Lecturer Performance and its Determining Factors in a Blended Learning System During The COVID-19 Pandemic

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Abstract **– This study aims to determine lecturer performance in the implementation of blended learning and analyzes the effect of the main influencing variables. The study was conducted at the State University of Medan. The results show that ICT capability has a positive effect on lecturer performance either directly or through learning materials and LMS. Learning materials significantly affect the performance of lecturers, but this is not the case with LMS. Learning planning has a significant effect on lecturer performance even though learning resource support is not significant. The main determinants of lecturer performance are leadership, learning planning, and learning materials.**

Keywords **– ICT capability, lecturer performance, leadership, learning plan.**

1. Introduction

The development of science and technology brings about major changes in many aspects of life. The loss of several types of work during Industrial Revolution 4.0 was followed by the emergence of new types of work with demands for information technology competencies [1].

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These changes have forced the world of education to respond quickly and appropriately [2].

The State University of Medan, which is a public university in the western part of Indonesia, had responded to these developments by improving the quality of education via the quality of lecturers, infrastructure, and information technology-based learning tools. However, these efforts have not achieved all the set goals. The COVID-19 pandemic has restricted activities on campus, resulting in some drawbacks in lecture and class deliveries [3]. The results of an initial study found that lecturer performance decreased due to insignificant lecture deliveries. Face-to-face learning is very limited due to the COVID-19 pandemic, while online learning based on learning management systems (LMSs) has not been optimally executed [4]. This evaluation presents several problems related to lecturer readiness in mastering information technology, blended system learning planning, and the implications for management in regulation, monitoring, and evaluation. These problems must be immediately addressed so that lecturer performance does not continue to suffer.

Therefore, this study is limited to lecturer performance in blended system teaching for the 2020-2021 academic year and several of its main influencing factors, namely, ICT capability, lesson planning, learning materials, learning resources, LMS devices, and leadership. This study aims to analyze lecturer performance in delivering lectures during the COVID-19 pandemic. The study will also reveal the variables that affect the performance of lecturers, both directly and through other variables, as well as the obstacles faced in the implementation of blended learning. The results are used as material to produce a model for improving lecturer performance in the implementation of blended learning by strengthening the most effective factors that influence learning effectiveness, which is the core of lecturer performance.

2. Literature Review

The State University of Medan, Indonesia has implemented blended learning since 2018 by utilizing the e-learning management system for online learning. However, other problems arose in relation to lecturers' readiness for using information technology, which was relatively weak, both in the use of LMS and the development of digital teaching materials and learning media, and in searching for online learning resources [4]. In addition, the lack of internet access in many student residences also poses a constraint in online learning implementation. During the COVID-19 pandemic, lecturer performance decreased due to face-to-face learning being very limited and online learning not being executed optimally [3].

Many factors have contributed to the low performance of lecturers, especially during the COVID-19 pandemic. The lecturers had problems in the implementation of online learning due to limitations in information and communication technology (ICT). Weaknesses in ICT will hinder lecturers in optimally conducting LMS-based online lectures, preparing digital teaching materials, tracing learning resources, and communicating with students [5],[6]. This problem will have a negative impact that can lead to failure in online learning and blended systems [7]. Therefore, lecturer readiness in using ICT must be improved in line with the developments and demands of the Fourth Industrial Revolution [6],[8].

Another factor that greatly determines the success of lecturers in teaching is learning materials prepared by lecturers for student learning. Learning using online platforms will be less effective unless equipped with suitable learning materials. Although an LMS or virtual learning environment (VLE) has been well developed, if it does not include appropriate learning materials, then the learning process will be ineffective [9]. In many cases, it was found that e-learning failures were caused by the lack of learning materials even though the learning process had used a good LMS platform. Learning materials, both conventional learning materials and media, have important functions that determine learning outcomes in face-to-face, online, and blended learning [10],[11]. To develop good learning materials, ICT skills are needed, especially the use of applications or software for learning purposes [12].

Learning materials must be developed along with the development of science. To compile quality learning materials, sufficient materials are needed, which can be obtained not only from textbook references but also results published in research journals, best practices, and broader learning resources [9]. In this era, artificial intelligence has been widely developed for animation, simulation, augmented reality, and virtual reality as learning resources [13]. Research has proven the important role of learning resources, such as electronic learning resources and the internet to support learning effectiveness [12]. The same applies to LMS devices, such as Moodle and Google classrooms, which help lecturers manage web-based teaching and learning processes to support online learning. LMSs are the foundation of online learning processes and are a determinant of online learning effectiveness [6].

In addition to ICT skills, lesson planning, which includes objectives, learning scenarios, teaching materials, methods, media, assignments, and evaluation instruments, is an important component of learning implementation [14]. Good planning is determined by several factors, such as adequacy of materials and references, mastery of ICT and organizational culture under good values-based academic leadership, vision, and coaching [15]. Leadership is more effective when accompanied by a well-planned regulation, monitoring, and evaluation system [16]. Additionally, regulations on education and teaching, research, and publications serve as guidelines for lecturers to achieve optimal academic performance [17].

3. Research Method

This research was conducted at the State University of Medan, Indonesia and involved 334 lecturers across all regular study programs in seven faculties. Five main variables were investigated in this study, namely, Lecturer Performance (Y) as an endogenous variable, and six exogenous variables, namely, ICT Capability (X_1), Lesson Planning (X_2), Learning Materials (X_3), Learning Resources (X_4), LMS Device (X_5), and Leadership (X_6). Lecturer performance data as endogenous variables were collected through lecturer performance assessment instruments [18]. The six exogenous variables were collected through questionnaires. The research instrument has been tested for validity and reliability as standard instruments. Furthermore, the data were analyzed using descriptive analysis and associative tests using path analysis [19].

4. Results and Discussion

Since 2020, lectures at the State University of Medan, Indonesia have been carried out via blended learning according to the Rector's Regulation Number 0362/UN33/PRT/2020 [18]. The composition of online and offline learning is determined by the lecturer according to the characteristics of the course and offline lectures complied with health protocols during the COVID-19

pandemic. Lecturers organized offline learning on a limited basis, while online lectures used LMS Sipda as the official university LMS and another similar LMS. A description of the data on blended learning implementation data is presented in Table 1.

Table 1. Description of the Implementation of Blended Learning

No	Implementation of blended learning	Total	Percent
1	Lecturer work experience		
	> 25 years	78	23.35
	10–24 years	164	49.10
	< 10 years	92	27.55
2	Duration of online learning in a blended system		
	> 60%	83	24.85
	30% - < 60%	227	67.96
	< 30%	24	7.19
3	Mastery of educational ICT		
	Good	61	18.26
	Satisfactory	176	52.70
	Low	97	29.04
4	Use of the internet for education		
	Good	77	23.05
	Satisfactory	128	38.32
	Low	129	38.63
5	LMS online learning used		
	Sipda (LMS)	282	84.43
	Google classroom	34	10.18
	Other	18	5.39
6	Student satisfaction		
	High	216	64.67
	Moderate	61	18.26
	Low	57	17.07

Table 1 shows that the distribution of scores is normative, except for the use of the internet for educational purposes, which tended to be low. Student satisfaction with online learning was high. For LMS devices, the very high use of the Sipda application, which reached 84.43%, was due to its status as the official LMS of the university. The 10.18% of lecturers using Google Classroom are generally those who had used this platform before Sipda became the official LMS and are reluctant to move to Sipda.The remaining 5.39% of lecturers use other applications. From these data, it can be stated that the implementation of blended learning has been going well in terms of the quantity but its effectiveness will be analyzed based on data on each variable.

The results of scoring the 334 respondents on six exogenous variables and one endogenous variable showed that in general, lecturers did not differ much from one another except in lecturer performance and LMS device. The description of the data for each variable after being grouped on a ten-point scale are shown in Table 2.

Table 2. Statistics of Research Variables

Variables	N	Mean	Std.Deviation
L-Perform (Y)	334	7.775	0.717
ICT-Cap (X_1)	334	7.411	0.788
L-Plan (X_2)	334	7.403	0.798
L-Material (X_3)	334	7.612	0.815
LMS-Dev (X_4)	334	6.949	0.759
L-Resrc (X_5)	334	7.275	0.750
Leadership (X_6)	334	7.475	0.782

For example, a Lecturer Performance score of 7.775 and all exogenous variables averaged between 7.275 to 7.612 except for LMS Device, which only had an average of 6.949. This relatively lower score is explained by the generally low ICT ability of lecturers, which hampers LMS-based online learning activities.

To test the effect of a variable through the relational path, its data must meet the requirements for the test, such as normality, heteroscedasticity, and linearity. The results of the normality test using the Kolmogorov–Smirnov test obtained the Asymptotic significance (Asymp. Sig.): 0.708; 0.509; 0.218; 0.804; 0.178; 0.223 and 0.684 for variables Y, X_1, X_2, X_3, X_4, X_5, and X_6. These data show that all variables meet the Asymp. Sig. value > 0.05 so the data are normally distributed. Furthermore, the heteroscedasticity test shows that the patterns in the scatterplot meet the requirements through regression standardized predicted value. Likewise, the linearity test shows that the values meet the criteria summarized in Table 3.

Table 3. Summary of Linearity Test Results

Between groups	Variable	Sum of Sqr	df	Mean Sqr	F	Sig.
Deviation from Linearity	Y*X_1	23.374	213	0.110	0.958	0.611
	Y*X_2	21.789	210	0.104	0.751	0.965
	Y*X_3	21.247	203	0.105	0.813	0.906
	Y*X_4	22.006	199	0.111	0.818	0.901
	Y*X_5	27.306	209	0.131	1.102	0.278
	Y*X_6	25.343	211	0.120	0.982	0.550

Table 3 shows the value of deviation from linearity Sig. > 0.05, which means that all data pairs have a significant linear relationship. Furthermore, the relationship between the research variables, namely, the six exogenous variables and the one endogenous variable, was analyzed by path analysis, as shown in Figure 1.

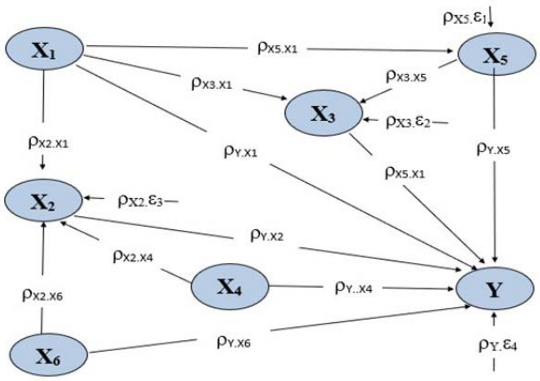

Figure 1. The Relationship between Variables in Path Analysis

From the relationship diagram between variables, four path equation models are set as follows:

1) $X_5 = \rho_{X5.X1} + \rho_{X5.}\varepsilon_1$
2) $X_3 = \rho_{X3.X1} + \rho_{X3.X5} + \rho_{3.}\varepsilon_2$
3) $X_2 = \rho_{X2.X1} + \rho_{X2.X4} + \rho_{X2.X6} + \rho_2.\varepsilon_3$
4) $Y = \rho_{Y.X1} + \rho_{Y.X2} + \rho_{Y.X3} + \rho_{Y.X4} + \rho_{Y.X5} + \rho_{Y.X6} + \rho_{Y.}\varepsilon_4$

To perform a path analysis, it is necessary to examine the correlation coefficient between variables, which are shown in Table 4.

Table 4. Correlation Matrix between Variables

Variable	Y	X_1	X_2	X_3	X_4	X_5	X_6
Y	1.000	0.865	0.715	0.853	0.320	0.656	0.867
X_1		1.000	0.704	0.850	0.292	0.661	0.840
X_2			1.000	0.713	0.160	0.621	0.674
X_3				1.000	0.262	0.709	0.832
X_4					1.000	0.249	0.279
X_5						1.000	0.646
X_6							1.000

A model was developed using regression testing and path analysis to test the significance of the effect between variables. A summary of the results of the test calculations is presented in Table 5.

Table 5. Significance Test Results Effect between Variables

Model	R	Adj. R Square	F	Sig.
X_1 ► X_5	0.661	0.437	257.485	0.000 [a]
X_1, X_5 ► X_3	0.872	0.761	525,935	0.000 [a]
X_1, X_4,X_6 ► X_2	0.723	0.522	120.283	0.000 [a]
X_1,X_2.X_3.X_4.X_5.X_6►Y	0.917	0.840	286.449	0.000 [a]

The test results obtain a very high correlation value, and the F coefficient is greater than the table value and is strengthened by a significance value < 0.05. Thus, all equation models are declared significant.

Two path analyses were carried out; the first path is the three equation models, and the second path is the one equation model. The first equation model was solved using regression analysis, and it was proven that the variable X_1 had a significant effect on X_5 at $\alpha = 0.05$ with a contribution of 43.7%. In the second model, variables X_1 and X_5 proved to have a significant effect on X_3 both partially and simultaneously with a contribution of 76.1%. The third model proves that the variables X_1, X_4, and X_6 simultaneously affect X_4 with a contribution of 52.2%, but partially, the effect of X_4 on X_2 is not significant. In the second path, simultaneously, all exogenous variables have a significant effect on the endogenous variable Y with a contribution of 84%, but the partial effect of X_5 on Y is not significant. For path analysis of the direct effect of each exogenous variable on the endogenous variable, the results are shown in Table 6.

Table 6. Summary of Path Analysis Test

No	Model	Path	Coeffici-ent	t	Sig.	ε
1	X_1 ►X_5	ρ_{51}	0.661	16.046	0.000	0.750
2	X_1 ►X_3	ρ_{31}	0.676	18.864	0.000	0.488
	X_5 ►X_3	ρ_{35}	0.263	7.332	0.000	
3	X_1 ►X_2	ρ_{21}	0.481	6.823	0.000	0.691
	X_4 ►X_2	ρ_{24}	-0.061	-1.533	0.126	
	X_6 ►X_2	ρ_{26}	0.287	4.091	0.000	
4	X_1 ►Y	ρ_{y1}	0.287	5.928	0.000	0.400
	X_2 ►Y	ρ_{y2}	0.107	3.179	0.002	
	X_3 ►Y	ρ_{y3}	0.229	4.644	0.000	
	X_4 ►Y	ρ_{y4}	0.063	2.684	0.008	
	X_5 ►Y	ρ_{y5}	-0.004	-0.129	0.898	
	X_6 ►Y	ρ_{y6}	0.349	7.730	0.000	

Table 6 shows that there are 12 paths resulting from the four equation models. While ten paths were significant, two paths, the effect of X_4 on X_2 and X_5 on Y, were not. The equation model built is:

1) $X_5 = 0.661\ X_1 + 0.750$
2) $X_3 = 0.676\ X_1 + 0.263\ X_5 + 0.488$
3) $X_2 = 0.481\ X_1 - 0.061\ X_4 + 0.287\ X_6 + 0.691$
4) $Y = 0.287\ X_1 + 0.107\ X_2 + 0.229\ X_3 + 0.63\ X_4 - 0.004\ X_5 + 0.349\ X_6 + 0.400$

Based on the significance test, the path analysis model was built as shown in Table 7.

Table 7. Path, Coefficient and Affect

No	Path	Coefficient	Affect
1	$\rho Y.X_1$	0.865	74.82%
2	$\rho X_3.X_1$	0.850	72.25%
3	$\rho X_3.X_5$	0.661	43.69%
4	$\rho Y.X_3$	0.853	72.76%
5	$\rho X_2.X_1$	0.704	49.56%
6	$\rho X_2.X_6$	0.674	45.43%
7	$\rho Y.X_2$	0.715	51.12%
8	$\rho Y.X_4$	0.320	10.24%
9	$\rho Y.X_6$	0.867	75.17%

If further analyzed, it is known that lecturers' ICT competence (X_1) is proven to affect the performance of lecturers (Y) by 74.82%. The influence of ICT ability has also been shown to have a positive effect on the quality of learning material (X_3) developed by lecturers by 72.25%. This finding strengthens the concepts and theories of the role and function of ICT in supporting the performance of lecturers in developing digital teaching materials in online learning [12]. This theory reinforces the fact that the ICT capabilities of lecturers will determine the success of online learning and blended systems [5],[7]. This finding also strengthens previous research that ICT ability supports lecturers to improve the quality of learning materials [6],[9].

The influence of ICT ability is also significant on the implementation of online learning using the LMS device (X_5) by 43.7%. Most of the lecturers used the university's official LMS, which was built based on the Moodle known as Sipda, and the rest used Google Classroom or another similar LMS. LMS-based online learning, which has been hampered due to low ICT skills especially in more senior lecturers, has caused lecturer performance to decline, as found by other researchers [3], [4], [5], [20]. However, this problem is refuted by this study; although LMS-based online learning requires ICT skills, this variable does not have a significant effect on augmenting lecturer performance. ICT capabilities support lecturers in developing learning materials and supporting the use of LMSs in online learning, but only learning materials have a positive effect on lecturer performance, while LMS devices have no significant effect on lecturer performance.

Another variable that has a strong influence on the performance of lecturers in blended learning is learning planning (X_2) at 51.12%. This variable is supported by the effect of the leadership variable (X_6) at 45.43% and ICT ability at 49.28%. On the other hand, support for learning resources (X_4) is not significant. This finding confirms the role of planning in supporting the performance of lecturers in blended system learning [21],[22]. During the COVID-19 pandemic, many changes were implemented in learning activities so that the role of planning in blended learning greatly determines the performance of lecturers. Changes in online and offline learning activities during the pandemic have frequently occured; therefore, in blended learning, the function and role of planning are very large in determining the success of learning, in line with the findings of Sheninger [17], Northouse and Lee [23], Sriadhi et al.[24].

Another exogenous variable is Leadership (X_6), which has a significant direct effect on lecturer performance (Y) and learning planning (X_2). Conceptually, this influence is very relevant because good leadership will be able to coordinate and organize lecturers to work and achieve the best results [17],[25]. Therefore, it is natural that leadership contributes 45.43% to learning planning and directly affects lecturer performance by 75.17%. The results of this study are in line with that of previous studies [5],[25]. Leadership includes not only management attitudes and actions but also regulations and a periodic and measurable monitoring and evaluation system [16],[17]. These factors become the strength of the leadership variable, which is proven to have a strong influence on the performance of lecturers both directly and through learning planning in the implementation of blended learning.

5. Conclusion

The study analyzed the causal effect of six exogenous and one endogenous variables. Of the 12 causal paths, two paths proved insignificant, namely, learning resources on learning planning and LMS devices on lecturer performance. From the path analysis, three important findings were obtained as follows.

1) ICT ability has a direct positive effect on lecturer performance in blended learning. ICT capabilities can also indirectly affect the performance of lecturers through the development of digital learning materials and the use of LMS devices.
2) The quality of learning material significantly affects the performance of lecturers, but using an LMS application does not significantly affect the performance of lecturers.
3) Learning resources have a significant effect on lecturer performance but have no significant effect on learning planning.
4) Learning planning is proven to have a significant effect on lecturer performance. The advantages of this learning plan are supported by the leadership and ICT capabilities of the lecturers.
5) The main determinants of lecturer performance in the blended learning system, especially during the COVID-19 pandemic, are leadership, learning planning, and learning materials. Leadership

includes management attitudes and actions, regulatory tools, and measurable monitoring and evaluation systems to ensure the effectiveness of learning implementation. Leadership contributes to the performance of lecturers either directly or through learning planning, while the quality of learning materials and planning is supported by the ICT capabilities of the lecturers.

Findings from this study highlight the importance of improving leadership and the ability of lecturers in ICT. These two variables must be prioritized because they will have a strong influence on learning planning and the quality of learning material, which are significant for optimizing lecturer performance. The role and function of leadership must be accompanied by supporting tools such as regulations, monitoring systems, and periodic evaluations. In addition, the ability of lecturers in ICT needs to be improved, especially to improve the quality of digital learning materials. Lecturers' abilities to use LMS and learning resources can be sufficiently with practical tutorials or through FGDs.

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