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The Influence of Study Time and Calculus Course Lecturers on Student Learning Outcomes

Septi Fajarwati[1]*, Desty Rakhmawati[2]
*[1,2]Universitas Amikom Purwokerto, Indonesia

[1]septi.semangat45@amikompurwokerto.ac.id; [2]Desty@amikompurwokerto.ac.id

***Corresponding Author**

Keywords

Study Time, Lecturer Competence, learning Outcomes, Linear Regresion

Abstract

This study aims to analyze the influence of study time and lecturer competence on the learning outcomes of Informatics students at Universitas Amikom Purwokerto. The method used in this research is quantitative with a survey approach and statistical analysis. The sample consisted of 64 students who had completed the Calculus course in the 2022/2023 academic year. Data were collected from the students' final grades and analyzed using multiple linear regression tests. The analysis results indicated no significant influence between study time (morning and afternoon) and lecturer competence on student learning outcomes, both simultaneously and individually. The F-test and t-test results demonstrated that both independent variables were insignificant in influencing student learning outcomes. Therefore, it can be concluded that study time and lecturer competence statistically do not significantly contribute to students' academic achievement in the Calculus course. This research suggests that other factors, such as teaching methods and student motivation, may play a more crucial role in determining academic success.

Introduction

Calculus is one of the fundamental courses essential for Informatics students, including those at Universitas Amikom Purwokerto. This course not only equips students with mathematical understanding and analytical skills but also serves as a foundation for problem-solving in programming and complex algorithm development. Therefore, mastering Calculus material can be a key indicator of academic success in the Informatics department.

However, real-world observations reveal that many students face difficulties in understanding abstract concepts in Calculus, which results in poor academic performance. One critical factor influencing students' academic achievement is study time. According to Tuckman (1999), adequate and effective study time can enhance students' understanding of the material taught. Conversely, students who do not allocate sufficient time for in-depth learning often struggle to keep up with lectures and ultimately achieve lower results.

Additionally, Hattie (2009) states that the right and effective study time can significantly boost students' academic performance. Previous research also shows that optimal study time can vary among individuals, with morning study sessions often associated with better physical and mental alertness, enabling students to absorb material more effectively (Carciofo et al., 2014).

On the other hand, some students may find afternoon study sessions more suitable, especially those who have flexible learning styles and engage in activities outside morning lecture schedules (Smolensky & Lamberg, 2000).

Besides study time, the role of the lecturer is also significant in the learning process. According to Brown and Atkins (1988), a competent lecturer not only understands the material but can also convey complex concepts in a way that is easily comprehensible for students. The quality of teaching, including motivation, clarity of explanation, and the use of suitable teaching methods, greatly influences student learning outcomes (Hamzah B. Uno, 2011).

However, empirical studies examining the simultaneous effect of study time and lecturer competence on student learning outcomes, particularly at Universitas Amikom Purwokerto, remain limited. Most previous studies have focused on these factors individually without considering their interaction in the context of Calculus learning for Informatics students. Nugroho (2018) suggests that the synergy between student learning skills and lecturer competence is key to achieving optimal learning outcomes.

Based on these issues, this study aims to analyze the effect of study time (morning and afternoon) and lecturer competence on the learning outcomes of Informatics students at Universitas Amikom Purwokerto. This research is expected to contribute to improving learning strategies, both in terms of lecture scheduling and the selection of more effective teaching methods, to support enhanced student learning outcomes.

Method

This study uses a quantitative approach with survey methods and statistical analysis. The focus of this research is to measure the influence of two independent variables study time (morning or afternoon) and lecturers on the dependent variable, which is the students' learning outcomes in the Calculus course. The research was conducted at Universitas Amikom Purwokerto, with a sample consisting of Informatics students who have taken the Calculus course. This is a correlational study aimed at examining the relationship between study time (morning or afternoon), lecturers, and student learning outcomes. Data were collected from the documentation of students' academic scores, which were then analyzed using multiple regression statistical tests to determine the effect of each variable on learning outcomes.

The population of this study includes all Informatics students at Universitas Amikom Purwokerto who have completed the Calculus course in the 2022/2023 academic year. The sampling technique used is stratified random sampling, where samples were taken from students who attended morning and afternoon classes. A total of 100 students were selected as the sample, with the criteria being students who have completed the Calculus course and attended classes either in the morning or the afternoon, to differentiate the study times.

Data collection involved documenting the final grades of students in the Calculus course, obtained from official academic records as an indicator of learning outcomes. The documentation of final grades was retrieved from the academic information system of Universitas Amikom Purwokerto after obtaining the necessary permissions from relevant authorities.

After data collection, several steps of analysis were conducted, including: Classical assumption tests were carried out to ensure the regression model met the required conditions, including tests for normality, multicollinearity, and heteroscedasticity. Multiple linear regression analysis was used to determine the influence of study time (morning and afternoon) and lecturers on student learning outcomes. The F-test was used to determine whether the regression model as a whole was significant, while the t-test was used to assess the impact of each independent variable on learning outcomes. The tests were conducted at a 5% significance level ($\alpha = 0.05$), with the following hypotheses:

H_0: There is no significant influence of study time and lecturers on students' learning outcomes.

H_1: There is a significant influence of study time and lecturers on students' learning outcomes.

Research Variables consist of : Independent Variable (X1) : Study time (distinguished between morning and afternoon study sessions). Independent Variable (X2) : Lecturers. Dependent Variable (Y) : Students' learning outcomes (final grades in the Calculus course).

The procedure began with obtaining academic grade data from the Universitas Amikom Purwokerto academic information system. The data were analyzed using SPSS software, followed by compiling an analysis report that showed the influence of study time (morning and afternoon) and the lecturer in charge on students' learning outcomes.

Results and Discussion

The analysis steps using the classical assumption test are conducted to ensure that the regression model meets the required criteria, including: Normality Test, Multicollinearity Test, and Heteroscedasticity Test.

The normality test is used to verify whether the residuals (errors) of the regression model are normally distributed. This can be assessed using methods such as the Kolmogorov-

Smirnov test, Shapiro-Wilk test, or graphical methods like histograms and Q-Q plots. If the residuals are normally distributed, the assumption of normality is satisfied.

Table 1. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Lecturers	Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcomes	Lecturer A	.067	32	.200*	.975	32	.648
	Lecturer B	.077	32	.200*	.984	32	.903

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

In Table 1, the results of the normality test can be seen from the Kolmogorov-Smirnov significance value, which is 0.200. Since 0.200 > 0.05, it means that the data in this study is normally distributed.

The multicollinearity test is performed to detect whether there is a high correlation between independent variables, which can affect the reliability of the regression coefficients. Multicollinearity can be identified using Variance Inflation Factor (VIF) and Tolerance values: VIF < 10 indicates no significant multicollinearity. Tolerance > 0.1 also indicates no significant multicollinearity.

Table 2. Multicollinearity Test Result

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	Study Time	1.000	1.000
	Lecturers	1.000	1.000

a. Dependent Variable: Learning_Outcomes

In Table 2, the results of the multicollinearity test show that the Variance Inflation Factor (VIF) values for all independent variables are less than 10, with a VIF of 1 for both variables. This indicates that there is no multicollinearity issue in the model.

Table 3. Heteroscedasticity Test Result

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	9.761	3.543		2.755	.008
	Study Time	2.578	1.626	.194	1.585	.118
	Lecturers	-3.030	1.626	-.228	-1.864	.067

a. Dependent Variable: Abs_RES

In Table 3, the results of the heteroscedasticity test using the Glejser test show a significance value (Sig.) of 0.118 for the study time variable and 0.067 for the lecturer variable. Since the significance values for both variables are greater than 0.05, it can be concluded that there is no indication of heteroscedasticity in the regression model.

Multiple linear regression analysis is a statistical method used to examine the relationship between two or more independent variables and a single dependent variable. In this context, it is used to determine the effect of study time (morning and afternoon) and the lecturer in charge on students' learning outcomes. This analysis helps identify how much each independent variable contributes to the variation in students' academic performance.

By using multiple linear regression, researchers can assess the significance and strength of the relationship between the independent variables (study time and lecturer) and the dependent variable (learning outcomes). The regression equation takes the form: $Y = a + b_1X_1 + b_2X_2$

Where, Y : Students' learning outcomes (dependent variable); a : Intercept (constant); b_1, b_2 : Regression coefficients showing the influence of each independent variable; X_1 : Study time (morning or afternoon); X_2 : Lecturers

This method also involves statistical tests such as the F-test to evaluate the overall model significance and the t-test to assess the individual contribution of each variable. The results can help educators and institutions understand whether the timing of classes or the instructor has a statistically significant impact on students' academic performance, guiding improvements in teaching strategies and scheduling.

Table 4. Multiple Linear Regression Analysis Result

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	78.161	6.283		12.439	.000
	Study_Time	-.468	2.883	-.021	-.162	.872
	Lecturers	-1.860	2.883	-.082	-.645	.521

a. Dependent Variable: Learning_Outcomes

Based on Table 4, the multiple linear regression equation obtained is as follows:

$Y = a + b_1X_1 + b_2X_2$

$Y=78.161-0.468X1-1.860X2$

The constant value (a) is 78.161, meaning that if both study time and the lecturer in charge variables are zero, the students' learning outcome will be 78.161. The regression coefficient for the study time variable (b_1) is negative, with a value of -0.468. This indicates that for every 1% decrease in study time, students' learning outcomes will decrease by -0.468%, assuming all other independent variables remain constant. The regression coefficient for the lecturer in charge variable (b_2) is also negative, with a value of -1.860. This suggests that for every 1% decrease in the lecturer's contribution, students' learning outcomes will decrease by -1.860%, assuming all other independent variables remain constant.

The F-test is a statistical test used in multiple linear regression analysis to examine the overall significance of the regression model. It aims to determine whether the independent variables collectively have a significant influence on the dependent variable.

Table 5. F-Test Result

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.874	2	29.437	.221	.802[b]
	Residual	8112.306	61	132.989		
	Total	8171.180	63			

a. Dependent Variable: Learning_Outcomes

b. Predictors: (Constant), Lecturers, Study_Time

Based on Table 5, The calculation results show that the significance value (Sig.) is 0.802. The testing criteria state that H_0 is rejected if the significance value (Sig.) < α and H_0 is accepted if the significance value (Sig.) > α. Based on the calculation results, it can be concluded that the significance value (Sig.) > α, i.e., 0.802 > 0.05. Therefore, the null hypothesis (H_0) is accepted, indicating that there is no strong evidence that study time and the lecturer in charge collectively influence students' learning outcomes. It is important to note that failing to reject the null hypothesis (H_0) does not imply that the variables have no influence at all but rather that there is insufficient statistical evidence to support a significant relationship in this context. Other factors or variables not included in the model may contribute to students' academic performance.

The T-test in multiple linear regression analysis is used to test the significance of the influence of each independent variable (study time and lecturer in charge) on the dependent variable (students' learning outcomes) individually or partially.

Table 6. T-Test Result

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	78.161	6.283		12.439	.000
	Study_Time	-.468	2.883	-.021	-.162	.872
	Lecturers	-1.860	2.883	-.082	-.645	.521

a. Dependent Variable: Learning_Outcomes

Based on Table 6, the significance level for the study time variable is 0.872 > 0.05. Therefore, H_0 is accepted, indicating that study time is not individually significant in influencing students' learning outcomes. Similarly, for the lecturer in charge variable, the significance level is 0.521 > 0.05. Therefore, H_0 is also accepted, meaning that the lecturer in charge is not individually significant in influencing students' learning outcomes. A significance value greater than 0.05 for both variables indicates that changes in study time or the lecturer in charge individually are not strong enough to statistically influence students' learning outcomes.

Conclusion

Based on the statistical tests conducted, both collectively (F-test) and individually (t-test), the variables of study time and the lecturer in charge do not have a significant influence on students' learning outcomes in the regression model analyzed. The significance values exceeding 0.05 in both tests suggest that variations in study time and the lecturer's role do not directly or strongly contribute to differences in students' learning outcomes. This could be due to other factors not included in the model, such as teaching methods, students' learning motivation, learning environment, or psychological factors that might have a greater impact on academic performance. It is important to note that statistical insignificance does not imply that the variables are entirely irrelevant but rather that the available data lacks sufficient evidence to confirm a significant relationship. For a deeper understanding, further analysis could be conducted, such as including additional variables, expanding the sample size, or using more advanced statistical approaches.

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