

## Does the Learning Environment Affect Students' Mathematics Achievement?

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### Abstract

This study aims to describe the relationship and causal effects between independent and dependent variables, namely the Learning Environment and Students' Mathematics Achievement, using a causal-correlational study at SDN 074 Ayudia, Bandung City, with a population of all students and a sample of 28 students from class VB. This study uses a quantitative research method with an explanatory research approach. The sampling technique employed was probability sampling using simple random sampling, while the instruments used were questionnaires and tests. The analysis requirements for the data used include normality testing using the Kolmogorov-Smirnov test and linearity testing, with hypotheses involving correlation and regression analysis assisted by SPSS version 26. Based on the research results, it can be concluded that the Learning Environment has a significant influence on Students' Mathematics Achievement. The normality test results indicate that the data is normally distributed, thus meeting the requirements for further statistical analysis.

**Keywords:** Learning environment, Mathematics achievement, Education

### INTRODUCTION

Education is a structured and systematic process aimed at improving and enhancing the good behavior of students, enabling them to face the changes occurring in society. Schools serve as the institution through which this education is delivered. Through schools, students gain knowledge they previously did not have (Halim & Rahma, 2020). According to (Yuliana et al., 2023), education prepares students to participate in social life and the workforce, as these are significant challenges in the 21st century. Furthermore, education is an effort to develop the potential within each individual, enabling them to be responsible and complete their tasks independently. Education also encompasses growth, change, and the development of potential in students' conditions (Pristiwanti et al., 2022). Students themselves are an integral part

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of the educational process, as the ultimate goal of education is to ensure that students develop and achieve the predetermined objectives of education (Arifin, 2022).

In efforts to develop students' skills and help them reach their full potential, teachers and parents must pay close attention to the child's development (Al Ayyubi et al., 2018; Al Ayyubi, Bukhori, et al., 2024; Al Ayyubi, Hayati, et al., 2024; Al Ayyubi, Rohaendi, et al., 2024). This is because various factors can influence them, such as good or bad study habits (Mutaqin et al., 2024). Therefore, it is essential for educators and parents to focus on these habits to instill positive practices in students, creating a pleasant learning environment that supports students' learning activities. The learning environment is an external factor that can significantly affect students' academic performance. Several aspects of the learning environment that influence students include family, school, and social or community factors, which are often referred to as the "three pillars of education" (Heryyanti et al., 2021). According to (Sinurat, 2021), research shows that a positive and pleasant family environment has a significant impact on students, encouraging them to follow rules both at school and at home. (Sari, 2021) also states that a harmonious family environment with attention to children positively affects the achievement of optimal learning outcomes. (Annauval & Ghofur, 2021) emphasize that the family environment and learning motivation are key factors in fostering students' academic development.

The learning environment plays a vital role in a child's development. A child is easily influenced by what they see and hear in their family environment, and this can extend beyond the family setting. In addition to the family, the school environment also plays a crucial role in maintaining discipline and order, which is essential for students' personal development (Putri & Mufidah, 2021). Research by (Simanjuntak et al., 2023) shows that the school environment significantly impacts students' academic achievement. Moreover, the facilities and infrastructure provided by the school also play a crucial role. When teachers effectively utilize these resources, students feel more comfortable and motivated to explore their potential with the support and encouragement of the school. The activities in the school environment also contribute to students' character education. Teachers can model behaviors such as throwing trash in the proper place, working together, and teaching honesty, which help shape students' character (Ningsih, 2023).

After experiencing the learning environment in both the family and school contexts, students will eventually transition into society or the social environment. The positive impacts derived from a well-structured family and school environment make it easier for them to adapt socially. One of the factors that can influence a child's character is the environment (Nabilla & Desmon, 2022). In order for students to improve their academic performance, support and motivation from both parents and schools are needed, so that the achievements they gain can be beneficial for their future. The influence of a positive community environment will also have a significant impact on the students' social education. On the other hand, a less favorable social

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environment can result in undesirable character traits. Therefore, both teachers and parents must pay attention to factors such as the home atmosphere, peer interactions, socializing, and more (Abbas & Rizki, 2023). Thus, the learning environment becomes one of the main factors that determine the quality of students' academic performance (Soraya & Alizza, 2023). The support from both the school and the family is essential to foster students' achievements by creating good communication and a comfortable family environment. This will allow students to feel that they are capable of developing well (Arwen, 2021).

This study aims to examine the impact of the learning environment on students' mathematics performance. Through statistical analysis, this research not only evaluates the relationship between the two variables but also determines the extent to which the learning environment contributes to students' achievements. The findings of this study are expected to provide valuable insights to educators, parents, and school authorities in improving the quality of the learning environment, thereby enhancing students' performance, particularly in mathematics.

## METHOD

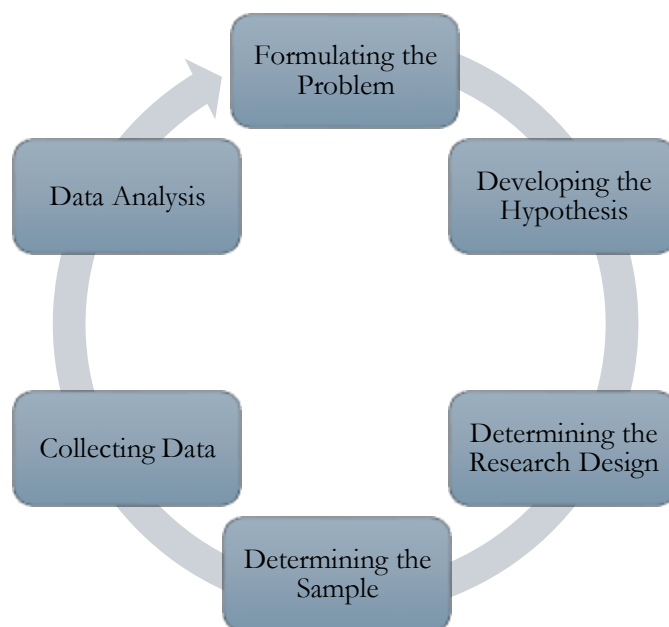
This study uses a quantitative research method with an explanatory research approach (Sugiyono, 2021). The purpose of this research is to describe the relationship and causal effect between the independent variable and the dependent variable, which in this case are the Learning Environment and Students' Mathematics Achievement. Therefore, the study used is a causal-correlational study. A causal-correlational study is a quantitative research method used to understand the relationship between two or more variables, namely the independent (explanatory) variable and the dependent (outcome) variable. In this method, the researcher aims to identify whether there is a significant relationship between the variables and measure the extent to which the independent variable affects the dependent variable (Tamphu et al., 2024). The main characteristic of a causal-correlational study is that there is no direct manipulation of the independent variable. The researcher only observes naturally occurring phenomena or collects data as it is, without influencing or altering the variables under investigation. Therefore, this method differs from an experiment, where the researcher actively manipulates the independent variable to observe its effects on the dependent variable (Nurhikmah, 2021). This research was conducted at SDN 074 Ayudia, Kota Bandung, with the population consisting of all students and a sample of 28 students from class VB.

The sampling technique used is probability sampling with simple random sampling, while the instruments used are questionnaires and tests. The data analysis requirements include normality testing using the Kolmogorov-Smirnov test and linearity testing. The hypotheses tested include correlation and regression analysis using SPSS version 26. If the data is normally distributed, data analysis will proceed with Pearson's correlation test and regression analysis to predict the dependent variable

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based on the independent variable (Setyawan et al., 2021). However, if the data is not normally distributed, Spearman's correlation test will be used without performing regression analysis (Arnani, 2024; Wulansari, 2023).



**Picture 1.** Steps in Research Design

## RESULTS AND DISCUSSION

### Results

Normality testing is conducted to determine whether the data obtained comes from a population that is normally distributed or not. This is done as a prerequisite for inferential statistical testing. In this study, the researcher used the Kolmogorov-Smirnov test for normality testing.

**Table 1. Normality Test Output**

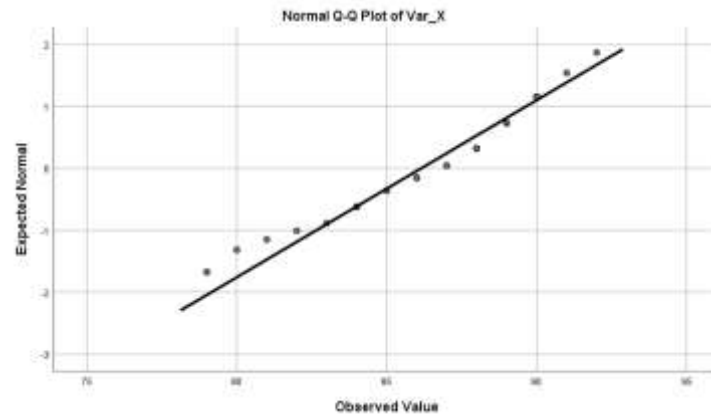
		Statistic	Sig.
Value	Learning Environment	.152	.067
	Mathematics	.129	.200*
	Achievement		

Based on the data in Table 1 above, the significance values for the Learning Environment and Students' Mathematics Achievement are 0.067 and 0.200,

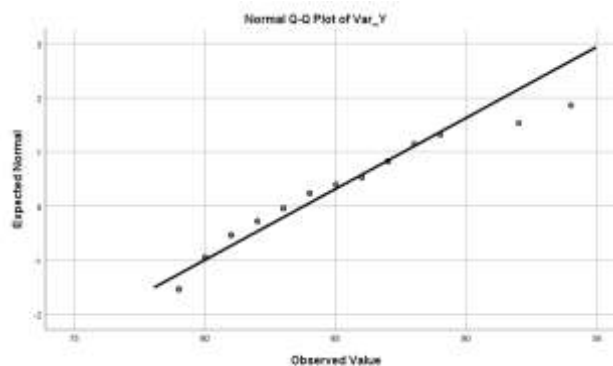
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respectively. Since these significance values are greater than 0.05, according to the decision criteria, the null hypothesis ( $H_0$ ) is accepted. Thus, it can be concluded that the data is normally distributed.



Picture 1. Normal Q-Q Plot Var\_X



Picture 2. Normal Q-Q Plot Var\_Y

In the Normal Q-Q Plot diagram of the Learning Environment and Students' Mathematics Achievement, it can be seen that the data points spread around the diagonal line and are aligned with the diagonal line. Therefore, the data can be said to follow a normal distribution. To examine the strength of the relationship, the correlation values are as follows.

Tabel 2. Correlations

		Var_X	Var_Y
Learning Environment	Pearson Correlation	1	.777**
	Sig. (2-tailed)		.000
Mathematics Achievement	Pearson Correlation	.777**	1
	Sig. (2-tailed)	.000	

Based on the data in Table 2 above, the significance value for the Learning Environment and Students' Mathematics Achievement is 0.000. Since this significance value is smaller than 0.05, according to the decision criteria, the null hypothesis ( $H_0$ )

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is rejected. Thus, it can be concluded that the Learning Environment significantly influences Students' Mathematics Achievement.

**Table 3. Correlation Value**

Correlation Coefficient Interval	Relationship Strength
0,00 – 0,19	Very low
0,20 – 0,39	Low
0,40 – 0,59	Moderate
0,60 – 0,79	Strong
0,80 – 1,00	Very Strong

The value of the Correlation Coefficient is 0.777, which falls within the range of 0.60-0.79 based on the interpretation guidelines in Table 3. This indicates that the relationship between the Learning Environment and Students' Mathematics Achievement is strong. The Correlation table also shows that the Learning Environment and Students' Mathematics Achievement variables are marked with \*\*, confirming that there is a significant correlation between the two variables.

**Tabel 4. Model Summary**

Model	R Square
1	.604

Based on the data in Table 4 above, the R Square value or the coefficient of determination, which shows how well the regression model formed by the interaction between the Learning Environment and Students' Mathematics Achievement fits the data, is 0.604 or 60.4%. This can be interpreted as the Learning Environment having a 60.4% influence on Students' Mathematics Achievement, while the remaining 39.6% is influenced by other factors outside of Students' Mathematics Achievement.

**Tabel 5. ANOVA<sup>a</sup>**

Model		df	F	Sig.
1	Regression	1	44.196	.000 <sup>b</sup>

Based on the data in Table 5 above, the significance value for the regression is 0.000. Since this significance value is smaller than 0.05, according to the decision criteria, the null hypothesis ( $H_0$ ) is rejected. Therefore, it can be concluded that the linear regression model meets the linearity criteria, and the regression model can be used to predict the independent and dependent variables, namely the Learning Environment and Students' Mathematics Achievement.

**Tabel 6. Coefficients<sup>a</sup>**

Model	Unstandardized Coef.		Sig.
	B	Std. Error	
1 (Constant)	10.967	10.960	
Lingkungan Belajar	.845	.127	.000

Based on the data in the Coefficients table, the regression equation is derived from the constant coefficient and the variable coefficient in the Unstandardized Coefficients B column. The regression equation is  $Y = 10.967 + 0.845X$ . This means that if the value of the Learning Environment is zero, the students' learning outcomes in Hijaiyyah learning will be 10.967, with a regression coefficient of 0.845. This indicates that for every increase of one unit in the Learning Environment, students' learning outcomes in Hijaiyyah learning will increase by 0.845. Moreover, since the significance value is less than 0.05, the null hypothesis ( $H_0$ ) is rejected, which means that the Learning Environment has a significant impact on Students' Mathematics Achievement.

## Discussion

The results of this study indicate that the learning environment has a significant impact on students' mathematics achievement. This can be seen through several stages of analysis that have been conducted:

### Normality Test

The data used in this study were tested for normality using the Kolmogorov-Smirnov method. Based on the analysis results, the significance values for the Learning Environment and Students' Mathematics Achievement variables were 0.067 and 0.200, respectively, both of which are greater than 0.05. Thus, the data can be considered normally distributed, fulfilling one of the important assumptions in inferential statistics. Additionally, the Normal Q-Q Plot shows that the data is spread around the diagonal line, supporting the conclusion that the data follows a normal distribution.

### Correlation Between Learning Environment and Students' Mathematics Achievement

The correlation analysis results show a significance value of 0.000, which is less than 0.05. This indicates that there is a significant relationship between the Learning Environment and Students' Mathematics Achievement. Furthermore, the correlation coefficient of 0.777 falls within the 0.60-0.79 interval, which, according to the interpretation guidelines, indicates a strong relationship. This significant correlation is reinforced by the presence of \*\* in the analysis results, indicating a significant relationship between the two variables.

### Coefficient of Determination (R Square)

The regression analysis results show an R Square value of 0.604, or 60.4%. This indicates that the Learning Environment contributes 60.4% to students' mathematics



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achievement. The remaining 39.6% is influenced by other factors outside the Learning Environment. This finding highlights that while the Learning Environment is an important factor, there are still other factors to consider in improving students' mathematics achievement.

### Linear Regression Model

The regression analysis results yield the following regression equation:  $Y = 10.967 + 0.845X$ . In this model, the constant value of 10.967 indicates that if the Learning Environment is zero, the initial achievement level of students is 10.967. The regression coefficient of 0.845 suggests that for every one-unit increase in the Learning Environment, students' mathematics achievement will increase by 0.845. The significance value of the regression is 0.000, which is less than 0.05, indicating that this regression model is significant and can be used to predict the relationship between the Learning Environment and Students' Mathematics Achievement.

The results above show that the Learning Environment is one of the main factors influencing students' mathematics achievement. Therefore, it is important for educators, parents, and schools to create a conducive learning environment, both at home and in school. A positive learning environment, such as emotional support, adequate learning facilities, and good social relationships, can help students achieve better results. This study also emphasizes that although the Learning Environment has a significant impact, there are other factors that also contribute to students' mathematics achievement. According to (Nurhikmah, 2024), students' academic achievement is influenced by various factors, both internal such as motivation, interest, and intellectual ability, and external such as family, school, and community environments. This aligns with the view of (Rahim et al., 2024), which states that students' success depends not only on the learning environment but also on psychological factors and the teaching methods used by teachers. Therefore, the impact of the Learning Environment should be seen as one of the components interacting with other factors in determining students' learning outcomes.

### CONCLUSION

Based on the research findings, it can be concluded that the Learning Environment has a significant impact on students' Mathematics Achievement. The normality test results show that the data follows a normal distribution, thus meeting the requirements for further statistical analysis. The significance value of the correlation test is 0.000, which is less than 0.05, indicating that there is a significant relationship between the Learning Environment and Mathematics Achievement. Additionally, the correlation coefficient value of 0.777 indicates a strong relationship between the two variables. This finding reinforces the idea that the better the learning environment, the greater the opportunity for students to achieve higher performance in mathematics.



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The regression analysis shows that the Learning Environment contributes 60.4% to students' Mathematics Achievement, while the remaining 39.6% is influenced by other factors outside the Learning Environment. The linear regression model obtained is  $Y = 10.967 + 0.845X$ , meaning that for every one-unit increase in the Learning Environment, Mathematics Achievement will increase by 0.845. The constant value of 10.967 suggests that even without the influence of the Learning Environment (a value of zero), students still have a certain baseline achievement level. This model is significant and can be used to predict the relationship between the independent and dependent variables.

Overall, this study emphasizes the importance of the Learning Environment as a key factor in supporting students' academic achievement, particularly in mathematics. Therefore, schools, parents, and the community need to work together to create a conducive learning environment, in terms of physical, emotional, and social aspects. However, since there are other factors influencing mathematics achievement, further research is needed to identify additional aspects that can be optimized to improve students' learning outcomes. These findings provide practical guidance for educators in designing teaching strategies based on a positive learning environment.

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