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Learning Technology as a Supporting Infrastructure for Learning in the 4.0 Era in the Department of Building Engineering Education, Faculty of Engineering, Manado State University

Djubir R.E. Kembuan
Department of Building Engineering Education, Universitas Negeri Manado, Indonesia
djubirkembuan@unima.ac.id

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Abstract:
In an educational institution, learning outcomes are an important indicator of the success of the teaching and learning process. This study aims to analyze the implementation of Learning Technology as a Supporting Infrastructure for Learning in the 4.0 Era at Universities. The research method used is quantitative research with a correlational approach to find the influence of each variable. This study found a significant positive influence between learning facilities and student learning outcomes. In addition, the results of this study also found a direct positive and significant influence between learning facilities and student learning independence. Another result is a direct positive and significant influence between learning facilities and student learning commitment. This study can conclude that lecturer performance, learning facilities, learning commitment, and student learning independence positively influence student learning outcomes.

Keywords: Learning Technology, Learning Era 4.0, Building Engineering Education, University.

Introduction

Education is the most important capital for a nation. Therefore, the role of higher education is indispensable in the process and dynamics of sustainable development. UNIMA, in its vision, states that "Becoming a Quality, Superior and Calculated University both regionally, nationally, and internationally." Furthermore, its mission stated: (1) Realizing the implementation and educational services that can carry out the functions of Unima in carrying out academic, professional, and vocational education.; (2) Realizing efficient, effective, transparent, accountable and productive education management; (3) Realizing innovative and quality research capacity in the context of the development of science and technology, especially in the fields of education and teaching, and solving problems of national, regional, and regional development; (4) Realizing the capacity and quality of technology and art transfer in the framework of community service and strengthening revenue generation; and (5) Realizing social responsibility in the framework of equal distribution of higher education in Indonesia.

Efforts to realize the vision and mission above are something that is not easy to achieve, this is reflected in the low learning outcomes. Results are one of a person's goals in learning and, at the same time, an encouragement for a person's activities. In an educational institution, learning outcomes are an important indicator of the success of the teaching and learning process. However, it is undeniable that the high and low student results are greatly influenced by other factors besides the teaching process, including lecturers' performance. The main task of lecturers is to implement the Tri

Dharma of Higher Education. Unfortunately, the learning process that has occurred so far still tends to be one-way, not paying attention to the active participation of students in the learning process. Lecturers tend not to position themselves as facilitators, motivators, and dynamists in a learning process that places students as learning subjects. Lecturers are more likely to place themselves as the only source of learning, so students are more likely to be considered as learning objects who must accept everything that educators give. As a result, the learning process that has occurred so far is less meaningful for students, so they have not been able to develop students' competencies and potential abilities more optimally. This is reflected in the fact that students fail to complete their education within the minimum time limit that has been programmed or even fail to complete their studies at all. Factors that allow students to fail to complete their studies at this university include the performance of lecturers in learning process activities both in the classroom and outside the classroom. A lecturer is a professional educator and scientist with the primary task of transforming, developing, and disseminating science, technology, and the arts through education, research, and community service. In learning activities, lecturers play the role of supervisors. In their role as supervisors, lecturers must try to liven up and provide encouragement so that a conducive interaction process occurs.

In addition to lecturer performance factors, learning facility factors also have the potential to affect student learning outcomes. Learning facilities are everything that can support and facilitate teaching and learning activities. Learning facilities are one of the components of the learning strategy, and the implementation of teaching and learning will be more efficient if supported by adequate learning facilities. But ironically, every student completes his assignment in general incomplete for the reason of inadequate learning resources. Learning facilities are facilities and infrastructure that can support the smooth learning process both at home and at school. With adequate learning facilities, smooth learning will be realized.

In addition, the factor of student learning commitment plays a role in reducing learning outcomes. Commitment is not based on Mood. Commitment does not come from outside of us. Commitment comes from within a person, about how consistently an individual is doing what has been planned. Commitment is not based on "feelings" but an obligation that a person must do. Commitment is one of the activities of a person, including those who are already involved in the learning process. Often, someone does not dare to make a commitment Fearing the severity of the consequences and ultimately failing to achieve their commitments, the individual cannot be expected to have a strong desire to contribute to the achievement of learning outcomes. Building a commitment to learning in activities is a process of building student commitment to follow the learning process to improve learning outcomes. To develop yourself, a commitment is needed to continuously learn in any condition, considering that the learning process knows no time limit.

Related to student learning outcomes, the learning independence factor also plays a role in influencing student learning outcomes. Independence is one of the most important aspects of personality for individuals. A person living this life is never free from trials and challenges. Individuals who have high independence are relatively able to face all problems because independent individuals do not depend on others and always try to face and solve existing problems.

The results of this study are expected to provide benefits both theoretically and practically. Theoretically, the results of this research are expected to add to the treasures of science, especially in the field of education, especially learning in higher education. Practically, the results of this research

are expected to provide benefits of building higher lecturer performance, building learning facilities that support teaching and learning activities, forming a positive learning commitment to complete studies on time, and awakening learning independence oriented towards learning outcomes, especially in the advancement of education in general.

METHOD

Place and Time of Research

a. Research Place

This research was carried out on students of the Faculty of Engineering, State University of Manado (UNIMA). The basis for his consideration was chosen as a place for research. First, it has a large number of students so that the implementation of research can be carried out in one place. Second, students are relatively homogeneous, so they have the same characteristics. Third, students are on campus so that they can support the ease of conducting research. Fourth, the researcher is one of the lecturers who teaches engineering at the Manado State Faculty of Engineering.

Research Time

The research will be carried out for approximately four months, from June 2024 to October 2024. Before data collection, several preparatory activities related to research are carried out, such as preparing a theoretical framework and conducting seminars on theoretical studies to be used then, the preparation of instruments and instrument trials will be continued.

Population and Sample

1. Population

The population in this study consists of the target population of all students who sit in the even semester of 2023/2024, and the affordable population is students of the Department of Building Engineering Education, Faculty of Engineering, State University of Manado, who sit in the sixth semester, as many as 304 students.

2. Sample

The withdrawal or creation of samples from the population to represent the population and the conclusion of the study as something that applies to the population. Arikunto (2010) said that "the sample is a partial or representative of the population studied." Furthermore, according to Sugiyono (2010), the sample is "part of the number and characteristics possessed by the population. In this study, the author took samples using the purposive sampling technique. Regarding this, Arikunto (2010) explained that "purposive sampling is carried out by taking subjects not based on strata, random or regional but based on certain objectives. Likewise, according to Sugiyono (2010), purposive sampling is "a technique for determining samples with certain considerations. This means that each subject taken from the population is deliberately selected based on certain goals and considerations. Based on this explanation, in this study, the number of samples used was 100 (one hundred) or 33% of the total affordable population of 304 students of the Faculty of Engineering, Unima, Information and Communication Technology Education Study Program (PTIK), as well as to meet the requirements of path analysis.

Data Collection Techniques

The data collection technique in this study is for the five variables, namely, lecturer performance variables, learning facilities, learning commitment, and learning independence, using a questionnaire with the Likert scale model. Meanwhile, student learning outcomes are taken based on the results of the combination of learning outcomes from 3 engineering courses in semester VI, namely: (1) System Analysis and Design, (2) LAN Wireless, and (3) Telecommunication System Technology. Furthermore, each variable can be explained as follows.:

Student Learning Outcome Instruments

a. Conceptual Definition

Student learning outcomes are a form of learning outcomes achieved by students from several courses through learning activities within a certain period that are measurable and expressed in the form of values obtained through evaluation by lecturers, including indicators, cognitive realm, and psychomotor realm.

b. Operational Definition

Student learning outcomes are the value of maximum efforts achieved by students through learning activities based on a certain period that is measured and expressed in the form of values obtained through evaluation, which are measured based on indicators: cognitive realm and psychomotor realm. The student learning outcome value in this study is a combination of student learning outcome scores in even semesters in three engineering courses, including (1) the value of the System Analysis and Design course, (2) the value of the Wireless LAN course, and (3) the value of the Telecommunication System Technology course.

Lecturer Performance Instruments

a. Conceptual Definition

Lecturer performance is a set of lecturer behaviors that contribute positively to the process of learning activities as the main task and function carried out within a certain period, with indicators: success rate, teaching competence, responsibility, and transparency to assessment.

b. Operational Definition

Lecturer performance is a student assessment of a set of lecturer behaviors that contribute positively to the process of learning activities as the main task and function carried out within a certain period, which is measured through indicators: success rate, teaching competence, responsibility, and transparency to assessment.

The assessment of lecturer performance uses an instrument in the form of a questionnaire with a total of 30 statement items such as the Likert scale model of five choices (1-5); for positive choices, 1 = strongly disagree, 2 = disagree, 3 = disagree, 4 = agree, and 5 = strongly agree, while negative statements: 5 = strongly disagree, 4 = disagree, 3 = disagree, 2 = agree, and 1 = strongly agree.

c. Lecturer Performance Instrument Grid.

The grid of lecturer performance variable instruments is shown in Table 1

Table 1. Variable Instrument Grid of Lecturer Performance After the Trial

It	Indicator	Item Number		Sum
		Positive (+)	Negative (-)	
1.	success rate,	1,2,4,6,8	3,5	7
1.	teaching competence,	9,10,12,13 16	11,14,15	8
3.	responsibility	18,19,23	17,20,21,22	7
4.	Transparent to assessments	7,24,25	26,27	5
		16	11	27

Result and Discussion

A. Data description

1. **Student Learning Outcome Data**

Student learning outcome data collected through student documents based on odd semester final grades with a score range showing that it is between 58 – 84. The results of data analysis were obtained: the average score was 70.81, the standard deviation was 6.758, the median was 71, and the mode was 66. The number of 7th graders and the length of 4th grade. The results of data processing are displayed in the following frequency distribution table 2.

Table 2. Frequency Distribution of Student Learning Outcomes Score

Number	Class Interval	Absolute Frequency	Relative Frequency (%)	Cumulative Frequency (%)
1	58 - 61	8	8.00	8.00
2	62 - 65	11	11.00	19.00
3	66 - 69	20	20.00	39.00
4	70 - 73	29	29.00	68.00
5	74 - 77	13	13.00	81.00
6	78 - 81	11	11.00	92.00
7	82 - 85	8	8.00	100.00
Sum		100	100	

Based on the mean value of 70.81, which is located in the interval class of 70 – 71, it can be seen that 29 respondents (29.00%) have student learning outcomes scores equal to the average, 39 respondents (39%) are below average, and 32 respondents (32%) are above average. Furthermore, the histogram of this variable can be seen in the following figure 1.

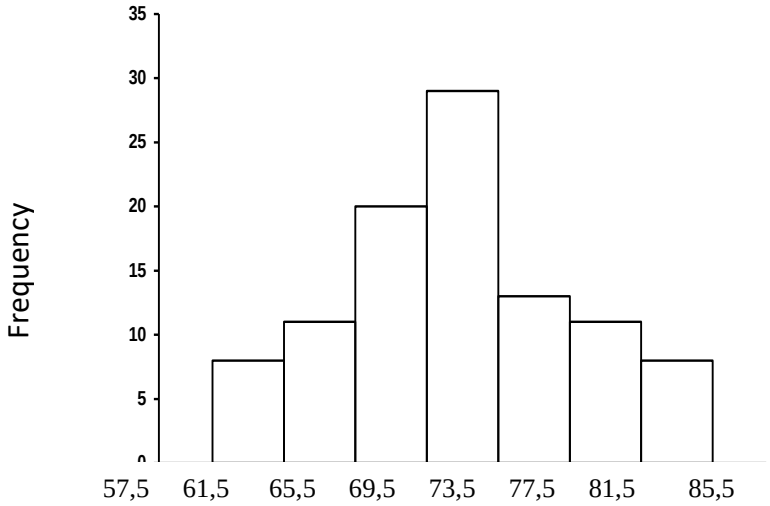

Figure 1. Histogram of student learning outcomes

2. Learning Facilities

Based on the data of learning facilities collected through a questionnaire containing 27 statements with a score scale of 1 – 5, it shows that the theoretical range is between 27 – 135. The answers given ranged from 105 to 132, with a range of 27.

The results of the data analysis were obtained: the average score was 119.77, the standard deviation or standard deviation was 7.11, the median was 120, and the mode was 122. The number of 7th graders and the length of 5th grade. The results of data processing are displayed in the following frequency distribution table 3.

Table 3. Frequency Distribution of Learning Facilities Score

Number	Class Interval	Absolute Frequency	Relative Frequency (%)	Cumulative Frequency (%)
1	105 - 108	7	7.00	7.00
2	109 - 112	11	11.00	18.00
3	113 - 116	16	16.00	34.00
4	117 - 120	21	21.00	55.00
5	121 - 124	22	22.00	77.00
6	125 - 128	13	13.00	90.00
7	129 - 132	10	10.00	100.00
Sum		100	100	

Based on the mean value of 119.77 located in the interval class 117 – 120, it can be seen that 21 respondents (21%) have learning facility scores equal to the average, 34 respondents (34%) are below average, and 45 respondents (48.75%) are above average. Furthermore, the histogram of this variable can be seen in the following figure 2.

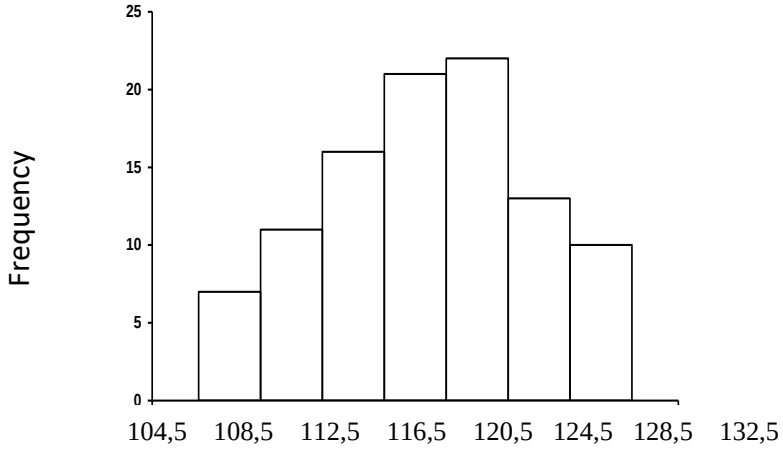

Figure 2. Learning Facilities Histogram

B. Testing Requirements Analysis

To be able to use path analysis (*path analysis*) in hypothesis testing, it is first necessary to test the statistical prerequisites for the data. Testing the prerequisites for analysis includes:

1. Data normality test (data scores must be normally distributed)
2. Test the homogeneity of variance for each related variable
3. Test the linearity and significance of regression and correlation.

1. Data Normality Test

The normality test of each variable is carried out to find out whether the distribution of data from each variable does not deviate from the characteristics of the normally distributed data. The normality test was carried out on the regression estimation errors of Y over X2, Y over X3, Y over X4, X4 over X2, X4 over X3, X3 over X1, and X3 over X2, using Lilliefors Test statistics.

The test of the Y regression estimation error on X1 results in a maximum Lcal price of 0.070, while Ltabel at the real level of alpha 0.05 obtains a value of 0.089. It turns out that L_{counts} < Ltabel or 0.070 < 0.089. Thus, it can be concluded that the error of estimating Y over X1 is normally distributed. The test of the Y regression estimation error on X2 results in a maximum Lcal price of 0.068, while Ltabel at the real level of alpha 0.05 obtains a value of 0.089. It turns out that L_{counts} < Ltabel or 0.068 < 0.089. Thus, it can be concluded that the error of estimating Y over X2 is normally distributed. For the test of the Y regression estimation error on X3, the maximum Lcal price is 0.020, while the Ltabel at the real level of alpha 0.05 obtained a value of 0.089. It turns out that Lcal < Ltabel or 0.020 < 0.089. Thus, it can be concluded that the error of estimating Y over X3 is also normally distributed. The test of the Y regression estimation error on X4 results in a maximum Lcal price of 0.101, while Ltabel at the real level of alpha 0.01 obtains a value of 0.104. It turns out that L_{counts} < Ltabel or 0.101 < 0.104. Thus, it can be concluded that the error of estimating Y over X4 is normally distributed. The test of the X4 regression estimation error on X1 results in a maximum Lcal price of 0.036, while Ltabel at the real level of alpha 0.05 obtains a value of 0.089. It turns out that L_{counts} < Ltabel or 0.036 < 0.089. Thus, it can be concluded that the error of estimation of X4 over X1 is normally distributed. For the test of the estimated error of the regression of X4 over X2, the maximum Lcal price is 0.067, while the Ltabel at the real level of alpha 0.05 obtained a value of 0.089. It turns out that Lcal < Ltabel

or 0.067 < 0.089. Thus, it can be concluded that the error of estimation of X4 over X2 is also normally distributed. The test of the X4 regression estimation error on X3 results in a maximum Lcal price of 0.055, while Ltabel at the real level of alpha 0.05 obtains a value of 0.089. It turns out that L_{counts} < Ltabel or 0.055 < 0.089. Thus, it can be concluded that the error of estimation of X4 over X3 is normally distributed. The test of the X3 regression estimation error on X1 results in a maximum Lcal price of 0.067, while Ltabel at the real level of alpha 0.05 obtains a value of 0.089. It turns out that L_{counts} < Ltabel or 0.067 < 0.089. Thus, it can be concluded that the error of estimation X3 over X1 is normally distributed.

For the test of the estimation error of the regression of X3 over X2, the maximum Lcal price is 0.066, while the Ltabel at the real level of alpha 0.05 obtained a value of 0.089. It turns out that Lcalk < Ltabel or 0.066 < 0.089. Thus, it can be concluded that the error of estimation of X3 on X2 is also normally distributed. Therefore the estimation errors Y over X1, Y over X2, Y over $X3_{,Y}$ over X4, X4 over X1, X4 over X2, X4 over X3, X3 over X1, and X3 over X2, are normally distributed. Thus, hypothesis testing using correlation and regression analysis can be carried out. Meanwhile, a summary of the results of the overall normality test can be seen in the following table 4.

Table 4. Summary of the Estimation Error Normality Test $Y - \hat{Y}$

No	Estimation Error	L0	Ltabel(0.05)	Ltable($0._{01}$)	Information
1.	Y top X1	0,074	0,089	0,104	Normal
2.	Y top X2	0,068	0,089	0,104	Normal
3.	Y top X3	0,020	0,089	0,104	Normal
4.	Y top X4	0,101	0,089	0,104	Normal
5.	X4 over X1	0,036	0,089	0,104	Normal
6.	X4 over X2	0,067	0,089	0,104	Normal
7.	X4 over X3	0,055	0,089	0,104	Normal
8.	X3 over X1	0,076	0,089	0,104	Normal
9.	X3 over X2	0,066	0,089	0,104	Normal

Information:
Y = Student learning outcomes
X1 = Lecturer performance
X2 = Learning facilities
X3 = Learning Commitment
X4 = Student learning independence

The table above shows that the data on lecturer performance, student learning independence, learning facilities, and student learning outcomes come from a normally distributed population. Because the normality of the standard error of estimation is met, the use of path analysis can be carried out.

2. Linearity and Regression and Correlation Significance Test

One of the prerequisites for path analysis is that the relationship between the independent variable and the linear bound variable is that it is different. To test the linearity, a simple regression analysis was performed.

2.1 Linearity Test and Significance of Regression Equation between X2 and Y

The calculation of the regression test on the variable data of student learning outcomes on learning facilities produced a regression direction of b of 0.486 and a constant of a of 12.626. Thus, the form of the relationship between the two variables can be described by the regression equation $\hat{Y}$ = 12.626 +0.486X2. See Table 5.

Table 5. Results of Regression Equation Signification Test Analysis

$\hat{Y}$ = 12,626 +0,486X2

ANOVAb

Model		Sum of Squares	df	Mean Square	F	Mr.
1	Regression	1283.299	1	1283.299	38.839	.000a
	Residual	3238.091	98	33.042		
	Total	4521.390	99			

a. Predictors: (Constant), X2

b. Dependent Variable: Y

Based on the regression significance test through a calculation using the SPSS program presented in Table 4.9 above, it appears that the F-calculated value is obtained = 38.839, while the F price of the table with a numerator of 1 and a denominator of 98 at a significance level of 0.01 = 6.96. This shows that the price of F-calculated is greater than the price of F-table. Thus, it can be concluded that the coefficient of Y regression direction over X2 is "very significant" at a significance level of 0.01.

Furthermore, for the regression linearity test through calculation using the SPSS program presented in Table 4.10, the price of Fcal linearity = 1.978 was obtained, while the price of Ftabel with a numerator of 26 and a denominator of 72 at the level of a definition of 0.05 = 2.07, thus it can be concluded that the regression equation between the learning facilities and the learning outcomes of students Y = 12.626 +0.486X2 is linear. See Table 6.

Table 6. Results of Regression Equation Linearity Test Analysis

$\hat{Y}$ = 12,626 +0,486X2

ANOVA Table

			Sum of Squares	df	Mean Square	F	Mr.
Y * X2	Between Groups	(Combined)	2632.676	27	97.50	3.71	.000
		Linearity	1283.299	1	1283.29	48.92	.000
		Deviation from Linearity	1349.376	26	51.89	1.97	.012
	Within Groups		1888.714	72	26.23		
	Total		4521.390	99			

2. 3. Linearity Test and Significance of Regression Equation between X2 and X4

The calculation of regression analysis on the variable data of student learning independence over learning facilities resulted in a regression direction of b of 0.368 and a constant of a of 78.120. Thus, the form of the relationship between the two variables can be described by the regression equation $\hat{X}_4$ = 78.120 + 0.368X2. see Table 7

Table 7. Results of Regression Equation Signification Test Analysis

$\hat{Y}$ = 78,120 + 0,368X2

ANOVAb

Model		Sum of Squares	df	Mean Square	F	Mr.
1	Regression	735.538	1	735.538	18.265	.000a
	Residual	3946.572	98	40.271		
	Total	4682.110	99			

a. Predictors: (Constant), X2

b. Dependent Variable: X4

Based on the results of the significance test of the regression equation presented in Table 4.17, the value of F-calculated = 18.265 while the price of F table with a numerator of 1 and a denominator of 98 at a significance level of 0.01 is 6.96, this shows that the price of F-calculated is greater than the price of F-table, so it can be concluded that the coefficient of the direction of regression Y over X2 is "very significant" at the significance level of 0.01.

Furthermore, from the results of the linearity test presented in Table 8, the price of Fcal linearity = 1.252 < from the price of Ftable, which is = 2.07). This means that the direction of regression between learning facilities and student learning independence ($\hat{X}_4$ = 78.120 + 0.368X2) is linear. See Table 8.

Table 8. Results of Regression Equation Linearity Test Analysis

$\hat{Y}$ = 78,120 + 0,368X2

ANOVA Table

			Sum of Squares	Df	Mean Square	F	Mr.
X4 * X2	Between Groups	(Combined)	1964.400	27	72.756	1.928	.015
		Linearity	735.538	1	735.538	19.487	.000
		Deviation from Linearity	1228.863	26	47.264	1.252	.226
	Within Groups		2717.710	72	37.746		
	Total		4682.110	99			

C. Hypothesis Testing

Testing the prerequisites for analysis, it can be seen that the relationship between free variables and bound variables is linear, the data is normally distributed, and the variance of bound variables is based on homogeneous free variables. With the prerequisites of analysis being met, one of the most important requirements that must be met is the existence of a significant correlation between variables related to others. The correlation coefficient is a coefficient that states the magnitude of the level of relationship contribution obtained based on field data after a correlation test carried out using the SPSS 17 program, with the results arranged in the form of a matrix as follows in Table 9.

Table 9. Simple Correlation Matrix Between Variables

	X1	X2	X3	X4	And
X1	1	.317**	.405**	.376**	.567**
X2	.317**	1	.457**	.396**	.533**
X3	.405**	.457**	1	.445**	.555**
X4	.376**	.396**	.445**	1	.729**
And	.567**	.533**	.555**	.729**	1

Remarks = Correlation coefficient is very significant at alpha 0.00

In the table above, it is known that all correlation coefficients between research variables have positive values, and based on calculations, the correlation coefficients are stated to be very significant at the real level $\alpha = 0.01$, this shows that there is a positive relationship between the research variables. Furthermore, the calculation of path analysis using SPSS Version 17.0 is as follows in Table 10.

Table 10. Results of Calculation of Path Coefficient and t-Count dependent Variable Y

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Mr.
		B	Std. Error	Beta		
1	(Constant)	-52.439	8.659		-6.056	.000
	X1	.251	.062	.265	4.076	.000
	X2	.172	.061	.189	2.826	.006
	X3	.115	.056	.143	2.039	.044
	X4	.483	.066	.491	7.290	.000

a. Dependent Variable: Y

Table 11. Results of Calculation of Path Coefficients and t-Calculation Dependent Variable X3

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Mr.
		B	Std. Error	Beta		
1	(Constant)	49.512	12.348		4.010	.000
	X1	.194	.093	.201	2.089	.039
	X2	.195	.092	.211	2.130	.036
	X3	.218	.084	.267	2.605	.011

a. Dependent Variable: X4

Table 12. Results of Calculation of Path Coefficient and t-Count Dependent Variable X4

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Mr.
		B	Std. Error	Beta		
1	(Constant)	29.575	14.673		2.016	.047
	X1	.342	.107	.289	3.197	.002
	X2	.416	.103	.366	4.038	.000

a. Dependent Variable: X3

3. Hypothesis Testing

3.1 First Hypothesis Test

The first hypothesis states that "learning facilities (X2) have a direct positive effect on learning outcomes (Y).

H0 : $\beta y2 = 0$

H1 : $\beta y2 > 0$

The results of the calculation of the path coefficient for the hypothetical causal model were obtained with the value of the path coefficient $\rho y2 = 0.189$ with tcount = 2.826 and ttable = 1.66 at $\alpha = 0.05$. Because the tcount > ttable so that the path coefficient is significant, H0 is rejected. This means that the second hypothesis is proven, that the variable of learning facilities has a direct positive effect on learning outcomes.

3.2. Second Hypothesis Test

The second hypothesis states that "learning facilities (X2) have a direct positive effect on students' learning independence (X4).

H0 : $\beta x42 = 0$

H1 : $\beta x42 > 0$

The results of the calculation of the path coefficient for the hypothetical causal model obtained the value of the path coefficient $\rho x42 = 0.211$ with tcal = 2.130 and ttable = 1.66 at $\alpha = 0.05$. Because the tcount > ttable so that the path coefficient is significant, H0 is rejected. This means that the sixth hypothesis is proven, that the variables of learning facilities have a direct positive effect on student learning independence.

3.3. Third Hypothesis Test

The third hypothesis states that learning facilities (X2) have a direct positive effect on learning commitment (X3).

H0 : $\beta x32 = 0$

H1 : $\beta x32 > 0$

The results of the calculation of the path coefficient for the hypothetical causal model obtained the value of the path coefficient $\rho X32 = 0.366$ with tcal = 4.038 and ttable = 1.66 at $\alpha = 0.05$. Because the tcount > ttable so that the path coefficient is significant, H0 is rejected. This means that the ninth

hypothesis is proven, that the variable of learning facilities has a direct positive effect on learning commitment.

D. Discussion of Research Results

1. Student learning facilities have a direct effect on student learning outcomes.

The results of the hypothesis test support the direct positive influence of student learning facilities on student learning outcomes. This means that the height or low of learning facilities has a direct effect on the height or low Student Learning Outcomes. The more adequate the learning facilities, the higher the student learning outcomes. On the contrary, the less inadequate, the lower the learning facilities and Student Learning Outcomes.

The results of the calculation were obtained by the path coefficient PY2 = 0.189. Testing of the hypothesis was carried out using a static test "t" with the condition that if the tcount value > ttable, Ho would be rejected, and H1 would be accepted. From the results of the calculation, it is known that the price of tcal = 2.826 at the real level $\alpha = 0.01$ with dk = 99. These findings have implications that student learning outcomes can be directly improved through student learning commitment.

2. Learning facilities affect student learning independence

The results of the hypothesis test support the direct positive influence of learning facilities on student learning independence. This means that the high or low learning facilities have a direct effect on the high or low learning independence of students. The higher the learning facilities, the higher the student's learning independence. On the contrary, the lower the learning facilities, the lower the student's learning independence.

The results of the calculation were obtained by the path coefficient rX42 = 0.211. Testing of the hypothesis was carried out using a static test "t" with the condition that if the tcount value > ttable, Ho would be rejected, and H1 would be accepted. From the results of the calculation, it is known that the price of tcal = 2,130 at the real level $\alpha = 0.01$ with dk = 99. This finding contains implications that student learning independence can be improved directly through learning facilities.

3. Learning Facilities have a direct effect on learning commitment.

The results of the hypothesis test support the direct positive influence of learning facilities on student learning commitment. This means that the adequacy or inadequacy of learning facilities has a direct effect on the high or low commitment to student learning. The higher the adequate learning facilities, the higher the student's commitment to learning. On the other hand, inadequate learning facilities, lower the commitment to student learning.

The results of the calculation were obtained by the path coefficient rX32 = 0.366. Testing of the hypothesis was carried out using a static test "t" with the condition that if the tcount value > ttable, Ho would be rejected, and H1 would be accepted. From the results of the calculation, it is known that the price of tcal = 4.038 at the real level $\alpha = 0.01$ with dk = 99. These findings have implications that learning commitment can be increased directly through learning commitment.

The results of this study provide information that lecturer performance, learning facilities, learning commitment, and student learning independence, have a positive effect on student learning

outcomes, thus this study has the following implications: Based on the results of the analysis of the respondents' answers as described in Chapter IV, the implications that arise are as follows:

1. The results of this study also found that there was a positive and significant direct influence between learning facilities on student learning outcomes. Improving learning facilities can increase student learning outcomes. The implication is that if you want to improve student learning outcomes, you can do it by improving learning facilities.
   The effort required to provide adequate learning facilities for the effective implementation of higher education requires the support of the availability of learning facilities as a learning resource that spurs the dynamics of thinking and supports the growth and development of students as a whole. Learning resources such as the availability of space, reading rooms (whether digital or not), laboratory equipment, learning aids, and information technology must be easily accessible by lecturers and students. Learning facilities are teaching and learning aids that have functions that allow a complete, interesting, and diverse learning process. Learning aids include textbooks/libraries, whiteboards, maps, laboratory equipment, audiovisual, and others. All of them are tools to make it easier for students to follow the learning process in the classroom and the laboratory. Lack of learning aids, lecturers, and students will experience difficulties in managing education, as a result of which has a great impact on the results of the learning process and learning outcomes.
   Learning facilities are a vehicle or means for learning that is complete and appreciative and will make students better understand what is learned in theory in class into reality in the field so that students become understanding and skilled and able to adapt knowledge to their daily activities.

2. The results of this study also found that there was a positive and significant direct influence between learning facilities on student learning independence.
   Improving learning facilities can increase student learning independence. The implication is that if you want to increase student learning independence, it can be done by improving learning facilities. Learning facilities are learning facilities and infrastructure. Infrastructure includes school buildings, learning rooms, sports fields, worship rooms, art rooms, and sports equipment. Learning facilities include textbooks, reading books, school laboratory tools and facilities, and various other learning media. Facilities that consist of learning facilities and infrastructure that learning facilities are direct tools to achieve educational goals, for example, locations/places, buildings, and others, while infrastructure is an indirect tool to achieve educational goals, for example, spaces, books, libraries, laboratories and so on.
   Efforts to improve learning facilities need to be made because learning facilities are facilities and infrastructure that can support the smooth learning process both at home and at school. With adequate learning facilities, smooth learning will be realized. The more complete the learning facilities, the easier it will be to carry out learning activities the effective implementation of higher education requires the support of the availability of learning facilities as a learning resource that spurs the dynamics of thinking, and supports the growth and development of students as a whole.

3. The results of this study also found that there was a positive and significant direct influence between learning facilities on student learning commitment.

Improving learning facilities can increase student learning commitment. The implication is that if you want to increase student learning commitment, you can do it by improving learning facilities. Efforts to improve learning facilities need to be carried out, planning in the formulation of actions that will be carried out in the future, both related to operational activities, in this case, the planning in question is to detail the procurement design or the manufacture of equipment and equipment related to learning facilities (libraries, laboratories, computers, and so on). Procurement is an activity that is carried out to provide all types of learning facilities and infrastructure that are following needs to achieve the goals that have been set. In the context of learning facilities, procurement is all activities that are carried out by providing all the needs to support learning activities so that they run effectively and efficiently, following the desired goals.

Conclusion

Based on the discussion of the research results, it can be concluded as follows.

1. There is a direct positive influence of learning facilities on student learning outcomes. This implies that if there is an increase in student learning facilities, it will increase student learning outcomes.
2. There is a direct positive influence of learning facilities on learning independence. This implies that if there is an increase in adequate learning facilities, it will increase student learning independence.
3. There is a direct positive influence of learning facilities on learning commitment. This contains the understanding that if there is an increase in adequate learning facilities, it will increase student learning commitment.

The findings of this study show that student learning outcomes are directly positively influenced by lecturer performance, learning facilities, learning commitment, and student learning independence, thus improving student learning outcomes can be improved:

1) Procurement of adequate learning facilities
2) Increased student commitment to learning

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