



## The Influence of Motivation and Study Habits on Student Achievement Index

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### ABSTRACT

This study analyzes the direct and indirect effects of learning motivation and learning habits on student grade point average (GPA). The study used a quantitative approach with the path analysis method. The research sample consisted of 57 students and was obtained based on the distribution of research questionnaires. The results showed some important findings: First, learning motivation has a significant direct influence on learning habits, with a path coefficient of 0.673, indicating the critical role of Motivation in shaping positive learning patterns. Second, learning motivation was also shown to significantly influence the GPA with a path coefficient of 0.498, confirming its role as a key factor in academic achievement. Thirdly, learning habits did not considerably affect the GPA, with a path coefficient of only 0.253. Furthermore, it was found that learning habits did not play an effective role as a mediator in the relationship between learning motivation and grade point average. The practical implications of this study suggest that strategies to improve students' academic achievement should focus more on strengthening learning motivation without neglecting the importance of forming positive learning habits.

Keywords: grade point average; learning habits; learning motivation

### INTRODUCTION

Higher education is a critical stage in shaping the quality of human resources, especially in preparing individuals to face future challenges. One of the indicators of student success in higher education is the grade point average (GPA), which reflects students' academic achievements during the learning process, as conveyed (Manurung, 2017). However, GPA is not only influenced by intellectual ability alone but also by various other factors such as motivation and learning habits.

Learning Motivation is an essential factor that encourages students to achieve optimal academic results. Dierendonck et al., (2023) analogizes Motivation as fuel in running a gasoline engine. It is further explained that whatever the shape of the gasoline engine is if there is no driving force, it will be meaningless. About learning, this analogy emphasizes that without Motivation, students may not achieve maximum learning results. Therefore, Motivation is an essential factor that must be present in the learning process.

Motivation can be divided into two types, namely intrinsic and extrinsic Motivation. Intrinsic Motivation relates to the drive from within the student to learn, such as interest or desire to understand the material. Meanwhile, extrinsic Motivation comes from outside, such as rewards, recognition, or environmental expectations. Astriyani et al., (2018) Learning motivation can grow naturally within students but can also be influenced by external stimuli, such as support from parents, teachers, and the surrounding environment. Support from these

various parties encourages and helps consistent and disciplined study habits so they can face multiple challenges in the learning process.

Students with high Motivation tend to focus well, manage their study time more effectively, and persevere in facing challenges (Sidabutar et al., 2020). In addition, high Motivation also encourages students to set clear goals, take the initiative in finding additional learning resources, and use effective learning strategies. Thus, Motivation affects academic success and students' character, making them more independent and responsible for their learning process.

However, besides Motivation, learning habits are essential in determining student learning success. These two aspects complement each other in creating an effective learning process. Motivation encourages students to start and maintain their enthusiasm for learning, while study habits help them carry out the process in a structured, consistent, and sustainable manner. This is in line with the opinions of (Dierendonck et al., 2023; Munjirin & Iswinarti, 2023), which emphasize that Motivation provides a strong initial push while learning habits create effective and productive work patterns. The combination of these two factors not only helps students achieve good academic results and builds a disciplined, resilient, and independent character. Thus, good motivation and study habits management are necessary to support overall educational success.

Conversely, learning habits also play an important role compared to Motivation. (Nainggolan et al., 2022) Revealed that learning habits have a significant influence on math learning outcomes. Similarly, Jannah et al. (2021) stated that learning habits can affect overall learning outcomes. According to (Pérez-Rivas et al., 2023), learning is the process of gaining knowledge to gain experience as a motivation to change attitudes, habits, and behaviour. Learning habits can be defined as learning patterns or attitudes formed in a person to manifest attitudinal characteristics in learning activities (Khoza, 2020). Learning habits include students' patterns and strategies to understand, remember, and apply learning materials. A good learning habit, such as planning a study schedule, recording essential points, and reflecting on the material that has been learned, can improve understanding and construction of material (Amrulloh et al., 2024; Azma, 2019; Sartika et al., 2018). Conversely, bad habits, such as studying only on the eve of exams and lack of time management, often lead to unsatisfactory results.

Many studies have shown a significant relationship between Motivation, learning habits, and GPA. (Adriani, 2018; Lase, 2018; Spripatmi et al., 2019) One study found that students with high learning motivation and good learning habits tend to have a higher GPA than those who are less motivated and do not have adequate learning habits. These findings suggest that psychological factors such as Motivation and behaviours such as learning habits significantly contribute to student achievement (Munjirin & Iswinarti, 2023).

However, these two aspects are often overlooked in education management despite the importance of motivation and learning habits. Most of the government's attention is focused on curriculum development and material mastery without considering strategies to build motivation and learning habits in students. The formation of these two factors can help students achieve their academic potential optimally. This study simultaneously analyzes the effect of learning motivation and study habits on student achievement index, thus providing a more comprehensive picture than previous studies that tend to be partial.

Based on this reasoning, this study aims to analyze the effect of motivation and learning habits on students' GPA. By understanding the relationship between these three variables, valuable insights can be gained so that more effective learning strategies can be designed to support student academic achievement.

## **RESEARCH METHODS**

This research uses a quantitative approach with the path analysis method. This approach analyzes the causal relationship between exogenous variables, namely learning Motivation and study habits, and endogenous variables, such as student GPA. Path analysis was chosen because it can test the direct and indirect effects between variables in complex causal models. This technique makes it possible to understand the direct relationship between variables and the mediation mechanisms that may occur in the learning process. The research was conducted on mathematics education study program students who had taken at least two semesters in the 2024/2025 academic year. The research sample was taken using a simple random sampling technique, with 57 respondents. This number is considered adequate for testing Partial Least Squares (PLS) based path analysis models, as suggested by (Nurwulan et al., 2015).

The research instrument used a questionnaire that had been tested for validity and reliability. Learning Motivation is measured based on indicators of learning goal orientation, task value, self-efficacy, and self-regulation developed concerning research (Sartika et al., 2018). Learning habits are measured by indicators of time management, learning strategies, and supporting and inhibiting factors that refer to research (Febriyanto & Husnul, 2020). Before use, the questionnaire was tested on a small sample to ensure validity and reliability with the software SPSS v.25.

Data was collected through an online questionnaire using the Google Form site, which was inputted directly by students and protected confidentiality, especially in the achievement index data. Data analysis was conducted in two stages. The first stage was validation, reliability, and prerequisite test analysis using SPSS. The second stage was path analysis using the software SMART-PLS v.4. This process includes testing the outer model to check construct validity and reliability and testing the inner model to analyze the causal relationship between variables.

The path analysis model used tested three main paths. The first path is the direct effect of learning Motivation on GPA. The second path is the direct effect of learning habits on GPA. The third path is the indirect effect of learning Motivation on GPA through learning habits as a mediating variable. With this approach, the research provides a comprehensive understanding of the relationship between variables in higher education.

## **RESULTS AND DISCUSSION**

### **Validity and Reliability Test**

In this test, the validity and reliability tests, namely Cronbach's alpha, using SPSS software assistance, are presented in Table 1 and Table 2.

Table 1. Output Validity of Statement

Learning Motivation (X1)														
X1.1	X1.2	X1.3	X1.4	X1.5	X1.6	X1.7	X1.8	X1.9	X1.10	X1.11	X1.12	X1.13	X1.14	X1.15
.655**	.554**	.740**	.616**	.544**	.794**	.635**	.467**	.578**	.533**	.413**	.585**	.723**	.664**	.601**
Learning Habits (X2)														
X1.1	X1.2	X1.3	X1.4	X1.5	X1.6	X1.7	X1.8	X1.9	X1.10	X1.11	X1.12	X1.13	X1.14	X1.15
.545**	.669**	.815**	.629**	.672**	.669**	.734**	.454**	.755**	.624**	.694**	.688**	.578**	.818**	.680**

Table 2. Output Reliability of Statement

Reliability Statistics Learning Motivation (X1)	
Cronbach's Alpha	N of Items
.877	15
Reliability Statistics Learning Habits (X2)	
Cronbach's Alpha	N of Items
.913	15

Based on the results of the validity test of each question in Table 1, it is obtained that all values  $r_{count > table}$  at a significance value of 5% with  $(n=57)$ , which is 0.266. So, it can be concluded that all items in the research questionnaire for learning motivation and learning habits are valid. Furthermore, based on Cronbach's alpha value in Table 2, the reliability coefficient values of the learning motivation and learning habits questionnaires are 0.877 and 0.913, respectively, which are more significant than 0.266, so it can be concluded that all items in this research questionnaire are reliable or consistent.

### Residual Normality Assumption Test

The normality test on the regression model tests whether the residual values resulting from the regression are normally distributed. A good regression model is if the data is typically distributed. In this study, the normality test on the residual value of data using SPSS software is presented in Table 3.

Table 3. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		57
Normal Parameters <sup>b</sup>	Mean	.0000000
	Std. Deviation	.14698470
Most Extreme Differences	Absolute	.108
	Positive	.100
	Negative	-.108
Test Statistic		.108
Asymp. Sig. (2-tailed)		<b>.094<sup>c</sup></b>

Based on the results of the normality test, it is known that the significance value is  $(0.094) > \alpha (0.05)$ , so it can be concluded that the residual value is usually distributed.

### Heteroscedasticity Assumption Test

The Heteroskedastistas test is a residual variant that is not the same for each variable in the regression model. A good regression model is if there are no heteroscedasticity

symptoms. In this study, heteroscedasticity testing used the Glejser test and scatterplot using SPSS software.

Table 4. Uji Glejser (Heteroskedastisitas)

Model	Coefficients			t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	.487	.138		3.526	.001
Learning Motivation	.000	.004	-.019	-.096	<b>.924</b>
Learning Habits	-.007	.004	-.392	-1.987	<b>.052</b>

a. Dependent Variable: RES2

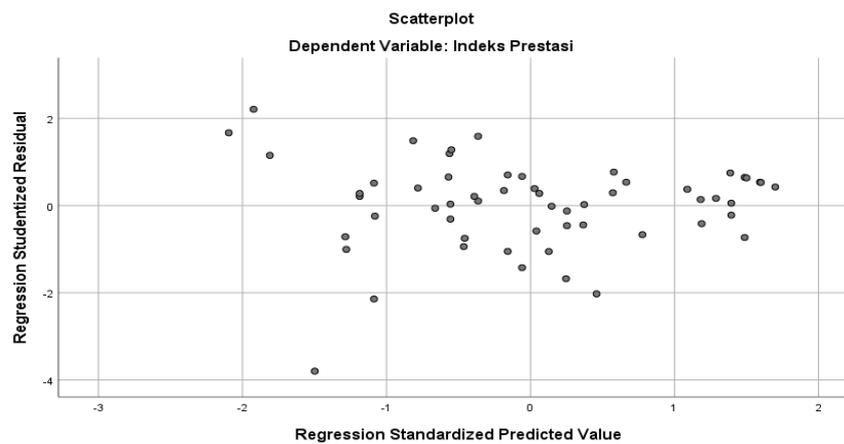


Figure 1. Output Scatterplot

Based on Table 4, the geysers test obtained Sig. The values of learning motivation and learning habits are 0.924 and 0.052 >  $\alpha$  (0.05), so it can be concluded that there is no heteroscedasticity. The scatterplot output in Figure 1 shows no heteroscedasticity. This is because the data points spread above and below or around 0. In addition, the distribution of data points does not form a specific pattern.

### Linearity Assumption Test

A linearity test is used to see whether two variables have a significant linear relationship. A good regression model if the data has a significant linear relationship between the exogenous and endogenous variables. Linearity testing using SPSS software can be shown in the Table 5.

Table 5. ANOVA (Output Linearity Test)

ANOVA Table		Sum of Squares	df	Mean Square	F	Sig.	
GPA * Learning Motivation	Between Groups	(Combined)	1.564	16	.098	4.147	.000
		Linearity	1.119	1	1.119	47.468	.000
		Deviation from Linearity	.445	15	.030	<b>1.259</b>	.272
	Within Groups		.943	40	.024		
Total		2.507	56				

ANOVA Table		Sum of Squares	df	Mean Square	F	Sig.

GPA * Learning Habits	Between Groups	(Combined)	1.650	17	.097	4.418	.000
		Linearity	1.182	1	1.182	53.796	.000
	Within Groups	Deviation from Linearity	.468	16	.029	<b>1.331</b>	.228
			.857	39	.022		
	Total		2.507	56			

Based on Table 5, the Deviation from the Linearity value is 1.259, and  $1.331 > 0.05$ . It can be concluded that there is a significant linear relationship between variables. Both learning motivation and learning habits have a linear relationship with the GPA.

### Multicollinearity Assumption Test

The multicollinearity test determines whether there is an intercorrelation (strong relationship) between exogenous variables. A good regression model is characterized by no intercorrelation between exogenous variables (no multicollinearity symptoms). One of the most accurate ways to detect the presence or absence of multicollinearity symptoms is to use the Tolerance and VIF (Variance Inflation Factor) methods. Table 6 below shows the results of multicollinearity testing using SPSS software.

Table 6. Coefficient (Output Multicollinearity Test)

Model	Coefficients	Unstandardized Coefficients		t	Sig.	Collinearity Statistics		
		B	Std. Error			Beta	Tolerance	VIF
		1	(Constant)	2.061	.223	9.233	.000	
	Learning Motivation	.015	.007	.340	2.265	.028	<b>.397</b>	<b>2.517</b>
	Learning Habits	.016	.006	.423	2.819	.007	<b>.397</b>	<b>2.517</b>

a. Dependent Variable: GPA

Based on the coefficients table, the Tolerance value is  $0.397 > 0.10$ , and the VIF value is  $2.517 < 10.00$ , so it can be concluded that the effect of learning motivation and learning habits on the GPA does not occur in multicollinearity.

### Path Analysis Test

Based on the results of the assumption test, it is found that all initial assumptions have been met, and then the path analysis test can be carried out. Path analysis in Structural Equation Modeling (SEM) consists of evaluating the outer model (measurement model) and inner model (structural model). The outer model assesses the relationship between indicators and their latent constructs by testing convergent validity (loading factor  $> 0.7$ ) and reliability (Cronbach's Alpha and Composite Reliability  $> 0.7$ ). In contrast, the inner model evaluates the relationship between latent constructs through the R-square value (measuring the predictive power of the model), F-square (the amount of influence), and path coefficient (indicating the strength of the relationship between variables with a t-statistic value  $> 1.96$  for 5% significance); the results of evaluating these two models determine the overall feasibility of the model in explaining the phenomenon under study, furthermore, for testing the overall path analysis in this study using SMART PLS software.

Table 7. Outer loadings average variance extracted

	GPA	Learning Habits	Learning Motivation
X1			1.000
X2		1.000	
Y	1.000		

Table 8. Construct reliability and validity

	Cronbach's Alpha	Composite Reliability (Rho A)	Composite Reliability (Rho C)	Average Variance Extracted (AVE)
Learning Habits	0.899	0.913	0.916	0.524
Learning Motivation	0.797	0.836	0.848	0.516

Tables 7 and 8 show the results of testing the outer model of the measurement quality of the research instrument, where the loading factor value  $> 0.7$  s that the indicator is valid in measuring the construct, the AVE value  $> 0.5$  indicates that the variance explained by the indicator is greater than the measurement error variance, the square root of the AVE which is greater than the correlation between constructs proves that each construct is different from one another, and the Cronbach's Alpha and CR  $> 0.7$  values confirm that the measurement is reliable and consistent.

Table 9. R-square

	R-square	R-square adjusted
GPA	0.481	0.462
Learning Habits	0.453	0.443

The R-square value in Table 9 shows how much the exogenous variable can explain the endogenous variable. The  $R^2$  result of 0.453 states that the contribution of the influence of the exogenous variable (learning motivation) on the intervening variable (learning habits) is 45.3%, which is included in the moderate category. Furthermore, the  $R^2$  result of 0.481 states that the contribution of the influence of the exogenous variable on the endogenous variable is 48.1%, including in the moderate category. The higher the  $R^2$  value, the better the model's predictive ability.

Table 10. F-square

	GPA	Learning Habits	Learning Motivation
GPA			
Learning Habits	0.067		
Learning Motivation	0.262	0.827	

Table 10 shows the f-square value to measure the influence of exogenous variables on the endogenous.  $f^2 = 0.067$  indicates the influence or impact of the intervening variable (learning habits) on the endogenous variable (GPA) is classified as low,  $f^2 = 0.262$  indicates the influence or effect of the exogenous variable (learning motivation) on the endogenous variable (GPA) is classified as moderate, and  $f^2 = 0.827$  indicates the influence or impact of the exogenous variable (learning motivation) on the intervening variable (learning habits) is classified as strong. The higher the  $f^2$ , the stronger the effect of exogenous variables on intervening or endogenous.

Table 11. Path coefficients

	Original sample (O)	Sample mean (M)	Standard Deviation (STDEV)	T-statistic ( O/STDEV )	P values
Learning Habits → GPA	0.253	0.292	0.164	1.539	<b>0.124</b>
Learning Motivation → GPA	0.498	0.464	0.166	2.994	<b>0.003</b>
Learning Motivation → Learning Habits	0.673	0.675	0.111	6.076	<b>0.000</b>

The path coefficient shows the effect and strength of the relationship between variables in the model. A positive coefficient value indicates a unidirectional relationship and a negative value indicates an opposite relationship. Significance is determined by t-statistic > 1.96 or p-value < 0.05, where a significant value confirms the research hypothesis about the relationship between variables. Based on the output of path coefficients in Table 11, it is concluded that the exogenous variable (learning motivation) has a significant effect directly on the intervening variable (learning habits) and the endogenous variable (GPA). Meanwhile, the relationship between the intervening variable (learning habits) and the endogenous variable (GPA) is that it does not have a significant effect directly.

Table 12. Specific indirect effects

	Original sample (O)	Sample mean (M)	Standard Deviation (STDEV)	T-statistic ( O/STDEV )	P values
Learning Motivation → Learning Habits → GPA	0.170	0.209	0.141	1.209	0.227

The specific indirect effect value measures the magnitude of the indirect effect between variables through intervening or mediating variables. The indirect impact is declared significant if the t-statistic > 1.96 or p-value < 0.05. Based on the specific indirect effect output in Table 12, the p-values are 0.227 (> 0.05). This indicates that the intervening variable (learning habits) does not effectively mediate the relationship between the exogenous variable (learning motivation) and the endogenous variable (GPA). In addition, it can be explained that changes in exogenous variables passed through intervening variables do not significantly impact changes in endogenous variables. In other words, the indirect path of learning motivation → learning habits → GPA is not proven to be an effective mechanism in explaining how learning Motivation affects the GPA in this research model. Furthermore, Figure 2 below will visually display the structural model of path analysis.

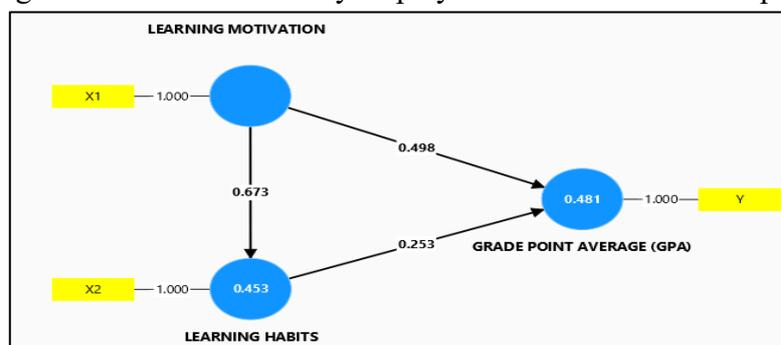


Figure 2. Graphical output

The structural model in Figure 2 shows that learning motivation (X1) has a direct influence on GPA (Y) with a path coefficient of 0.498 and also has an indirect influence

through learning habits (X2) with a path coefficient of 0.673. Meanwhile, learning habits (X2) affect GPA (Y) with a path coefficient of 0.253. The R-square value on the learning habits variable is 0.453, which means that 45.3% of its variance is explained by learning Motivation, while the R-square value on GPA is 0.481, which indicates that the combined influence of learning motivation and learning habits presents 48.1% of its variance. The 1.000 on the path to X1 and X2 indicates that both variables are measured as observed or manifest. These results are in line with the results of research from Rumahlewang et al., (2019), the combined effect of study habits and motivation on learning achievement is significant. When both factors are present, they create a synergistic effect that improves academic performance more than either factor alone.

The results showed that learning motivation significantly affects learning habits, with a path coefficient of 0.673. This finding strengthens the theory of self-regulated learning proposed by (Kadir & Khilmiyah, 2023), which states that high learning motivation encourages the formation of positive and structured learning habits. (Jamil, 2019) added that learning Motivation is the primary driver in forming effective and sustainable learning patterns. Regarding the direct effect of learning Motivation on the achievement index, this study found a significant relationship with a coefficient of 0.498. This result is in line with a longitudinal study conducted by (Azhar & Wahyudi, 2024), which proves that learning Motivation plays a vital role in long-term academic achievement. (Abdurrahman et al., 2025) Learning Motivation directly affects educational achievement and contributes to developing more adaptive learning strategies.

Interestingly, this study found that learning habits did not significantly affect the achievement index (coefficient 0.253). This finding contradicts previous studies (Andriani, 2018), which found a positive relationship between learning habits and academic achievement. This difference in findings may be due to several factors, such as differences in cultural contexts, education systems, or measurement methods used in the research. Furthermore, the analysis results show that learning habits do not play an effective role as a mediator in the relationship between learning Motivation and GPA. This contrasts the findings of (Ozbakpoor et al., 2024), who identified a significant mediating role of learning habits in the motivation-achievement relationship. (Oktafiana & Daryono, 2024) I also found that learning habits are often the bridge that connects internal Motivation with academic achievement. This discrepancy may indicate that other contextual variables, such as social support, learning environment, or other psychological factors, play a more significant role in mediating the relationship.

These findings have important implications for educational practice. Given their dominant role in directly influencing academic achievement, the findings confirm the importance of programs that enhance student motivation, such as rewards, career guidance, and curriculum adjustments, to maximize student potential. Although learning habits do not have a direct effect, teachers and institutions still need to teach effective learning techniques as a supportive element.

## **CONCLUSIONS**

Based on the research and discussion that has been carried out, it can be concluded as follows:

1. Learning motivation has a dominant role in influencing student GPA, both directly and through the formation of learning habits. This finding also confirms that learning Motivation is a key factor that needs significant attention to improve student GPA.
2. This study revealed interesting findings where learning habits did not significantly affect the grade point average, with a path coefficient of only 0.253.
3. Learning habits also did not prove to be effective as a mediator in the relationship between learning Motivation and GPA. This indicates that although learning habits can be formed from strong Motivation, their influence on GPA is less significant than expected.

These findings provide important implications for developing learning strategies in higher education, where the primary focus should be increasing student motivation as a key factor in improving academic achievement without neglecting the importance of forming positive learning habits.

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