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Factors Influencing Mathematics Learning in Students in the Alor Islands Region

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Abstract

Mathematics is a fundamental skill for all individuals, making it essential for every child to achieve proficiency. Several factors influence mathematics learning achievement, which can be categorized into internal and external factors. This study aims to identify the factors affecting mathematics achievement among junior high school students in the Teluk Mutiara District of Alor. The research employed a multiple linear regression analysis method. Data were collected through questionnaires completed by 7th-grade students from junior high schools in the district. The results indicated that factors such as the mother's educational background, the father's occupation, the amount of time allocated for studying mathematics, and the students' interest in learning mathematics significantly influenced their mathematics achievement.
Keywords: Regression Analysis; Teluk Mutiara District; Learning Achievement; Mathematics Education

Abstrak

Matematika sangat penting bagi setiap orang, oleh karena itu setiap anak harus menguasai matematika. Dalam pembelajaran matematika, terdapat beberapa faktor yang mempengaruhi prestasi belajar matematika yaitu faktor internal dan faktor eksternal. Penelitian ini bertujuan untuk mengetahui faktor-faktor apa saja yang mempengaruhi prestasi belajar matematika pada siswa SMP di Kecamatan Teluk Mutiara Alor. Penelitian ini menggunakan metode analisis regresi linier berganda. Metode pengumpulan data yang digunakan adalah dengan cara mengisi angket yang diisi oleh siswa SMP di Kecamatan Teluk Mutiara. Subjek penelitian adalah anak SMP kelas 7 di Kecamatan Teluk Mutiara Alor. Hasil penelitian menunjukkan bahwa faktor-faktor yang mempengaruhi prestasi belajar matematika pada siswa SMP di Kecamatan Teluk Mutiara Alor adalah pendidikan ibu, pekerjaan ayah, waktu belajar matematika, dan minat belajar matematika.
Kata Kunci: Prestasi Belajar; Analisis Regresi; Distrik Teluk Mutiara Alor

I. INTRODUCTION

Education is broadly defined as a process of acquiring knowledge, comprehension, and behavioral skills in alignment with academic needs through structured methodologies (Mutiarahman, Edriati, & Suryani, 2023). The ultimate goal of this educational process is to produce high-quality outputs, equipping individuals with specialized skills and knowledge (Meilina, Mariana, & Rahmawati, 2023).

For Indonesia to thrive in the era of globalization, it is imperative that the nation cultivates a workforce with strong competitiveness and comparative advantages, particularly in the mastery of mathematics and the ability to harness science and technology (Warsito et al., 2023; Purnomo, 2017; Rusgianto, 2006).

Schools play a pivotal role in preparing students to master mathematical concepts (Heriyati et al., 2020). Through a systematic approach to mathematics education, spanning from elementary to high school, students are expected to develop a comprehensive understanding of the subject (Yasmita, 2020). However, for some students, mathematics remains a challenging and intimidating subject (Sen, 2022). Both cognitive and emotional factors significantly influence students' achievements in mathematics. Consequently, many students avoid or even develop negative attitudes toward the subject, perceiving it as confusing and complex (Susilawati, 2012; Tora, 2022).

Studies have echoed these sentiments, highlighting that mathematics is often viewed as a difficult subject, requiring intense concentration (Mukminah et al., 2021; Utari et al., 2019; Jalal, 2022). Research conducted by Jupri et al. (2014) revealed that Indonesian students demonstrate minimal proficiency in basic mathematical skills, such as arithmetic, understanding algebraic expressions, and working with variables. Many students find mathematical formulas and numbers tedious and intimidating, which exacerbates their difficulties in mastering the subject (Chasania et al., 2019; Purnomo, 2017; Rani et al., 2021; Tajuddin et al., 2023).

In addition, the learning capabilities of students are often generalized, failing to account for individual differences in learning styles and abilities. As a result, mathematics achievement remains unsatisfactory, as evidenced by low scores in competency tests and other assessments (Salsabila et al., 2023; Gunawan & Fitra, 2021; Khuzaimah, 2020; Rahmatia, 2012). This issue is particularly pronounced in regions such as East Nusa Tenggara, especially in the Alor Islands.

To improve academic performance in Alor, educators must implement innovative teaching strategies to enhance the quality of mathematics education. Additionally, there is a need to shift students' perceptions and attitudes toward mathematics, fostering greater motivation for independent learning to drive improved achievement.

Various factors, both internal and external, influence students' academic performance. Internal factors include physical health, psychological state, interests, and motivation, while external

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factors encompass family background, school environment, community context, parental education level, and family income (Risnawati, Syahwela, & MZ, 2023; Andri, Zagir, & Dores, 2017; Mustamin & Sulasteri, 2013).

This study aims to investigate the factors influencing the learning achievement of junior high school students in mathematics, specifically within the Teluk Mutiara District. The primary focus is to identify and analyze the factors that significantly affect students' performance in mathematics. To achieve this, a method that facilitates the classification of causal factors and the identification of determining variables is essential.

Regression analysis serves as an effective method for this purpose, as it allows researchers to determine the relationships between independent and dependent variables (Montgomery et al., 2021; Lazarides & Buchholz, 2019; El-Adl & Alkharusi, 2020; Siegler et al., 2012). Prior to conducting regression analysis, exploratory data analysis will be performed (Komorowski et al., 2016) alongside descriptive analysis (Hahs-Vaughn & Lomax, 2020) to gain insights into the characteristics of the data and to provide an overview of the dataset (Myers, Well, & Lorch Jr, 2010).

II. METHOD

This quantitative study employs a descriptive research design to examine the relationship between various factors and mathematics learning achievement among junior high school students. The primary focus is to investigate how physical health, parental occupation, parental education, learning atmosphere, teaching methods employed by teachers, learning time, and student interest in learning influence mathematics achievement.

In this study, students' mathematics learning achievement serves as the dependent variable, while the independent variables include physical health, parental occupation, parental education, learning atmosphere, teaching methods, learning time, and learning interest.

The data for this research was obtained through primary sources, specifically questionnaires completed by students across several junior high schools in the Teluk Mutiara District. A total of 356 students were randomly sampled from 14 junior high schools in the region.

To analyze the data, multiple linear regression analysis was utilized (Uyanık dan Güler, 2013) to identify the factors influencing mathematics learning achievement among junior high school students in the Teluk Mutiara District, Alor. The hypothesis examined in this study investigates whether there is a simultaneous effect of the independent variables—physical health, parental occupation, parental education, learning atmosphere, teaching methods, learning time, and learning interest—on students' mathematics achievement, assessed using the F-test (Van Ginkel, 2019); (Anatolyev, 2012).). Additionally, the t-test (Fay dan Proschan, 2010); (de Winter, 2019) was conducted to evaluate the impact of each independent variable individually. As a parametric test, the t-test requires that

certain prerequisites be met, including normality, homoscedasticity, and independence of samples (Tae Kyun Kim, 2015).

Following these tests, classical assumption tests were conducted, including normality tests (Mishara, et al, 2019); (Ghasemi dan Zahediasl, 2012), heteroscedasticity tests (Zhou, 2013); (Klein et al, 2016), and multicollinearity tests (Alin, 2010). In this study, a significance level (p-value) of 0.05 was adopted.

III. Result and Discussion

A. F-Test (Simultaneous Test)

In this study, the factors identified as potential influences on students' mathematics learning achievement include physical health, parental occupation, the highest level of education attained by parents, learning atmosphere, teaching methods employed by the instructor, learning time, and interest in learning. Table 1 presents the results of the F-test conducted in this research.

Table 1.
Result of F-Test

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	2908.66	11	264.42	7.3	.00
Residual	12410.06	344	36.08		
Total	15318.72	355			

As indicated in Table 1, a significance value of 0.000 was obtained, which is less than the threshold of 0.05. This result suggests that, when considered simultaneously, the factors of gender, age, father's education, mother's occupation, physical health, teaching methods employed by the instructor, mathematics learning atmosphere, mother's education, father's occupation, mathematics learning time, and interest in learning mathematics collectively influence students' mathematics achievement scores.

B. T - Test (Partial Test)

Following the simultaneous test, a partial test was conducted to identify which specific factors exert an influence. The results of this partial test are presented in Table 2.

Table 2.
Result of t-Test

Model	T	Sig.
(Constant)	50.383	0.000
Father's Education	1.017	0.310
Mother's Education	2.163	0.031
Father's Occupation	2.521	0.012
Mother's Occupation	0.950	0.343
Physical Health	-0.954	0.341
Mathematics Learning Time	3.580	0.000
Mathematics Learning Interest	6.051	0.000
Teacher's Teaching Method	1.143	0.254
Mathematics Learning Atmosphere	-1.632	0.103

Variables with a significance value below the p-value threshold of 0.05 are considered significant. As illustrated in Table 2, both mother's education and father's occupation yield p-values <0.05, indicating that these variables are significant and have an impact on mathematics learning achievement among junior high school students in the Teluk Mutiara Alor District. This finding aligns with the research conducted by Novianto (2019), which demonstrates a relationship between education and occupation and learning achievement.

Additionally, mathematics learning time and interest in learning mathematics emerge as significant variables. These

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results corroborate findings from Retariandalas (2017), which examined the influence of reading interest and learning motivation on students' science learning achievement, concluding that learning motivation significantly affects science learning outcomes.

Conversely, the variable of physical health exhibits a significance value greater than 0.05, indicating that it does not impact mathematics learning achievement in the Teluk Mutiara Alor District. This is consistent with the findings of Prastyawan & Pulungan (2022), which reported no relationship between physical health and student learning achievement.

Furthermore, the variable of the teacher's teaching method also yields a significance value greater than 0.05, suggesting it has no effect. These findings are contrary to those of Bayanah (2019) and Sari (2022), which indicate that the learning atmosphere and teaching methods positively influence student learning outcomes.

C. Classical Assumption Test

The following is presented the result of classical assumption test:

1) Multicollinearity Test

The result of multicollinearity test is provided in the following:

Table 3.
The result of multicollinearity test

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)	.760	1.316
Father's Education	.811	1.233
Mother's Education	.757	1.322
Father's Occupation	.892	1.122
Mother's Occupation	.980	1.021
Physical Health	.895	1.117
Mathematics Learning Time	.700	1.429
Mathematics Learning Interest	.710	1.409
Teacher's Teaching Method	.921	1.086

As indicated in Table 3, the analysis reveals no evidence of multicollinearity among the variables, as all Variance Inflation Factor (VIF) values are less than 10, and the tolerance values exceed 0.05.

2) Heteroscedasticity Test

Figure 1, the following is the Figure 1, the result of heteroscedasticity:

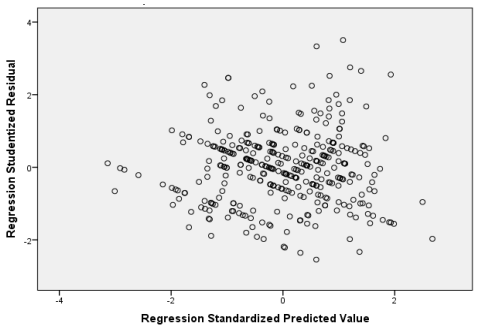

Figure 1. Result of Heteroscedasticity Test

Figure 1 illustrates that there is no discernible pattern in the scatter diagram, indicating the absence of heteroscedasticity.

3) Normality Test

The results of the normality test are presented as follows:

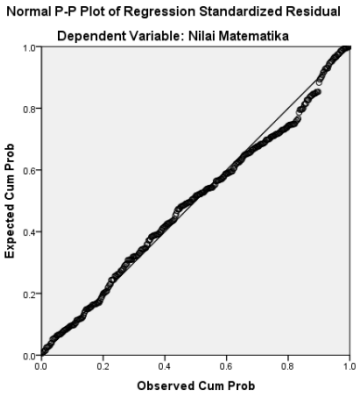

Figure 2. Normality Test

Figure 2 illustrates that the data is normally distributed, as it aligns closely with a straight line.

Based on the classical assumption tests conducted, all assumptions have been satisfied. Thus, it can be concluded that the variables significantly impacting student learning achievement include the father's occupation, mother's education, interest in learning mathematics, and the time allocated for mathematics study.

IV. CONCLUSION

Based on the discussion, it can be concluded that the factors influencing students' mathematics achievement include the mother's education, father's occupation, mathematics learning time, and interest in learning mathematics.

The findings of this study are intended to provide valuable insights for both the government and educational institutions, encouraging them to foster a more supportive learning environment. Additionally, it is crucial to develop programs aimed at enhancing students' interest and motivation, ultimately leading to improved mathematics achievement.

For future research, it is recommended to investigate other internal and external factors that may impact mathematics learning achievement, such as the integration of technology in the learning process.

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