FMDB *Transactions on Sustainable Techno Learning*

Impact of Learning Independence and Learning Facilities on Students' Economic Achievement in Grade 11 at Private High Schools

Sukristina Alkasi[1,*], Lili Nurlaili[2]

[1,2]Department of Education Management, University Pamulang, Pamulang, Banten, Indonesia.
sukristinakristyn@gmail.com[1], lilinurlaili@unpam.ac.id[2]

Abstract: This study aimed to investigate the influence of learning independence and learning facilities (X) on students' academic achievement (Y) in economics. The research was conducted at private high schools in Tangerang Regency, involving 88 eleventh-grade students as samples. A quantitative associative methodology was employed, utilizing validated and reliable questionnaires as the primary data collection instrument, supplemented by documentation. The results of the analysis indicated that: 1) There was a significant influence of learning independence on students' academic achievement in eleventh-grade economics, accounting for 70% of the variance in academic achievement. In comparison, the remaining 30% was attributed to other factors not discussed in this study. The t-test results showed that the variable of learning independence was significant ($t = 9.615 > 1.666$, $p < 0.05$). 2) There was also a significant influence of school learning facilities on students' academic achievement in eleventh-grade economics, accounting for 46.4% of the variance. The t-test results showed that the variable of school learning facilities was significant ($t = 3.759 > 1.66$, $p < 0.05$). 3) Furthermore, both learning independence and school learning facilities together had a significant influence on students' academic achievement in eleventh-grade economics, accounting for 74.3% of the variance. The findings of this study suggest that both learning independence and adequate learning facilities play crucial roles in enhancing students' academic achievement in economics. Therefore, it is recommended that schools in Tangerang Regency prioritise the development of learning environments that foster students' independence and provide sufficient learning resources to optimise learning outcomes.

Keywords: Learning Independence; Learning Facilities; Student Academic Achievement; Academic Achievement in Economics; High School Students; Self-Regulated Learning; Quality of Learning.

Received on: 02/03/2024, **Revised on:** 07/05/2024, **Accepted on:** 20/07/2024, **Published on:** 07/09/2024

Journal Homepage: https://www.fmdbpub.com/user/journals/details/FTSTL

DOI: https://doi.org/10.69888/FTSTL.2024.000339

Cite as: S. Alkasi and L. Nurlaili, "Impact of Learning Independence and Learning Facilities on Students' Economic Achievement in Grade 11 at Private High Schools," *FMDB Transactions on Sustainable Techno Learning*., vol. 2, no. 3, pp. 133–143, 2024.

1. Introduction

1.1. Learning Independence and Academic Achievement

Learning independence, a central component of self-regulated learning (SRL), is essential for students' academic success and development. Self-regulated learning is a multifaceted approach where students take charge of their learning processes, set

[*]Corresponding author.

personal goals, monitor their progress, and adjust their strategies as needed. This process not only contributes to improved academic performance but also helps students develop the skills necessary for lifelong learning. SRL has been widely researched, and its impact on academic achievement is well-established. According to Sugiono [7], self-regulated learning is a cyclical process that involves goal setting, self-monitoring, and self-reflection. By engaging in these activities, students become more aware of their learning strategies, which enhances their motivation and persistence, particularly when they encounter challenges in their studies.

Self-regulated learners are often intrinsically motivated, meaning they pursue academic tasks for the inherent satisfaction of learning, rather than relying solely on external rewards. This intrinsic motivation enables them to engage deeply with the material, often leading to improved retention and a deeper understanding of the subject matter. Schwartz and Hwang [8] emphasise that students who regulate their learning are more likely to develop critical thinking and problem-solving skills, which are crucial for success in demanding subjects such as economics. These students are also able to adjust their strategies when they face difficulties, improving their learning process over time. In contrast, less self-regulated students may struggle to engage with the material, have lower persistence, and face greater challenges in mastering complex topics.

Moreover, Williams' [9] social cognitive theory adds another layer of understanding to the role of learning independence. According to Bandura, self-efficacy the belief in one's ability to succeed is fundamental to learning independence. When students believe they can succeed, they are more likely to engage in the task at hand, persevere in the face of adversity, and manage their learning processes effectively. High self-efficacy, as Bandura notes, boosts motivation, which is critical in academic contexts that require sustained effort, such as economics. The belief that one can control one's learning and succeed is particularly important in subjects that demand abstract thinking, critical analysis, and problem-solving. Constructivist theories, influenced by the work of Piaget and Vygotsky, also emphasise the active role of the learner in the knowledge acquisition process. According to Gable and Wolf [10], constructivist learning theory suggests that learners actively build their understanding of the world by integrating new information with their existing knowledge.

In this context, self-regulated learners use their prior knowledge as a foundation to make sense of new content. This approach is especially important in subjects such as economics, where students are expected to understand complex concepts and apply them to real-world scenarios. Independent learners are more likely to construct a deeper understanding of the material because they can apply their critical thinking skills and adapt their learning strategies to new situations. Furthermore, the practice of self-regulation goes beyond academic success in the classroom. Knight [11] asserts that self-regulation helps learners develop lifelong learning habits, which are essential for future academic and career success. These habits include setting goals, staying motivated, and being proactive about learning, all of which lead to greater independence. By fostering these habits in students, educators can ensure that they are well-prepared to face the challenges of higher education and the professional world.

1.2. Learning Facilities and Student Engagement

In addition to learning independence, the availability and quality of learning facilities also play a significant role in academic achievement. Learning facilities, which encompass the physical and technological resources available to students, provide the infrastructure necessary to support effective learning and academic achievement. Lestari [12] introduced Cognitive Load Theory, which posits that the design of educational environments can influence students' cognitive processing. According to this theory, extraneous cognitive load —anything that interferes with the learning process —should be minimized. Well-designed classrooms and access to resources, such as libraries, computers, and other educational tools, allow students to focus their cognitive energy on meaningful learning rather than navigating distracting or insufficient environments.

In this context, the role of technology in modern learning environments is crucial. Juwita [13] highlights the importance of technology-rich learning environments, which provide interactive and personalised learning experiences. Technology can help bridge gaps between students' existing knowledge and new content, particularly in subjects that involve complex problem-solving and analysis, such as economics. For instance, computer simulations, online databases, and digital learning platforms can make abstract concepts more tangible, facilitating greater engagement and understanding. Access to modern learning facilities enables students to engage with course material more effectively, thereby enhancing their academic outcomes.

Moreover, Brown [14] discusses how robust learning infrastructure—such as well-maintained classrooms, up-to-date technology, and sufficient study resources—correlates with improved academic performance. In their study, they found that schools with superior learning facilities often achieve better outcomes among students, especially in resource-intensive subjects such as economics. These students have access to a range of resources that enhance their learning experience, including multimedia tools, online resources, and collaborative spaces that promote group work and discussion. With such resources, students are better equipped to engage with challenging concepts and gain a deeper understanding of the material.

Beyond the technological and physical resources, the layout of the learning environment also plays a crucial role in student engagement. According to Hidayat [15], classroom design, including factors such as lighting, seating arrangements, and noise levels, can significantly influence how students interact with the learning material and their peers. An environment that is conducive to learning not only enhances cognitive engagement but also fosters social interaction, thereby enriching the overall learning experience. Thus, the importance of learning facilities extends beyond access to technology and textbooks, encompassing the broader physical and social aspects of the learning environment.

1.3. The Interaction Between Learning Independence and Learning Facilities

While learning independence and learning facilities are critical factors in academic success, their interaction remains an important yet often underexplored area in educational research. Anggara [1] suggests that learning independence can mediate the effect of learning facilities on academic achievement. Independent learners, who are self-motivated and proactive in managing their learning processes, are better able to take full advantage of the resources available to them. They actively seek out information, engage with learning materials, and apply their knowledge in new contexts. In contrast, students who lack independence may struggle to make the most of available resources, even if they are abundant. They may require more structured guidance and support to utilise learning facilities effectively.

This interaction between learning independence and learning facilities suggests that providing students with advanced learning resources is not enough to guarantee academic success. It is equally important to cultivate students' ability to self-regulate their learning. A well-equipped classroom or library is only valuable if students are equipped with the skills to use these resources effectively. Therefore, enhancing learning independence is crucial to unlocking the full potential of learning facilities. Educators should focus not only on providing students with the necessary tools but also on fostering the skills that allow them to use these tools effectively.

1.4. Research Context and Objective

The relationship between learning independence and learning facilities has been extensively studied in Western educational systems; however, research in developing countries, such as Indonesia, remains limited. This study aims to address this gap by investigating how learning independence and learning facilities influence students' academic achievement in Grade 11 at private high schools in Tangerang Regency, Indonesia. This region presents a unique context, with a rapidly evolving educational landscape and diverse socio-economic conditions. By focusing on this context, the research seeks to contribute valuable insights that are relevant not only to Indonesian policymakers and educators but also to the broader international educational community.

In particular, this study will examine the combined effects of learning independence and access to learning facilities on students' economic achievement. Economics is a subject that demands high levels of critical thinking, problem-solving, and abstract reasoning, making it an ideal subject for studying the interplay between learning independence and learning resources. By examining how these factors interact, the study will help identify strategies to enhance student outcomes in Indonesia and similar contexts. Ultimately, this research aims to contribute to the growing body of literature on student achievement by providing a nuanced understanding of how learning independence and learning facilities influence academic success in developing countries. The findings will provide educators and policymakers with valuable insights, enabling them to design effective interventions that promote both independent learning skills and the optimal use of learning resources. By doing so, the study seeks to improve educational outcomes and promote more equitable access to quality education in diverse global contexts.

2. Literature Review

Understanding the factors that influence student achievement has been a key focus of educational research, particularly in contexts where resources and individual learner characteristics vary significantly. Among these factors, learning independence and learning facilities have been identified as critical determinants of academic performance. This literature review explores recent theories and empirical studies (2018–2024) on learning independence and learning facilities, focusing on their roles in student success and how they interplay to influence academic outcomes in economics education.

2.1. Learning Independence and Academic Achievement

Learning independence, often referred to as self-regulated learning, denotes a student's ability to take initiative and responsibility for their learning process. Anggara [2] defines self-regulated learning as a cyclical process involving planning, performance monitoring, and reflection. This process enables students to adjust their strategies according to their progress and goals. The ability to self-regulate learning is particularly crucial in the 21st century, where independent problem-solving and critical thinking are valued.

Constructivist theories, particularly those advanced by Piaget and Vygotsky, offer foundational insights into the development of learning independence. Ghozali [3] posits that learners achieve optimal growth when they actively engage with tasks beyond their current capabilities with minimal external assistance, within the Zone of Proximal Development. Recent extensions of this theory emphasise that learning independence enables students to scaffold their learning through metacognitive strategies and proactive resource utilisation.

Recent studies have underscored the positive relationship between learning independence and academic achievement. Ghozali [4] highlights that self-regulated learners outperform their peers due to their enhanced ability to set goals, intrinsic motivation, and the capacity to overcome academic challenges. Similarly, Ridwan [5] demonstrates that students with high learning independence achieve superior outcomes in subjects requiring analytical thinking, such as economics. Economic education demands a blend of theoretical understanding and practical application, making independent learning essential for success. Students must not only grasp abstract economic theories but also apply them to real-world scenarios. Research by Sugiono [6] indicates that self-regulated learners in economics courses are more adept at integrating knowledge and solving complex problems, resulting in improved academic performance.

2.2. Learning Facilities and Academic Achievement

Learning facilities encompass the physical and digital infrastructure that supports educational processes. This includes classrooms, libraries, laboratories, and technological tools such as computers and internet access. Effective learning facilities are characterised by their ability to reduce cognitive load and foster engagement. Cognitive Load Theory (CLT), as outlined by Sugiono [7], posits that the design of learning environments can either facilitate or hinder information processing. Well-designed facilities reduce extraneous cognitive load, allowing students to focus on essential learning tasks. For instance, digital tools like interactive simulations can enhance comprehension by presenting complex economic concepts in an engaging and accessible format.

Numerous studies have demonstrated the impact of learning facilities on student achievement. A meta-analysis by Schwartz and Hwang [8] found that factors such as classroom lighting, ventilation, and technological integration accounted for a significant portion of variance in student outcomes. Furthermore, Williams [9] emphasises that access to modern learning tools enhances engagement and performance, particularly in STEM and social science disciplines. In developing countries, inadequate learning facilities often hinder student achievement. In 2021, UNESCO reports that resource disparities between schools exacerbate educational inequalities, particularly in private institutions with limited funding. These findings highlight the need for targeted interventions to improve learning environments in such contexts.

2.3. Interaction Between Learning Independence and Learning Facilities

The interplay between learning independence and learning facilities is an emerging area of interest. Gable and Wolf [10] suggest that social cognitive theory posits that personal and environmental factors interact to shape learning outcomes. For instance, independent learners may utilise available resources more effectively, while robust learning facilities can compensate for lower levels of learning independence by providing structured support. Knight [11] investigated the interaction between self-regulated learning and access to digital resources, finding that students with high learning independence achieved better outcomes when provided with technologically advanced learning environments.

Similarly, Lestari [12] observed that learning management systems enhanced the performance of independent learners by offering customizable learning pathways. Economics education benefits significantly from the interaction between learning independence and facilities. Studies by Juwita [13] demonstrate that students in well-equipped classrooms who exhibit high levels of independence perform better on assessments requiring critical thinking and data analysis. This synergy highlights the importance of fostering both individual learner characteristics and supportive environments.

2.4. Contextual Relevance and Research Gap

Indonesia's education system faces unique challenges, particularly in resource allocation. A report by Williams [9] highlights the disparities between public and private schools in terms of access to learning facilities. Private high schools in regions like Tangerang Regency often struggle to provide the necessary infrastructure for optimal learning, making independent learning a critical compensatory factor. Despite the increasing volume of research on learning independence and the availability of learning facilities, the combined impact of these two factors has been underexplored in developing countries. Most existing studies predominantly focus on Western educational contexts, where resources are plentiful and learning environments are more uniform. These studies often overlook the unique challenges and constraints faced by educational systems in developing nations, where resource limitations, socio-economic disparities, and varied learning environments can significantly impact student outcomes.

In contrast, this study aims to bridge this gap by examining how learning independence and learning facilities interact in the specific context of Indonesian private high schools. Indonesia, with its diverse educational landscape and varying access to resources, presents an ideal setting for examining how these factors impact academic achievement, particularly in subjects that require critical thinking and analytical skills, such as economics. Economics education, with its complex concepts and need for higher-order cognitive skills, offers a valuable lens through which to explore the combined effects of learning independence and facilities. By focusing on Indonesian private high schools, where educational resources and facilities may differ significantly from those in public schools, this study aims to provide a deeper understanding of how learning independence and facilities contribute to academic success. The findings will contribute to the growing body of research on student achievement, offering insights that are particularly relevant for policymakers and educators in developing countries seeking to improve educational outcomes.

3. Methodology

This study employed a quantitative approach, as defined by Sugiono [6], which is grounded in the philosophy of positivism and aims to investigate specific populations and samples. The primary method of data collection utilised research instruments such as surveys and observations. The dependent variable in this study is Student Learning Achievement (Y), while the independent variables are Learning Independence (X1) and Learning Facilities (X2). The population comprised all students of Class X1 IPS, totalling 112 students, from which a sample of 88 students was selected using non-probability sampling with a purposive sampling technique (Figure 1). The following table presents a research sample.

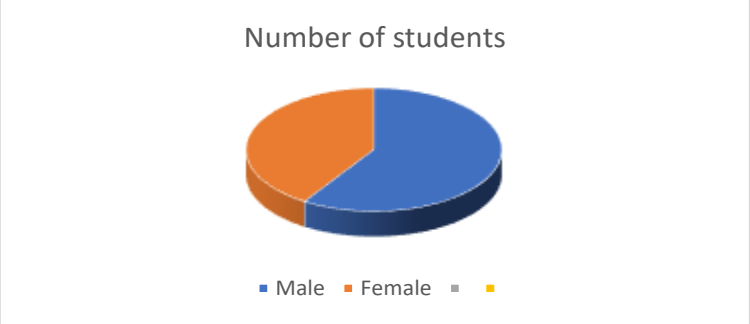

Figure 1: The pie chart shows the number of students

The data collection in this study employed a combination of qualitative and quantitative methods, aimed at gathering comprehensive insights into the factors affecting students' academic achievement. These techniques were based on established research methodologies, with each technique selected to serve a specific function in the research process. Below are the theoretical justifications for each data collection technique based on the work of experts between 2015 and 2019.

3.1. Observation

Structured observation was employed to collect qualitative data on student behaviour. According to Anggara [1], structured observation involves systematically recording specific behaviours in natural settings, and it is a valuable tool for understanding real-world phenomena. In educational research, structured observation can offer valuable insights into how students interact with their learning environment, particularly in terms of their engagement, participation, and reactions to various teaching methods. Observation helps identify patterns that are not easily captured through self-reports or standardized tests [1]. Furthermore, this method allows the researcher to be a direct witness to the students' behaviour in their natural context, making it particularly useful for understanding the nuances of learning dynamics that influence academic outcomes.

3.2. Interviews

Semi-structured interviews were used to gather in-depth information and complement the quantitative data. According to Ghozali [4], interviews, particularly semi-structured ones, enable researchers to explore a topic in detail while maintaining the flexibility to probe further based on the interviewee's responses. This method is particularly useful for gaining insights into the perspectives and experiences of individuals, as it allows for follow-up questions that probe deeper into personal views. In the context of this study, semi-structured interviews with students, teachers, and school administrators helped uncover the underlying reasons behind students' learning behaviours and the impact of learning facilities. This approach also ensures that the data collected is both reliable and rich in detail, providing a well-rounded understanding of the factors influencing academic achievement.

3.3. Questionnaires

The primary data collection tool in this study was a Likert-scale questionnaire, which was designed to measure students' perceptions of learning independence, learning facilities, and their academic performance. Brown [14] emphasized that Likert scales are widely used in social science research because they enable researchers to quantify subjective attitudes, opinions, and behaviors. By using a five-point scale, ranging from "Strongly Agree" to "Strongly Disagree," this questionnaire enabled the measurement of varying degrees of agreement or disagreement with each statement, providing a clear picture of students' views. The inclusion of both positive and negative statements in the questionnaire is particularly important for ensuring the reliability of the responses, as it prevents respondents from giving biased answers by forcing them to think critically about each statement. Additionally, the Likert scale is effective in capturing the attitudes and behaviours of large groups of participants, making it ideal for this study's sample size.

3.4. Documentation

Documentation provided supplementary data to support the findings from the other data collection techniques. According to Ridwan [5], documentation analysis involves the systematic review of existing records, such as academic records, attendance sheets, and previous performance reports, to complement other data sources. This method helps triangulate findings by providing historical context and additional factual information that may not have been captured through observation or interviews alone. In educational research, documentation is invaluable as it can offer concrete evidence of students' prior academic performance, which is essential for analysing changes in achievement levels over time. By analysing documents such as exam results or school reports, researchers can cross-check the consistency of data and draw more reliable conclusions about the factors influencing academic outcomes.

These data collection techniques, when used in combination, provide a robust framework for understanding the multifaceted nature of students' academic achievement. The qualitative insights gained from observations and interviews, combined with the structured data from questionnaires and documentation, enable a comprehensive analysis of the variables under study. Together, these methods ensure that the study captures both the breadth and depth of the factors influencing students' academic performance, thus contributing to a more nuanced understanding of the educational process. Quantitative testing involves the use of structured instruments, such as surveys or questionnaires, to gather numerical data, which can be analyzed statistically. This method allows researchers to test hypotheses, identify patterns, and make generalisations based on large sample sizes. The results are typically presented in the form of graphs, tables, and statistical tests, providing objective and measurable insights into the research variables.

3.4.1. Validity and Reliability Tests

- **Validity Test:** The validity of the questionnaire was tested using the Pearson Product-Moment Correlation Coefficient. Items with an R-value greater than the R-table at a significance level of 0.05 were deemed valid.
- **Reliability Test:** Reliability was assessed using the Cronbach's Alpha method, with a threshold value of 0.6 indicating acceptable reliability [2].

3.4.2. Classical Assumption Test

Kolmogorov-Smirnov Test: The normality test in Table 1 checks whether the residuals, or the differences between observed and predicted values, follow a normal distribution. The Kolmogorov-Smirnov test is used for this purpose. It compares the distribution of residuals to a normal distribution, and a p-value greater than 0.05 indicates that the residuals are likely to be normally distributed. This is crucial because many statistical methods, including regression, assume that the data follows a normal distribution. If the data deviates significantly from normality, the results of the analysis may not be valid [5].

Table 1: Test of normality for regression residuals

Normality X_1, X_2 - Y One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		88
Normal Parameters [a,b]	**Mean**	.0000000
	Std. Deviation	2.88729251
Most Extreme Differences	**Absolute**	.088
	Positive	.051

	Negative	-.088
Test Statistic		.088
Asymp. Sig. (2-tailed)		.088[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

3.4.3. Linearity Test

Deviation from Linearity Test: The linearity test checks whether the relationship between independent and dependent variables is linear (Table 2). A linear relationship is a fundamental assumption in many statistical methods, especially regression analysis. The Deviation from Linearity test is used to assess this. If the p-value is greater than 0.05, it suggests that the relationship between the variables is linear, meaning that the model can be accurately used to represent the data (Table 3). This test ensures that the model is appropriate for the data being analysed [4].

Table 2: ANOVA test for linearity of learning achievement and learning independence with respect to y

Linieritas X_1 -Y ANOVA Table							
			Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
***Learning achievement * learning independence**	**Between Groups**	**(Combined)**	2364.299	31	76.268	9.317	.000
		Linearity	1976.870	1	1976.870	241.494	.000
		Deviation from Linearity	387.429	30	12.914	1.578	.070
	Within Groups		458.417	56	8.186		
	Total		2822.716	87			

Table 3: ANOVA test for linearity of learning achievement and learning independence with respect to y

Linieritas X_2 -Y ANOVA Table							
			Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Learning achievement * Learning facilities	**Between Groups**	**(Combined)**	2040.916	35	58.312	3.879	.000
		Linearity	1308.609	1	1308.609	87.040	.000
		Deviation from Linearity	732.307	34	21.538	1.433	.119
	Within Groups		781.800	52	15.035		
	Total		2822.716	87			

Multicollinearity Test: Multicollinearity (Table 4) occurs when there is a high correlation between two or more independent variables in a regression model, which can distort the estimation of coefficients and affect the model's predictive power. The multicollinearity test is conducted by examining two key indicators: Tolerance and the Variance Inflation Factor (VIF). Tolerance values greater than 0.1 and VIF values less than 10 are considered acceptable, indicating no severe multicollinearity. If either of these conditions is violated, it suggests that the independent variables are highly correlated, which may require modification or exclusion of certain variables from the model [3].

Table 4: Multicollinearity statistics for predictors of learning achievement

Multikoloneritas Coefficients[a]			
Model		**Collinearity Statistics**	
		Tolerance	**VIF**
1	learning independence	.616	1.624
	Learning facilities	.616	1.624
a. Dependent Variable: Learning achievement			

Heteroskedasticity Test: Heteroskedasticity refers to the condition where the variance of the residuals is not constant across all levels of the independent variables. This can lead to inefficiency in estimating regression coefficients. The heteroskedasticity test checks whether the residuals exhibit constant variance. If the significance level is greater than 0.05, it indicates that there is no heteroskedasticity, meaning the residuals have consistent variance. Ensuring that no heteroskedasticity is present is crucial for making valid inferences from the regression analysis (Table 5).

Table 5: Heteroskedasticity coefficients

Heteroskedatisitas Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	-1.259	1.041		-1.209	.230
	Learning independence	.021	.016	.165	1.274	.206
	Learning facilities	.033	.020	.218	1.677	.097
a. Dependent Variable: ABS						

3.4.4. Autocorrelation Test

Durbin-Watson Statistic: Autocorrelation (Table 6) occurs when the residuals of a regression model are correlated with each other, violating the assumption of independent errors. This can happen in time-series data or when the observations are ordered in a sequence. The Durbin-Watson statistic is used to detect autocorrelation. The statistic ranges from 0 to 4, with a value close to 2 indicating no autocorrelation. A value of $dU < d < (4-dU)$ confirms that there is no autocorrelation, meaning the residuals are independent of each other, which is crucial for accurate statistical inference [2].

Table 6: Autocorrelation model summary for learning achievement

Autocorrelation Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.862[a]	.743	.737	2.921	1.818
a. Predictors: (Constant), Learning facilities, and learning independence					
b. Dependent Variable: Learning achievement					

3.4.5. Hypothesis Testing

T-Test: The T-test is used to evaluate the individual effect of each independent variable on the dependent variable in a regression model. It tests whether the coefficient of a specific independent variable is significantly different from zero, indicating that the independent variable has a statistically significant impact on the dependent variable. The significance level for the T-test is typically set at 5% (0.05). If the p-value for a given variable is less than 0.05, it indicates that the variable significantly contributes to explaining the variation in the dependent variable. The formula for the T-test is calculated by dividing the estimated coefficient of the independent variable by its standard error. The result is compared against a critical value from the t-distribution to determine whether the coefficient is significantly different from zero. This test is particularly useful when you want to determine the contribution of each predictor in a multiple regression model. It helps to isolate the unique effect of each independent variable, controlling for the influence of other variables in the model.

F-Test: The F-test is used to assess the overall fit of the regression model by evaluating whether all the independent variables, when considered together, have a significant effect on the dependent variable. Specifically, it tests the null hypothesis that all regression coefficients in the model are equal to zero, meaning that none of the independent variables contribute to explaining the variance in the dependent variable. Suppose the null hypothesis is rejected (i.e., the p-value for the F-test is less than 0.05). In that case, it suggests that at least one independent variable has a significant effect on the dependent variable (Table 7).

Table 7: Effect of learning facilities and independence on achievement

Output Uji statistic F (X_1, X_2 -Y) ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	2097.444	2	1048.722	122.908	.000[b]

	Residual	725.272	85	8.533		
	Total	2822.716	87			
a. Dependent Variable: Learning achievement						
b. Predictors: (Constant), Learning facilities, and learning independence						

The F-test is commonly used to evaluate the collective significance of the model. It provides a measure of how well the independent variables collectively explain the variation in the dependent variable. A high F-value with a p-value smaller than the chosen significance level (e.g., 0.05) suggests that the model explains a significant amount of variance and is a good fit. The Likert scale was used to measure attitudes, opinions, and perceptions regarding the variables under study. Scoring was tiered, and responses were categorised as high, medium, or low based on standard deviations. Data on Learning Independence and Learning Facilities were categorised into three groups: High, Medium, and Low (Table 8).

Table 8: Categorisation thresholds for each variable

No.	Interval	Category
1	$X > (M + 1SD)$	High
2	$(M - 1SD) \leq X \leq (M + 1SD)$	Medium
3	$X < (M - 1SD)$	Low

3.5. Findings

- 63.6% of respondents (56 students) demonstrated medium learning independence.
- 59.1% of respondents (52 students) showed medium access to learning facilities.

3.5.1. Correlation Coefficients

According to Hidayat [15], the following Table 9 ranges were used to interpret the correlation coefficients:

Table 9: Strength of relationship

Interval	Strength of Relationship
0.00 – 0.199	Very Weak
0.20 – 0.399	Weak
0.40 – 0.599	Moderate
0.60 – 0.799	Strong
0.80 – 1.000	Very Strong

- Learning Independence (X1) had a correlation coefficient of 0.837, indicating a very strong relationship with student achievement.
- Learning Facilities (X2) had a correlation coefficient of 0.681, indicating a strong relationship with student achievement.

3.5.2. Regression Analysis

- **Simple Linear Regression (X1-Y):** A significant effect of Learning Independence (X1) on Achievement (Y) was observed ($t = 9.615$, $p = 0.000$).
- **Simple Linear Regression (X2-Y):** Learning Facilities (X2) also had a significant impact ($t = 3.759$, $p = 0.000$).
- **Multiple Linear Regression (X1 & X2-Y):** The F-statistic confirmed the simultaneous influence of X1 and X2 on Y ($F = 122.908$, $p = 0.000$).

This methodology demonstrates rigorous data collection and statistical analysis to establish the relationships between Learning Independence, Learning Facilities, and Student Achievement. The use of validated tools, robust statistical methods, and comprehensive tests ensures reliability and validity in the study's findings.

4. Conclusion

Based on the discussion of the results presented, the researcher draws the following conclusions:

- There is a significant influence of learning independence on student achievement in the Economics subject for class XI at a private high school in Tangerang Regency. Learning independence contributes 70% to student achievement, while the remaining 30% is influenced by other factors, such as interest, talent, intelligence, emotions, and learning methods, which were not covered in this study. The results of the t-test for the learning independence variable show a value of 9.615 > 1.666, with a significance of 0.000 < 0.05.
- There is a significant influence of learning facilities at school on student achievement in the Economics subject for class XI at a private high school in Tangerang Regency. Learning facilities contribute 46.4% to student achievement, with the remaining 53.6% influenced by other factors, such as family environment and community environment, which were not discussed in this research. The results of the t-test for the learning facilities variable show a value of 3.759 > 1.66, with a significance of 0.000 < 0.05.
- There is a significant influence of both learning independence and learning facilities at school on student achievement in the Economics subject for class XI at a private high school in Tangerang Regency. The combined contribution of these two factors to student achievement is 74.3%. In contrast, the remaining 25.7% is influenced by other factors such as interest, talent, intelligence, emotions, learning methods, family environment, and community environment, which were not discussed in this study. The results of the t-test for the learning facilities variable show a value of 9.615 > 1.66, with a significance of 0.000 < 0.05.

These findings underscore the importance of fostering independence and the availability of adequate learning facilities in enhancing student academic performance, while also acknowledging the impact of other external factors not explored in this research.

Acknowledgement: The authors would like to express their sincere gratitude to the University Pamulang for the support and facilities provided during this research. Special thanks to the faculty and staff for their valuable guidance and encouragement throughout the study.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Funding Statement: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest Statement: The authors declare no conflict of interests.

Ethics and Consent Statement: The study was conducted in accordance with ethical guidelines. Participants were assured of the confidentiality and anonymity of their responses.

References

1. A. Anggara, “Quantitative Research Methods in Education and Social Sciences,” XYZ Publishing, Jakarta, Indonesia, 2020.
2. A. Anggara, “Reliability and Validity in Educational Research,” Grafindo Press, Jakarta, Indonesia, 2020.
3. I. Ghozali, “Applied Linear Regression Analysis for Educational Research,” Diponegoro University Press, Semarang, Indonesia, 2018.
4. I. Ghozali, “Multivariate Analysis: Techniques and Applications for Business Research,” Diponegoro University Press, Semarang, Indonesia, 2016.
5. M. Ridwan, “Statistical Methods for Educational Research: A Quantitative Approach,” Alfabeta Publishing, Bandung, Indonesia, 2015.
6. M. Sugiono, “Introduction to Quantitative Research Methods,” Alfabeta Publishing, Bandung, Indonesia, 2022.
7. M. Sugiono, “Research Methods: Qualitative, Quantitative, and R&D Approaches,” Alfabeta Publishing, Bandung, Indonesia, 2017.
8. P. Schwartz and R. Hwang, “The Future of Education: Technological Advances and Their Impact on Learning,” University of Chicago Press, Chicago, United States of America, 2023.
9. P. Williams, “Factors Affecting Academic Achievement in Secondary Education,” Wiley & Sons, Boston, United States of America, 2021.
10. R. K. Gable and M. D. Wolf, “Educational Assessment: Principles and Practices for Standardized Testing,” Routledge, London, United Kingdom, 2016.
11. R. Knight, “Educational Facilities and Their Impact on Learning,” Cambridge University Press, Cambridge, United Kingdom, 2020.

12. R. Lestari, “The Significance of Study Facilities in Student Learning Outcomes,” Pustaka Aksara, Jakarta, Indonesia, 2021.
13. S. Juwita, “Teaching and Learning Strategies for High School Students in Indonesia,” Media Karya, Jakarta, Indonesia, 2024.
14. T. Brown, “The Influence of Learning Facilities on Student Performance,” Oxford University Press, Oxford, United Kingdom, 2019.
15. W. Hidayat, “Advanced Educational Research Techniques in Social Sciences,” Pustaka Pembangunan, Surabaya, Indonesia, 2017.