AlphaMath
Journal of Mathematics Education, 10(2) November 2024
p-ISSN 2477-409X, e-ISSN: 2549-9084
Available online: https://jurnalnasional.ump.ac.id/index.php/alphamath/

Correlation Between Mathematical Literacy Abilities and Students' Mastery of Problem Solving Abilities

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http://dx.doi.org/10.30595/alphamath.v10i2.24175

ABSTRACT

This research aims to determine whether or not mathematical literacy skills influence students' problem-solving abilities. The research method used is quantitative research with a regression approach. The subjects were 64 class XI students, who were selected using cluster random sampling from a population of 133 students. Data was obtained using the Mathematical Literacy Ability Questionnaire and Mathematical Problem Solving Ability Test Instrument. Data were analyzed using appropriate test statistics, namely the Chi-Square and Simple Linearity Test as prerequisite tests. Hypothesis testing is carried out in stages: (1) Pearson's Product Moment Correlation analysis, (2) Correlation Significance Test, and (3) Coefficient of Determination Test. After the data analysis, it was concluded that mathematical literacy abilities (X) positively influenced mathematical problem-solving skills (Y). This is proven by the calculation results of Sig.=0.000 < Sig.α =0.05 and the coefficient of determination value of 0.906. This means that mathematical literacy skills strongly influence mathematical problem-solving abilities, and the effect is 90.6%. The regression equation Y = -53.813 + 0.8189X shows that for every additional unit of variable X, the Y value or students' mathematical problem-solving ability increases by 0.8189.
Keywords: Correlation Analysis, Mathematical Literacy, Mathematical Problem Solving.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui ada atau tidaknya pengaruh kemampuan literasi matematika terhadap kemampuan pemecahan masalah siswa. Metode penelitian yang digunakan adalah penelitian kuantitatif dengan pendekatan regresi. Subjek merupakan siswa kelas XI yang berjumlah 64, yang dipilih secara cluster random sampling dari populasi berjumlah 133 siswa. Data diperoleh menalui intrumen Angket Kemampuan Literasi Matematika dan Intrumen Tes Kemamampuan Pemecahan Masalah Matematika. Data dianalisis menggunakan statistik uji yang besesuaian, yaitu Uji Chi Square dan Uji Linearitas Sederhana sebagai uji prasyarat. Adapun uji hipotesis dilakukan dengan tahapan: (1) analisis Korelasi Pearson's Product Moment; (2) Uji Signifikasni Korelasi, dan; (3) Uji Koefisien Determinasi. Setelah proses analisis data didapatkan kesimpulan adanya pengaruh yang positif dari kemampuan literasi matematika (X) terhadap kemampuan pemecahan masalah matematika (Y). Hal ini dibuktikan oleh hasil perhitungan nilai Sig.=0,000 < Sig.α =0,05, dan nilai koefisien determinasi sebesar 0,906. Artinya terdapat pengaruh dari kemampuan literasi matematika terhadap kemampuan pemecahan masalah yang kuat dan pengaruhnya mencapai 90,6%. Adapun persamaan regresi Y =-53,813 + 0,8189X, menunjukkan bahwa setiap penambahan satu satuan variabel X, nilai Y atau kemampuan pemecahan masalah siswa bertambah sebesar 0,8189.
Kata kunci: Analisis Korelasi, Literasi Matematika, Pemecahan Masalah Matematika.

Received : October 8, 2024
Accepted : November 30, 2024
Published : November 30, 2024

Introduction

Mathematical problem solving ability is one of the competencies that students in Indonesia want to achieve through the mathematics learning process at school (Suryani et al., 2020; Willia et al., 2020; Winata & Friantini, 2018). Therefore, the condition of students' problem-solving abilities in Indonesia will continue to be a concern for educational activists. The level of mastery of students' problem solving abilities is generally measured using indicators from (Polya, 2014), namely: (1) understanding the problem; (2) make plans; (3) implementing the plan, and; (4) looking back. If viewed based on these indicators, the abilities of students in Indonesia to this day still need to be improved through various efforts that must be taken by mathematics teachers in schools.

There are research results that state that 73% of students have low mathematical problem-solving abilities (Sumartini, 2016). At that time the subjects studied were students at the Vocational High School level. Further research examining high school students when studying material on opportunities showed that students' mastery of the problem understanding indicator only reached 48.75% and only 40% were able to solve the problem (Akbar et al., 2018). More recent research on the problem-solving abilities of high school students was carried out on learning material about spatial figures, the conclusion showed that the average score of students in implementing problem-solving plans was only 35, and the average score of students' abilities in interpreting problem-solving solutions was only 14.46 (Ulfa et al., 2022). The results of the research above mean that the majority of students in Indonesia have not been able to exceed all the indicators in the problem solving stages as determined.

On the basis of the explanation above, of course mathematics teachers in schools need to immediately improve and look for alternative solutions to mathematics learning problems that arise. Researchers are interested in finding out what causes the low ability to solve mathematical problems, especially those experienced by students at the upper secondary school level. Later, the results of this research can be used as a basis for consideration to determine further alternative solutions.

Researchers certainly need to get more concrete data regarding the conditions experienced by the school, both students and mathematics teachers. As a first step, researchers conducted observations at SMA N 55 Jakarta. The data obtained by researchers includes that 47% of students still have low problem solving abilities, which can be seen from the final semester exam scores. If you want to make

improvements to student learning achievement at the school, the main role of teachers is most needed. However, as confirmed by the assumption above, before determining alternative solutions to students' low problem-solving abilities, it must be preceded by a process of finding out what matters can influence students' mathematical problem-solving abilities.

In this process of finding out, we certainly cannot ignore the role of PISA (Program for International Student Assessment), which is an international study that assesses the quality of the education system by measuring learning outcomes that are essential for successful life in the 21st century (Kemendikbudristek, 2023). What is measured is reading literacy, mathematics and science literacy abilities. If we look at the 2018 PISA results, Indonesia scored 379 points in its mathematical literacy skills, which is below the international average score (487 points) (OECD, 2019). Meanwhile, in PISA in 2022, Indonesia experienced an increase in ranking, namely rising 5 positions in the mathematical literacy category (Kemendikbudristek, 2023). However, one of the factors for this increase is also due to a decrease in scores obtained by the majority of countries participating in PISA, namely that 82% of PISA participating countries experienced a decrease in mathematics literacy scores (OECD, 2023). Therefore, Indonesia's achievements in PISA 2022 cannot yet be fully described as a significant increase in mathematical literacy skills.

Students' mathematical literacy abilities reflected in the PISA results attracted the attention of researchers to link them to the achievements of students' mathematical problem solving abilities, which are still part of the learning problems in Indonesia. PISA defines mathematical literacy as an individual's capacity to think mathematically and formulate, use and interpret mathematics to solve problems in various real-world contexts (OECD, 2021). From this definition, it can be seen that there is a connection between a person's mathematical literacy capacity and problem solving, where a person's mathematical literacy capacity will be useful when he is solving problems in the real world. Mathematical literacy itself has long been synonymous with everyday problem solving abilities (Anwar, 2018; Hapsari, 2019; Samosir et al., 2022). So it is important to increase students' mathematical literacy capacity to prepare them to solve everyday problems in the real world.

Research examining the influence of the mathematical literacy movement on improving problem solving abilities was conducted on class VIII students using geometry test instruments (Zahroh et al., 2020). The research results show that students who have high literacy skills can interpret and evaluate mathematical solutions in the real world. Analysis of junior high school students' mathematical literacy abilities in solving word problems was also carried out using instruments from

PISA (Muslimah & Pujiastuti, 2021). The results of the analysis show that students in the high group tend to be more able to solve story problems. The results of other analyzes also provide the conclusion that students who are able to achieve indicators of mathematical literacy ability can go through the stages of problem solving correctly (Alfillaili & Iffah, 2020).

If we review the initial findings of this research, namely the low problem solving abilities of class XI students in one of the vocational high schools, then it would be good for us to ask the question; "Is this caused by students' low mathematical literacy skills?" On this basis, it is necessary to conduct a study regarding the influence of mathematical literacy skills on the problem-solving abilities of class XI students at vocational high schools. To answer this question, it is important to conduct this research. This research is certainly different from previous studies, the main difference lies at the level of the subject and the material that is the object of study, namely algebraic derivative material. The results of this research can later be used as consideration for increasing the effectiveness of mathematics learning, especially in line with the aim of improving students' mathematical literacy and problem solving abilities.

Research Methods

The aim of the research to be achieved is to determine whether or not there is an influence of mathematical literacy skills on mathematical problem solving abilities in class XI high school students. The research method used is quantitative research with a regression approach, namely a quantitative data analysis method that is focused on understanding the relationship between independent and dependent variables (Sugiyono, 2018). The independent variable in this research is mathematical literacy ability (X), and the dependent variable is mathematical problem solving ability (Y). The research population was students at SMA N 55 Jakarta, totaling 133 students. The research sample was selected using cluster random sampling following the sampling stages from (Sugiyono, 2018), namely: (1) students were formed into 4 clusters based on study groups; (2) 2 clusters are randomly selected which will later become samples; (3) all students in the selected cluster will become the research sample. Based on these stages, 2 clusters were selected with a total of 64 students.

The research instruments used were the Mathematics Literacy Questionnaire and the Mathematics Literacy Test. It has been emphasized in the introduction that mathematical literacy capacity is closely related to problem solving abilities, therefore this research test instrument will also be used to review the stages of problem solving that students can go through. The test instrument used has been developed by

p-ISSN 2477-409X, e-ISSN: 2549-9084

referring to the PISA model mathematical literacy indicators. The research stages taken generally follow the steps in figure 1.

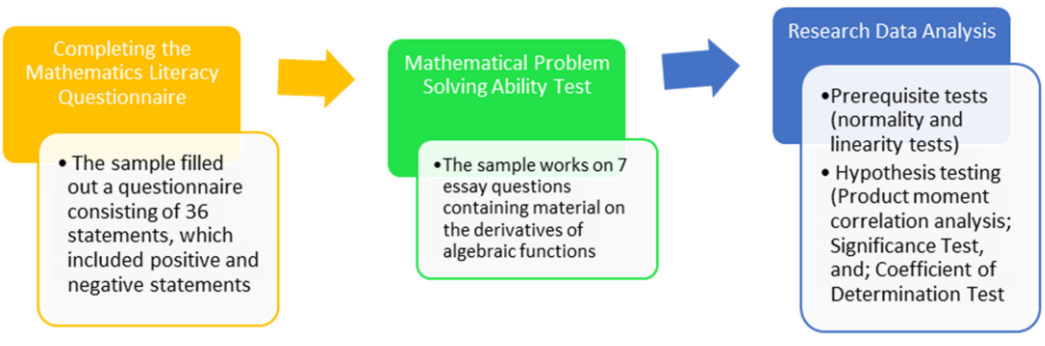

Figure 1. Research Stages Used

Figure 1 shows that there are 3 research stages that must be passed until conclusions are drawn, namely: filling out the mathematics literacy questionnaire; taking mathematical problem solving ability tests, and; data analysis.

At the stage of filling out the questionnaire, the sample will fill in 36 statements, which include positive and negative statements. Students fill in positive statements by writing a score of 5-1, where: 5 if they strongly agree (SS); 4 if agree (S); 3 if you disagree (KS); 2 if you disagree (TS), and; 1 if strongly disagree (STS). The negative statement questionnaire is filled in by students by writing a score of 1-5, where: 1 if strongly agree (SS); 2 if agree (S); 3 if you disagree (KS); 4 if you disagree (TS), and; 5 if strongly disagree (STS). At the test stage, the sample will work on 7 essay questions containing material on the derivatives of algebraic functions. The seven descriptive questions used have met the criteria for validity and reliability. Next, the data collected through filling out questionnaires and test results are analyzed.

The analysis stage begins with a normality test and linearity test as prerequisite tests before hypothesis testing. The normality test was carried out using the Chi Square Test with the aim of finding out whether the group data to be analyzed had a normal distribution or not. Hypothesis used:
H_0: sample data comes from a normally distributed population
H_1: sample data does not come from a normally distributed population
The test statistic used is Chi Square with the Formula (1) (Nuryadi et al., 2017):

$$\chi^2 = \sum_{i=l}^{k} \frac{(o_i - e_i)}{e_i} \qquad (1)$$

Information:
o_i = observation frequency
e_i = frequency of expectations

The test decision is: if $\chi^2_{count} < \chi^2_{table}$ then H_0 is accepted, and if $\chi^2_{count} \geq \chi^2_{table}$ then H_1 is accepted.

The linearity test was carried out using the Simple Linear Regression Test, which is aimed at analyzing the influence of one independent variable, namely mathematical literacy ability (X) on one dependent variable, namely mathematical problem solving ability (Y). The conclusion drawn later is that the data used is linear or non-linear, where the conclusion is based on the results of calculations using the Simple Linear Regression Test Formula (2) (Siregar, 2015):

$$Y = a + bX \quad (2)$$

Information:
Y = Dependent variable/problem solving ability
X = Independent variable/mathematical literacy ability
a = the magnitude of the value of Y when X = 0
b = the magnitude of the change in the value of Y if X increases by one unit

After the prerequisite tests have been fulfilled, a hypothesis test can be carried out using the following steps: (1) Pearson's Product Moment correlation analysis; (2) test the significance of the correlation coefficient, and; (3) coefficient of determination test.

Product moment correlation analysis is carried out to find relationships and prove the hypothesis of a relationship between 2 variables if the data for both variables is on an interval scale, using the Formula (3) (Kartiningrum et al., 2022):

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{\{n\sum X^2 - (\sum x)^2\}\{n\sum Y^2 - (\sum Y)^2\}}} \quad (3)$$

Information:
r = Pearson's Product Moment correlation coefficient
N = number of samples
X = raw number for variable X (mathematical literacy ability)
Y = raw number for variable Y (math problem solving ability)

Table 1. Interpretation of Correlation Coefficients

Value Interval *(r)*	Interpretation
0,00-0,199	Very Low
0,20-0,399	Low
0,40-0,599	Strong Enough
0,60-0,799	Strong
0,80-1,000	Very Strong

Source: Modification (Kartiningrum et al., 2022)

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p-ISSN 2477-409X, e-ISSN: 2549-9084

The results of the correlation coefficient calculation (r) are then converted into the Correlation Coefficient Interpretation Table, as presented in Table 1. The correlation coefficient significance test is used to conclude the condition of the population after the results of the correlation coefficient calculation are known. The correlation coefficient significance test was carried out using the t-test with the help of SPSS software. To draw conclusions it is necessary to formulate a hypothesis:

H_0:β=0; Mathematical literacy ability (X) does not significantly influence mathematical problem solving ability (Y)

H_1:β≠0; Mathematical literacy ability (X) has a significant effect on mathematical problem solving ability (Y)

The test decision is: H_0 is accepted if the calculation result of the sig.α > 0,05. Conversely, if the sig.α < 0,05, then H_0 is rejected.

The coefficient of determination test is used to find out how much the independent variable (mathematics literacy ability) contributes to the dependent variable (mathematical problem solving ability), and the results are in percentage form. The coefficient of determination (*KD*) can be determined using the Formula (4) (Kartiningrum et al., 2022):

$$KD = r^2 \times 100\% \quad (4)$$

KD = coefficient of determination

r = correlation coefficient

Result and Discussions

Results of the Mathematics Literacy Ability Questionnaire

The scores from the results of filling out the questionnaire by 36 samples were calculated, and then presented in the form of interval data as presented in Table 2.

Table 2. Frequency Distribution of Mathematical Literacy Ability

Interval Class	Frequency	Relative Frequency
75-87	2	3%
88-100	11	17%
101-113	27	42%
114-126	14	22%
127-139	7	11%
140-152	0	0%
153-165	3	5%
∑	64	100%

Based on the data in Table 2 it can be calculated; mean: 112.08; median: 109.6; mode: 107.7; variance: 262.04; standard deviation: 16.2; highest score: 164, and; lowest score: 75.

Mathematical Test Results

The student's answer to each essay question item is corrected and given a score of 0-10, so that from the 7 questions tested the student will get a maximum score of 70. The test results are presented in the form of interval data as in Table 3.

Table 3. Frequency Distribution of Mathematical Problem Solving Ability

Interval Class	Frequency	Relative Frequency
9-17	4	6%
18-26	10	16%
27-35	16	25%
36-44	10	16%
45-53	13	20%
54-62	8	13%
63-75	3	5%
∑	64	100%

Based on the data in Table 3, the average can be calculated: 38.59; median: 37.3; mode: 53.5; standard deviation: 14.30; variance: 205.56; highest score: 70, and; lowest score: 9.

Prerequisite Test Results

The prerequisite tests carried out consist of normality tests and linearity tests. The normality test was carried out on the data from the mathematical problem solving ability test. A summary of the normality test results using the Chi Square formula is presented in Table 4.

Table 4. Summary of Normality Test results using Chi Square

Class	f_i	$\bar{x}$	S	o_i	e_i	$\frac{(o_i - e_i)^2}{e_i}$
9-17	4			4	3,36	0,12
18-26	10			10	8,24	0,38
27-35	16			16	23,79	0,35
36-44	10	38,59	14,30	10	15,73	2,09
45-53	13			13	12,23	0,05
54-62	8			8	6,49	0,35
63-71	3			3	2,34	0,18
∑	64			64		3,53
χ^2_{count}					3,53	
χ^2_{table}					12,59	

Table 4 shows χ^2_{count}=3,53 < χ^2_{table} =12, 59, so the test decision is that H_0 is accepted. The conclusion is that the data comes from a normally distributed population.

p-ISSN 2477-409X, e-ISSN: 2549-9084

The next prerequisite test is the linearity test, which is carried out using the Simple Linear Regression Test: Y= a + bX. The calculation result is Y= -53.813 + 0.8189X. If interpreted based on the correlation coefficient, a = -53, 813 means that if students do not have mathematical literacy skills then they do not have mathematical problem solving abilities, and b = 0.8189 means that if students experience an increase in mathematical literacy skills by one unit then there will be an increase in their abilities. solving mathematical problems of 0.8189 units.

Regression analysis of research data between the variable mathematical problem solving ability (Y) and the variable mathematical literacy ability (X) produces a regression direction of -53.813, and a constant of (0.8189) The regression is a straight line from bottom left to top right. Or in other words, variables X and Y have a linear relationship with the regression line equation Y = -53.813 + 0.8189X. A scatter diagram showing variables X and Y have a linear relationship is presented in Figure 2.

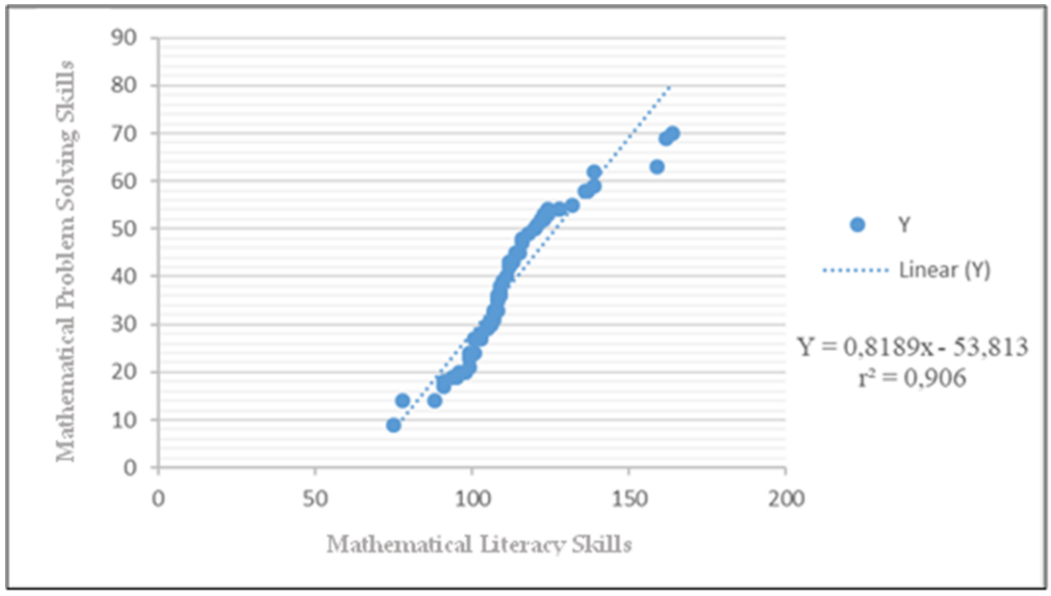

Figure 2. Mathematical Literacy Skills

This regression equation means that if you do not have mathematical literacy skills then you do not have mathematical problem solving abilities, and if there is an increase in mathematical literacy abilities by one unit then there will be an increase in mathematical problem solving abilities by 0.8189 units. At this stage it can be concluded that the data on literacy abilities and mathematical problem solving abilities are linear. The next research stage is hypothesis testing.

Hypothesis Test Results

The first stage carried out was the correlation coefficient test using the Pearson's Product Moment correlation test. The results of calculating the correlation coefficient between the variables mathematical literacy ability (X) and mathematical problem solving ability (Y), amounted to $r = 0.952$. The r calculation results are then converted into the Correlation Coefficient Interpretation Table, as in Table 1 above. The interpretation results of $r = 0.952$ indicate that the correlation coefficient between variables is included in the "Very Strong" category. This shows that there is a very strong correlation between students' mathematical literacy abilities and mathematical problem solving abilities.

The second stage is to test the significance of the correlation coefficient using the *t*-test, which is carried out using *SPSS software*. A summary of the *t*-test calculation results is presented in Table 5.

Table 5. Correlation Significance Test Results

Model		Unstandardized Coefficient		Standardized Coefficients	*t*	Sig.
		B	Std. Error	Beta		
1	(Constant)	-53.813	3.805		-14.144	.000
	Mathematical Literacy Ability	.819	.034	.952	24.443	.000

Table 5 shows the calculation results of Sig = 0.000 < Sig $\alpha = 0.05$, so the test decision is H_0 rejected, H_1 accepted. The conclusion obtained is that mathematical literacy ability (X) has a significant effect on mathematical problem solving ability (Y). The next stage is the coefficient of determination (*KD*) test. The *KD* calculation result is 90.6%, which means that 90.6% of the variation in students' mathematical problem solving abilities is determined or influenced by mathematical literacy abilities. Up to this stage, the researcher has completed the specified research stages. Based on the results of the normality test, it has been shown that the sample data comes from a normally distributed population, and the results of the linearity test also show that mathematical literacy abilities and mathematical problem solving abilities have a linear relationship.

The results of the correlation coefficient test show that there is a "Very Strong" correlation between the independent variable (mathematics literacy ability) and the dependent variable (mathematical problem solving ability). The results of the correlation significance test concluded that mathematical literacy abilities had a significant effect on mathematical problem solving abilities, which also means that the higher the students' mathematical literacy abilities, the higher the impact on their mathematical problem solving abilities. Furthermore, if we look at the results of the

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p-ISSN 2477-409X, e-ISSN: 2549-9084

determination test, we get a determination value of 90.6%, which indicates that mathematical literacy abilities have an influence or contribution of 90.6% to students' mathematical problem solving abilities. Up to this stage, researchers have been able to show that students' mathematical literacy skills have a significant influence on their mathematical problem solving abilities. These results are certainly in line with previous research which shows a correlation between literacy capacity and problem solving ability (Abduloh et al., 2018; Mahmud & Pratiwi, 2019; Samosir et al., 2022; Zahroh et al., 2020).

It should be noted that students' mathematical literacy abilities are not the only variable that plays a major role in achieving problem solving abilities, there could be other influencing factors. Meanwhile, if we look at the results of the determination test in this research, it can be said that there are still 9.4% other factors that influence mathematical problem solving abilities outside of mathematical literacy abilities. Especially in this research, it could be that this is influenced by students' initial abilities which are relatively high, especially in the material that is a prerequisite before studying algebraic derivative material. On the other hand, it can be caused by teacher intervention in the class which has started to implement a problem-based learning model. This has a positive impact on students' ability to plan a solution to solve a problem, carry out a plan, and draw conclusions. Apart from that, students' understanding of mathematical concepts also has a positive influence on their mathematical problem solving abilities.

Based on the results of this research, efforts to improve problem solving abilities through increasing students' literacy capacity must still be pursued. Concrete steps that can support improving students' mathematical literacy abilities need to be taken by teachers, with the hope that increasing students' problem solving abilities will be directly proportional to their mathematical literacy capacity. Ways that teachers can use to improve mathematical literacy skills include including everyday life in the context of the mathematics learning they undergo in class. To attract students to the world of mathematical literacy, this can also be done through developing culture-based literacy questions. The implementation of blended learning, which gives students the opportunity to search for learning materials independently can also increase student literacy (Naufal & Amalia, 2022). Of course, there are still many things that teachers can do to improve mathematical literacy skills, which can be adapted to the characteristics of each school.

Conclusion

Based on the results of data analysis, it has been proven that there is a significant positive influence of class XI students' mathematical literacy abilities on their

mathematical problem solving abilities. This is proven by the results of the hypothesis test, through the calculation results of the value Sig = 0.000 < Sig α = 0.05, it can be concluded that there is a significant influence. Apart from that, through a simple linear regression test it can also be concluded that the higher a student's literacy skills, the higher their mathematical problem solving abilities, and vice versa. Through the determination test, it has been proven that the magnitude of the influence of mathematical literacy skills on mathematical problem solving abilities reaches 90.6%, which means that students' mathematical problem solving abilities will be greatly influenced by their mathematical literacy abilities. Evidence of a very strong relationship between mathematical literacy abilities and mathematical problem solving abilities which has been proven through the results of this research needs to be taken into consideration by teachers in planning learning.

Acknowledgement
The researcher would like to express his sincere thanks to SMA Negeri 55 Jakarta for facilitating the implementation of this research.

References

Abduloh, U., Karomah, N., & Hidayati, S. (2018). Peningkatan Kemampuan Pemecahan Masalah Matematika Dalam Soal Literasi Matematika Melalui Model Creative Problem Solving Kelas VIII H SMPN 9 Semarang. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 774–780.

Akbar, P., Hamid, A., Bernard, M., & Sugandi, A. I. (2018). Analisis Kemampuan Pemecahan Masalah Dan Disposisi Matematik Siswa Kelas XI SMA Putra Juang Dalam Materi Peluang. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *2*(1), 144–153. https://doi.org/10.31004/cendekia.v2i1.62

Alfillaili, E., & Iffah, J. D. N. (2020). Analisis Kemampuan Literasi Matematika Siswa Dalam Memecahkan Masalah. *Conference on Research and Community Services*, *September*, 231–240. https://ejournal.stkipjb.ac.id/index.php/CORCYS/article/view/1631/1363

Anwar, N. T. (2018). Peran Kemampuan Literasi Matematis pada Pembelajaran Matematika Abad 21. *PRISMA: Prosiding Seminar Nasional Matematika*, *1*, 364–370. https://journal.unnes.ac.id/sju/prisma/article/download/19603/9527

Hapsari, T. (2019). Literasi Matematis Siswa. *Euclid*, *6*(1), 84-94. https://doi.org/10.33603/e.v6i1.1885

Kartiningrum, E. D., Basuki, H., Bambang, N., Otok, W., Nurul, E., & Yuswatiningsih, K. E. (2022). *Aplikasi Regresi dan Korelasi Dalam Analisis Data Hasil Penelitian* (1st ed.). STIKES Majapahit Mojokerto. https://repository.unair.ac.id/124805/1/CBUKU4_Buku Regresi dan Korelasi.pdf

Kemendikbudristek. (2023). *Laporan PISA 2022 Kemendikbudristek*.

https://balaibahasariau.kemdikbud.go.id/wp-ntent/uploads/2023/12/Laporan-Pisa-Kemendikbudristek.pdf

Mahmud, M. R., & Pratiwi, I. M. (2019). Literasi Numerasi Siswa Dalam Pemecahan Masalah Tidak Terstruktur. *Jurnal Pendidikan Matematika*, *4*(1), 69–88. https://doi.org/10.22236/KALAMATIKA.vol4no1.2019pp69-88

Muslimah, H., & Pujiastuti, H. (2021). Analisis Kemampuan Literasi Matematis Siswa dalam Memecahkan Masalah Matematika Berbentuk Soal Cerita. *Jurnal Pendidikan Matematika Dan Sains*, *8*(1), 36–43. https://doi.org/10.21831/jpms.v8i1.30000

Naufal, H., & Amalia, S. R. (2022). Peningkatan Kemampuan Literasi Matematika Siswa Di Era Merdeka Belajar Melalui Model Blended Learning. *Seminar Nasional Pendidikan Matematika Vol. 3 No. 1*, *3*, 333–340. https://proceeding.unikal.ac.id/index.php/sandika/article/view/885/660

Nuryadi, Astuti, T. D., Utami, E. S., & Budiantara. (2017). *Dasar Dasar Statistik Penelitian* (1st ed.). Yogyakarta: Sibuku Media.

OECD. (2019). *PISA 2018 Results (Volume I): What Students Know And Can Do*. https://doi.org/10.1787/5f07c754-en

OECD. (2021). *PISA 2022 Mathematics Framework*. https://pisa2022-maths.oecd.org/ca/index.html

OECD. (2023). *PISA 2022 Results Factsheets Indonesia PUBE*. https://doi.org/10.1787/53f23881-en

Polya, G. (2014). *How to solve it: A New Aspect of Mathematical Method (Vol. 34)* (34th ed.). Princeton University Press, Princeton. https://doi.org/10.2307/j.ctvc773pk

Samosir, E., Makmuri, & Aziz, T. A. (2022). Kemampuan Literasi Matematika: Kaitannya dengan Kemampuan Pemecahan Masalah. *Jurnal Riset Pendidikan Matematika Jakarta*, *4*(1), 60–72. https://doi.org/10.21009/jrpmj.v4i1.23026

Siregar, S. (2015). *Statistik Parametrik untuk Penelitian Kuantitatif: Dilengkapi dengan Perhitungan Manual dan Aplikasi SPSS Versi 17*. Jakarta: Bumi Aksara.

Sugiyono, S. (2018). *Metode Penelitian Kuatitatif, Kualitatif dan R & D Edisi 15*. Bandung: Alfabeta.

Sumartini, T. S. (2016). Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa melalui Pembelajaran Berbasis Masalah. *Mosharafa: Jurnal Pendidikan Matematika*, *5*(2), 148–158. https://doi.org/10.31980/mosharafa.v5i2.391

Suryani, M., Jufri, L. H., & Putri, T. A. (2020). Analisis Kemampuan Pemecahan Masalah Siswa Berdasarkan Kemampuan Awal Matematika. *Mosharafa: Jurnal Pendidikan Matematika*, *9*(1), 119–130. https://doi.org/10.31980/mosharafa.v9i1.605

Ulfa, Y. L., Roza, Y., & Maimunah. (2022). Kemampuan Pemecahan Masalah Matematis Siswa SMA pada Materi Jarak pada Bangun Ruang. *Mosharafa: Jurnal Pendidikan Matematika*, *11*(3), 415–424. https://doi.org/10.31980/mosharafa.v11i3.732

Willia, A., Annurwanda, P., & Friantini, R. N. (2020). Proses Pemecahan Masalah

Matematika Ditinjau dari Gaya Belajar Siswa. *AlphaMath : Journal of Mathematics Education*, *6*(2), 116-128. https://doi.org/10.30595/alphamath.v6i2.8165

Winata, R., & Friantini, R. N. (2018). Proses Pemecahan Masalah Mahasiswa Pendidikan Matematika STKIP Pamane Talino. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *4*(1), 87-96. https://doi.org/10.24853/fbc.4.1.87-96

Zahroh, H., Hafidah, Dhofir, & Zayyad, M. (2020). Gerakan Literasi Matematika dalam Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa. *Delta-Pi: Jurnal Matematika Dan Pendidikan Matematika*, *9*(2), 165–177. https://doi.org/10.33387/dpi.v9i2.2293