

The Role Of Motivation and Attendance Discipline in Improving Mathematics Achievement: A Regression Analysis

Ani Nuraini,* Abdullah, Dinar Nirmalasari, Farah Khoirunnisa

^{1,2}*Program Studi Sains Aktuaria, Universitas Darunnajah, Jakarta, Indonesia*

³*Pendidikan Matematika, Universitas Sultan Ageng Tirtayasa, Serang, Indonesia*

⁴*SMA Muhammadiyah 3 Jakarta, Indonesia*

*Email Corresponding author: aninuraini@darunnajah.ac.id

ABSTRACT

This study aims to analyze the role of learning motivation and attendance discipline on students' mathematics learning outcomes at SMA Muhammadiyah 3 Jakarta using multiple regression analysis. The study collected data on learning motivation, student attendance records, and mathematics learning outcomes as the main variables. The results of the multiple regression analysis indicate that both learning motivation and attendance discipline significantly influence and contribute significantly to improving students' mathematics learning outcomes. These findings serve as a basis for schools and teachers in designing learning strategies that increase student motivation and attendance discipline, thereby optimally improving mathematics learning outcomes.

Keywords: Learning Motivation, Attendance Discipline, Mathematics Learning Outcomes

1. INTRODUCTION

Mathematics is a fundamental science for developing students' critical and logical thinking skills (Maryanti & Qadriah, 2019). Many students struggle to achieve good math results, yet this is often used as a measure of student success in the learning process. The difficulties experienced in learning mathematics stem from students' initial perceptions of mathematics being less than good, because before they learn mathematics is difficult (Kholil & Safianti, 2020). Therefore, efforts are needed to identify factors that influence their mathematics learning outcomes.

One of the factors that plays an important role in improving mathematics learning outcomes is learning motivation (Ega Putri Nurrawi et al., 2023). Motivation is an impulse that causes certain actions and actions to occur (Yulianti & Siregar, 2020). Research shows that students who have high motivation tend to be more active and participate in class activities, ask questions, and are more enthusiastic about doing assignments and exams (Julia Astari et al., 2025). Strong learning motivation can increase students' focus, perseverance and interest in mathematics, thereby supporting the achievement of optimal learning outcomes. Another factor that can improve learning outcomes is discipline, specifically student attendance during the mathematics learning process in class. Discipline in attendance at school is very important, because a disciplined attitude aims to prevent deviant behavior and things that can disrupt the learning process (Syiffa et al., 2022). Disciplined and consistent attendance is crucial in mathematics learning, given the hierarchical nature of mathematics, ensuring students receive comprehensive and continuous learning. Good attendance allows students to actively participate in class discussions and activities, thereby improving their mathematics learning outcomes.

This study aims to analyze the role of motivation and attendance discipline on students' mathematics learning outcomes using multiple regression analysis to provide a quantitative overview of the contribution of each variable. Other studies have also found a positive and significant influence between discipline and learning motivation on students' mathematics learning outcomes, as supported by multiple regression statistical tests (Multi Sari & Sukartono, 2024). The findings of this study are expected to

provide a basis for consideration for schools and teachers in developing learning strategies that increase student motivation and attendance discipline, thereby significantly improving mathematics learning outcomes.

2. METHODS

This research is a quantitative explanatory study with a cross-sectional design. The aim is to explain the influence of learning motivation and attendance on mathematics learning outcomes through multiple linear regression analysis. Multiple linear regression method. Is a multiple regression method that can be used to solve problems in predicting dependent variables (Faruqhy et al., 2021). An exploratory survey is a research method that aims to explain the position of the variables being studied and the impact of one variable on another. Cross-sectional is a type of research that analyzes the relationship between exposure or risk factors (independent) and consequences or effects (dependent) by collecting data simultaneously at one point in time (Sofya et al., 2024). The study was conducted using quantitative methods. There were three variables in this study: one dependent variable (Y) and two independent variables (X). the independent variables in study were students motivation an attendance discipline, while the dependent variable was mathematics learning outcomes. The data was conducted at SMA Muhammadiyah 3 Jakarta during the even semester of the 2024/2025 academic year. The subjects were class XI IPA 2 students who regularly attended mathematics lessons during the semester. The sampling technique used saturated sampling, namely all members off the accessible population (Class XI IPA 2 students, N = 30) were used as research samples (Arum Sari et al., 2021). The instruments used were a learning motivation questionnaire, attendance recap and mathematics learning outcomes on the topic of circle equations.

3. RESULTS AND DISCUSSION

Multiple regression analysis was conducted to determine the effect of motivation and attendance discipline on student learning outcomes. The data were processed using the IBM SPSS Statistics application program. Before conducting multiple regression analysis, there are several classical assumptions that must be met so that the analysis results are valid, including normality test, heteroscedasticity test, multicollinearity test, namely based on tolerance values and VIF values. The following are the results of the classical prerequisite test for multiple regression analysis (Indartini & Mutmainah, 2024).

1. Normality Test

The normality test is carried out to determine whether the residual data in the regression model is normally distributed, by carrying out the One-Sample Kolmogorov-Smirnov test. The following table shows the results of the normality test.

Table 1. One-Sample Kolmogorov-Smirnov Test

N		30
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	1.62696846
Most Extreme Differences	Absolute	.140
	Positive	.099
	Negative	-.140
Test Statistic		.140
Asymp. Sig. (2-tailed)		.141 ^c

Based on the output the significance value (Asymp. Sig. 2-tailed) is 0.141. Since the sig. value is greater than 0.05 ($0.141 > 0.05$), it can be concluded that the residual data is normally distributed.

2. Heteroscedasticity Test

The heteroscedasticity test was conducted by regressing the absolute residual value (Abs_RES) against the independent variables, namely motivation and attendance discipline. The results of the heteroscedasticity test are shown in the coefficients table.

Table 2. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	5.034	2.571		1.958	.061
	Motivation	-1.038	.509	-.369	-2.040	.051
	Attendance Discipline	.030	.355	.015	.083	.934

Based on the result of the teroscedasticity test displayed in the coefficients table, it shows that.

- The motivation variable has a significance value of 0.051, which is greater than 0.05, indicating no indication of heteroscedasticity.
- The attendance discipline variable has a significance value of 0.934, which is also significantly greater than 0.05, indicating no indication of heteroscedasticity.

Since all independent variables have sinificance values greater than 0.05, it can be concluded that the regression model does not contain heteroscedasticity. In other words, the residual variance is constant, thus meeting the classic assumption of heteroscedasticity.

3. Multicollinearity Test

The multicollinearity test aims to determine whether there is a high correlation between the independent variables in a regression model. A good regression model should be free from muticollinearity so that each independent variable can make a clear contribution to explaining the dependent variable. The results of the multicollinearity test are shown in the coefficients table.

Table 3. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	79.443	4.371		18.175	.000		
	Motivation	2.929	.865	.505	3.386	.002	.973	1.027
	Attendance Discipline	1.990	.603	.492	3.297	.003	.973	1.027

Based on the output table, the tolerance values for the motivation and attendance discipline variables are both 0.973, while the VIF (Variance Inflation Factor) values are 1.027 for each. The criteria for testing multicollinearity are.

- If the tolerance value is > 0.10 and the VIF if < 10 , then multicollinearity does not occur.
- Conversely, if the tolerance value is < 0.10 or the VIF is > 10 , then muticollinearity is indicated.

Because all variables have tolerance values well above 0.10 and VIF values close to 1 and well below 10, it can be concluded that there is no multicollinearity between the motivation and attendance discipline variables in the regression model.

After all prerequisite analysis tests were met, the regression model was deemed suitable for further analysis using parametric analysis. The next step was to conduct hypothesis testing to determine the effect of the independent variables on the dependent variable. Hypothesis testing in this study consisted of:

- Partial t-test, used to determine the effect of each independent variable individually on the dependent variable.
- Simultaneous t-test (F-test), used to determine the effect of the independent variables collectively on the dependent variable.
- Coefficient of Determination (R-Square) test, used to determine the extent of the independent variables' contribution in explaining variation in the dependent variable.

Thus, these three tests can determine the extent and significance of the influence of motivation and

attendance discipline on student learning outcomes, both partially and simultaneously. Based on the results of the data analysis, the following are the results of the hypothesis test.

1. Partial t-test

The coefficients table shows the results of the partial test (t-test) to determine the influence of each independent variable on learning outcomes.

Table 4. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	79.443	4.371		18.175	.000
Motivation	2.929	.865	.505	3.386	.002
Attendance Discipline	1.990	.603	.492	3.297	.003

The table shows that the Motivation variable has a regression coefficient of 2.929 with a significance level of 0.002 (<0.05). This indicates that motivation has a positive and significant effect on learning outcomes. This means that the higher a student's motivation, the higher their learning outcomes tend to be.

Furthermore, the Attendance Discipline variable has a regression coefficient of 1.990 with a significance level of 0.003 (<0.05). This indicates that attendance discipline also has a positive and significant effect on learning outcomes. In other words, the more disciplined a student is in attendance, the better their learning outcomes will be.

2. Simultaneous t-test (F-test)

The F-test is used to show that the variables of motivation and attendance discipline simultaneously have a positive and significant effect on student learning outcomes.

Table 5. ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	54.603	2	27.301	9.603	.001 ^b
Residual	76.764	27	2.843		
Total	1310367	29			

The ANOVA table shows the results of a simultaneous test (F test) to determine whether the independent variables, Motivation and Attendance Discipline, jointly influence the dependent variable, Learning Outcomes.

The calculation yields a calculated F value of 9.603 with a significance value (Sig.) of 0.001. Since the significance value is less than 0.05, it can be concluded that the regression model is significant. This means that motivation and attendance discipline simultaneously have a significant effect on student learning outcomes.

Therefore, the hypothesis that motivation and attendance discipline jointly influence learning outcomes is accepted.

3. Coefficient of Determination (R-Square) test

The Model Summary table shows the magnitude of the contribution of the independent variables (Motivation and Attendance Discipline) to the dependent variable (Learning Outcomes).

Table 6. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.645 ^a	.416	.372	1.68615

The Model Summary table shows that

- The R value of 0.645 indicates a strong relationship between motivation and attendance discipline and learning outcomes.

- The R Square value of 0.416 means that 41.6% of the variation in learning outcomes can be explained by the motivation and attendance discipline variables.
- The remaining 58.4% is influenced by factors outside this regression model, such as the learning environment, individual abilities, teaching methods, and so on.
- The Adjusted R Square value of 0.372 provides a more accurate picture after adjusting for the number of predictor variables and sample size, which still indicates a significant contribution of both independent variables to learning outcomes.

This shows that motivation and attendance discipline are able to explain 41.6% of the variation in student learning outcomes, while the remaining 58.4% is influenced by other factors outside this research model.

This section presents the research results that have been processed in accordance with the data. Presentation of research results can use tables or graphs as a means to explain the results of the study. The results of the research are in line with the problems posed, so that the explanation in this section can be explained through sub-sections.

CONCLUSION

Based on the results of multiple regression analysis, this study indicates that motivation and disciplined attendance play a significant role in influencing student learning outcomes. A partial t-test revealed that the motivation variable has a positive and significant effect on learning outcomes, with a significance value of 0.002 (<0.05). This means that the higher a student's motivation, the better the learning outcomes they can achieve. The same effect was observed for the disciplined attendance variable, which had a positive and significant effect, with a significance value of 0.003 (<0.05). This finding confirms that students who are more disciplined in attendance tend to achieve better learning outcomes.

Furthermore, the results of the simultaneous t-test (F-test) showed that motivation and disciplined attendance together significantly influenced learning outcomes ($F = 9.603$; Sig. = 0.001 <0.05). This indicates that the combination of these two variables can explain the overall variation in student learning outcomes.

REFERENCES

- [1] Arum Sari, P., Studi Manajemen, P., & Ekonomi dan Bisnis, F. (2021). Pengaruh Kemampuan Kerja, Kompensasi, Disiplin Kerja dan Pengawasan terhadap Kinerja Karyawan Pada PT. PLN (Persero) UP3 Kota Metro. *Jurnal Manajemen DIVERSIFIKASI*, 1(2), 319–331. <https://doi.org/https://doi.org/10.24127/diversifikasi.v1i2.611>
- [2] Ega Putri Nurrawi, A., Tu Zahra, A., Aulia, D., Greis, G., & Mubarak, S. (2023). Motivasi Belajar Siswa Terhadap Hasil Belajar Matematika. *Plusminus: Jurnal Pendidikan Matematika*, 3(1), 29–38. <https://doi.org/https://doi.org/10.31980/plusminus.v3i1.1220>
- [3] Faruqhy, M. N., Andreswari, D., & Sari, J. P. (2021). PREDIKSI PRESTASI NILAI AKADEMIK MAHASISWA BERDASARKAN JALUR MASUK PERGURUAN TINGGI MENGGUNAKAN METODE MULTIPLE LINEAR REGRESSION (STUDI KASUS: FAKULTAS TEKNIK UNIVERSITAS BENGKULU). *Jurnal Rekursif*, 9(2), 172–183. <http://ejournal.unib.ac.id/index.php/rekursif/>
- [4] Indartini, M., & Mutmainah. (2024). *Analisis DATA KUANTITATIF* (H. Warnaningtyas, Ed.; 1st ed.). Klaten. Lakeisha.
- [5] Julia Astari, D., Magdalena Hutabarat, E., Humaira Tampubolon, D., Natalia Panjaitan, D., Salsya Aurelia Lubis, N., & Bahasa Inggris, P. (2025). Hubungan antara Faktor-Faktor yang Mempengaruhi Hasil Belajar Siswa Kelas 9 di SMPN 27 Medan. *Jurnal Pendidikan Tambusai*, 9(1), 11293–11299. <https://jptam.org/index.php/jptam/article/view/26488>

- [6] Kholil, M., & Safianti, O. (2020). Efektivitas Pembelajaran Penemuan Terbimbing Terhadap Hasil Belajar Matematika Siswa Materi Barisan dan Deret. *Laplace : Jurnal Pendidikan Matematika*, 1(2), 151–168. <https://doi.org/https://doi.org/10.35719/educare.v1i2.14>
- [7] Maryanti, & Qadriah, L. (2019). PENINGKATAN KEMAMPUAN BERPIKIR KRITIS DAN LOGIS MATEMATIK SISWA SMK NEGERI 1 SIGLI MELALUI MODEL KOOPERATIF TIPE STAD BERBANTUAN MAPLE. *Jurnal Sains Riset (JSR)*, 9(2), 9. <https://doi.org/https://doi.org/10.47647/jsr.v9i2.109>
- [8] Multi Sari, A., & Sukartono. (2024). Pengaruh Kedisiplinan dan Motivasi Terhadap Hasil Belajar Matematika Kelas Rendah Sekolah Dasar. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, 8(2), 529–539. <https://doi.org/10.24036/jippsd.v8i2>
- [9] Sofya, A., Chusnul Novita, N., Afgani, M. W., & Isnaini, M. (2024). Metode Survey: Explanatory Survey dan Cross Sectional dalam Penelitian Kuantitatif. *Edu Society: Jurnal Pendidikan, Ilmu Sosial, Dan Pengabdian Kepada Masyarakat*, 4, 1695–1708. <https://doi.org/https://doi.org/10.56832/edu.v4i3.556>
- [10] Syiffa, H., Farial, & Prasetya, M. E. (2022). Faktor Penyebab Ketidakterdisiplinan Siswa Dalam Kehadiran di SMA Negeri 1 Alalak. *Jurnal Pendidikan Dan Konseling*, 4(6), 5518–5526.
- [11] Yulianti, L., & Siregar, S. (2020). MOTIVASI SEBAGAI PENGUBAHAN PERILAKU. *FORUM PAEDAGOGIK*, 11(2), 81–97. <https://doi.org/10.24952/paedagogik.v12i2.3156>