnegara Academic Year 2022/2023," which concluded that there is a positive correlation (23.56%) between numeracy literacy and the understanding of mathematics concepts (Kholifatun et al., 2023).

This suggests that numeracy literacy plays a crucial role in mastering mathematics concepts, which are fundamental for solving real-life mathematical problems.

Mathematical literacy skills need to be improved by students so they are able to solve real mathematical problems or problems. Therefore, it is necessary to have basic knowledge skills that students already possess in order to be able to solve the problem. Understanding a mathematical concept is an initial strategy used in solving mathematical problems. The magnitude of the correlation between the variable understanding of mathematics concepts and the variable mathematical literacy is 0.64, which can be interpreted as meaning that the correlation value is classified as at a strong level (Naziliati, Mutaqin, & Ihsanudin, 2022).

The researchers found that partial self regulated learning does not positively impact students' mathematical literacy. To support these findings, other studies have also reported similar results. For instance, Junainsyah, Mariyam, and Buyung conducted research titled "Mathematical Literacy Ability of Class VIII Students Seen from Self Regulated Learning," which revealed that the factors influencing mathematical literacy in students do not significantly differ between those with low, medium, and high levels of self regulated learning (Juniansyah, Mariyam, & Buyung., 2023). Self regulated learning factors that influence mathematical literacy in students, both categories of high self regulated learning of students are only able to achieve three indicators of mathematical literacy at a low level (Risky Ardiansyah et al., 2023). Likewise, in the self regulated learning category, students in the low learning ability category are only able to achieve three indicators of mathematical literacy at a low level. However, students who have a low level of self regulated learning are able to achieve four indicators of mathematical literacy at low, medium and high levels. Factors that influence students' mathematical literacy abilities as seen from their self regulated learning are factors that exist within them (Khairizka,

Aminah, & Amiruddin, 2023). Students are still unable to understand and digest subject matter so that students will have difficulty planning strategies to solve their mathematical problems. Many students do not focus on the material being studied in class, resulting in a lack of mathematical understanding and as a result have difficulty meeting mathematical literacy achievement indicators. Therefore, self regulated learning does not have a partial influence on students' mathematical literacy abilities.

CONCLUSION

The research findings on the impact of understanding mathematics concepts and self-regulated learning on mathematical literacy in junior high school students in Tangerang Regency show a significant positive influence of both variables X1 (conceptual understanding of mathematics) and X2 (self-regulated learning) on variable Y (mathematical literacy) when considered together. The correlation coefficient of 0.492 and the significance value of 0.000 confirm this influence, accounting for 17.8% of the variance. The remaining 82.2% is influenced by other factors not covered in the study.

Based on these discoveries, the researcher recommends several actions. Firstly, schools should prioritize the understanding and practical application of mathematics concepts to help students retain knowledge and perform better in assessments. Schools should also ensure that they have the necessary teaching materials and facilities to support classroom learning. Additionally, future researchers should conduct thorough observations before selecting the variables to be studied. They should also consider introducing new variables to correlate with mathematical literacy abilities, given the significance of these skills in learning mathematics

BIBLIOGRAPHY

Aprianto, A., Debataraja, N. N., & Imro'ah, N. (2020). Metode Cochrane-Orcutt Untuk Mengatasi Masalah Autokorelasi Pada Estimasi Parameter Ordinary Least Squares. *Bimaster*, *09*(01), 95–102.

Arikunto, S. (2019). *Prosedur penelitian : suatu pendekatan praktik* . Rineka Cipta.

Gunawan, C. (2020). *Mahir Menguasai SPSS Panduan Praktis Mengolah Data Penelitian*. Deepublish.

Hamdi, Asep. S., & Bahruddin, E. (2014). *Metode Penelitian Kuantitatif Aplikasi Pendidikan*. Deepublish.

Juniansyah, Mariyam, & Buyung. (2023). Kemampuan Literasi Matematis Siswa Kelas VIII Ditinjau dari Kemandirian Belajar. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *07*, 1167–1181.

Khairizka, Wirda. I., Aminah, S., Amiruddin, Nanda, Vira. D., & Fatihah, T. (2023). Analisis Kemampuan Literasi Matematis Siswa Ditinjau dari Karakter Belajar Aljabar di Sekolah Dasar. *Journal on Education*, *05*(02), 2436.

Kholifatun, K., Jumini, S., & Sugiyanto, B. (2023). Hubungan Literasi Numerasi dengan Kemampuan Pemahaman Konsep Matematika pada Siswa Kelas 5 di MIN 3 Banjarnegara Tahun Pelajaran 2022/2023 . *Jurnal Pendidikan Modern*, *09*(01), 37–44.

Naziliati, Mutaqin, A., & Ihsanudin. (2022). Pengaruh Pemahaman Konsep dan Minat Baca terhadap Kemampuan Literasi Matematika. *TIRTAMATH: Jurnal Penelitian Dan Pengajaran Matematika*, *04*(02), 163–175.

Risky Ardiansyah, M., Martila Ruli, R., & Noor Aini, I. (2023). Analisis Kemampuan Literasi Matematis Siswa Dalam Menyelesaikan Soal Pisa Ditinjau Dari Kemandirian Belajar. *Jurnal Penelitian Pembelajaran Matematika*, *16*(02), 185–200.

Supardi. (2017). *Aplikasi Statistika Dalam Penelitian*. Ufuk Press.