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Analysis of Factors for the Use of University e-Learning Through the E-learning Readiness Model Approach

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Abstract: This study aims to analyze the factors influencing the use of e-learning as a learning medium at University X in Jakarta. With the increasing demand for distance education programs, the readiness of the institution to implement e-learning is crucial. This research is a research with a quantitative approach. Data collection techniques using questionnaire instruments in data and information collection. The model determination stage is an important step in the research process where the authors select and develop a suitable model to evaluate the use of e-learning in the readiness to open a distance learning program at university. This research employs the E-learning Readiness Model, encompassing technical, pedagogical, and social aspects. A survey method was utilized, distributing questionnaires to students and faculty members. The findings indicate that factors such as technological infrastructure, academic support, and user attitudes significantly impact e-learning usage. These results are expected to serve as a foundation for University X in designing and implementing effective distance education programs.

Keywords: e-Learning; Readiness & Distance Learning Program

Introduction

Higher education in the current digital era has undergone a significant transformation with the use of information and communication technology (Abdulsalam et al., 2023; Ou, Stöhr, & Malmström, 2024; Roztocki, Soja, & Weistroffer, 2019; Theobald et al., 2021). One of the innovations that dominates the world of education is the use of e-learning as a learning medium (Candiwan, Sari, P., & N, 2016; Cheng & Wang, 2022; Ritonga et al., 2022; Shal et al., 2024). E-learning allows students to learn independently and flexibly without having to be physically present in class (Abdullah et al., 2023; Ritonga et al., 2020; Saripudin, Komalasari, & Anggraini, 2021; Singh, 2020). In addition, e-learning also allows educational institutions to reach students from different regions and improve educational accessibility (Ashwin, 2012; James & Casidy, 2018; Tyas & Naibaho, 2021). E-learning, as a digital learning platform, promises flexibility, accessibility, and high interactivity (Gautam et al., 2021; Yuniarti & Hartati, 2020).

The success of the implementation of e-learning depends not only on the technology itself, but also on the readiness and acceptance of users (Ritonga et al., 2022; Yuniarti & Hartati, 2020). The importance of user readiness for the e-learning platform is the main foundation in understanding the extent to which University X can optimize its learning system. The E-learning Readiness Model approach is an appropriate framework to evaluate and improve such readiness. By using this model, University X can evaluate user readiness for e-learning comprehensively and in-depth. Through a deep understanding of e-learning readiness, University X in Jakarta can take preparatory steps to ensure the success of the opening of distance study programs runs smoothly and provides an optimal learning experience for the entire academic community

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of the University. Through this effort, it is hoped that the implementation of the distance program can run successfully and provide maximum benefits for the University's academic community. In evaluating the blended learning program at University X, it is important to focus on how students who have used e-learning feel the effectiveness and readiness of the program. Several key questions can be asked, such as how students perceive the quality of teaching materials delivered through the e-learning platform, the extent to which they feel supported by lecturers and institutions, what challenges they face in accessing and using the platform, and the level of student involvement in online learning activities compared to face-to-face. To determine the relevant variables, the e-learning readiness model can be used as a reference, covering aspects of technology, content, institutional support, and user skills. In addition, previous research on student experiences in blended learning can provide additional insights into variables such as learning satisfaction, motivation, and social interaction. With this approach, the evaluation of the blended learning program at University X can provide a comprehensive picture of the effectiveness and readiness of the program.

In the context of evaluating the readiness of the e-learning system at University X, the main focus is on the e-learning ecosystem which includes all elements that contribute to the effectiveness of online learning. This readiness assessment is important to ensure that all components, from technology infrastructure, content quality, to institutional support, function synergistically to support distance learning (PJJ). Applicable research models include a variety of approaches, such as the e-learning readiness model from Alharbi and Drew, as well as the model from Dziuban et al. which emphasizes the integration between online and face-to-face learning. Issues related to the readiness to implement e-learning are very relevant in the context of PJJ, especially considering that the success of distance learning programs is highly dependent on how well the e-learning ecosystem can support the teaching and learning process.

This readiness includes aspects of technology, user skills, and institutional support, all of which contribute to the student learning experience. In this case, the university policy stated in the strategic plan (renstra) to open the PJJ study program must be balanced with careful preparation in the e-learning system. Data from current blended learning can be used as a basis for assessing this readiness, so that universities can identify areas that need improvement before launching the PJJ program.

Method

This research is a research with a quantitative approach. Data collection techniques using questionnaire instruments in data and information collection. The model determination stage is an important step in the research process where the authors select and develop a suitable model to evaluate the use of e-learning in the readiness to open a distance learning program at university X. This study uses the e-learning readiness research model (ELR) to identify and analyze the factors that affect the readiness of the e-learning system at university X. The following is an overview of the ELR research model diagram.

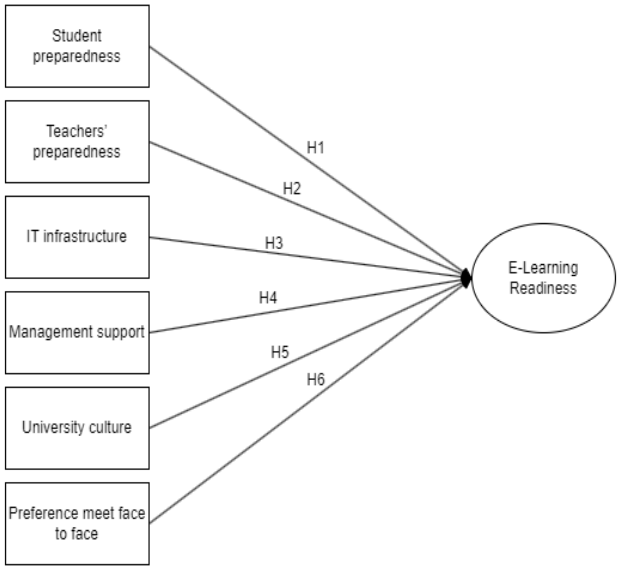

Figure 1. E-learning Readiness Model

The population in this study in users of the e-learning system of university X is students and lecturers who are in the Library and Information Science study program of the Faculty of Information Technology as many as 199 active students and 13 lecturers. The data analysis technique uses the Structural Equation Modeling (SEM) method using the SmartPLS version 4 application (Sugiyono, 2016). The Validity Test can be measured using the Pearson Correlation method (loading factor), while the reliability is measured by Cronbach's Alpha method.

Result and Discussion

The profiles of respondents used as the population in conducting data analysis are as follows:

Table 1. Respondent Data by Gender

Role	Gender	Sum	Percentage
Lecturer	Man	7	3 %
	Woman	4	2 %
Student	Man	136	65 %
	Woman	63	30 %
Total	210	100 %	

Based on the data of table IV-1, respondents with the role of Lecturer with Male gender amounted to 7 (3%), respondents with the role of Lecturer with Female gender amounted to 4 (2%), respondents with the role of Student with Male gender amounted to 136 (65%), respondents with the role of Student with Female gender amounted to 63 (30%) out of a total of 210 Lecturers and Students of the Library and Information Science Study Program, University X.

Table 2. Data of Active Student Respondents Based on Year of Enrollment

No	Year of Entry	Sum	Percentage
1	2020	5	2 %
2	2021	54	26 %
3	2022	41	20 %
4	2023	49	23 %
5	2024	50	24 %
6	Lecturer	11	5 %
	Total	210	100 %

Based on the data in table IV-1 in this study, it is known that the most active students were in 2021 with a percentage of 26%. The implementation of this research uses Smart PLS-4 software to produce the output of the external model. The following are the results of *the outer model* in this study:

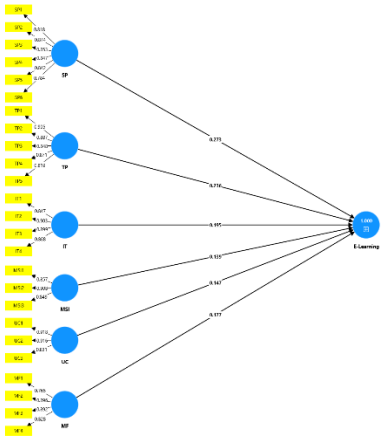

Figure 2. Diagram of the Outer Model Analysis Results

In Figure 2 which is a diagram of the results of the *outer model* analysis, there are 25 indicators used in the research model. It can be seen that in the figure above, an *outer model* of 25 valid indicators is obtained to be measured on the construct with the adjustment of the *outer model* score (Hair, 2019). Next, the results of the *outer model* analysis and its explanation will be described in detail.

Convergent Validity test, a variable is considered valid if it has a loading factor value exceeding 0.6 and a variable Average Variance Extracted (AVE) value exceeding 0.5. In this study, the results of the convergence validity test on SmartPLS4 can be seen in the table 3.

Table 3. Validity Test Results (Loading Factor)

Variable	Indicator	Loading Factor	Information
Student Preparedness (SP)	SP1	0.818	Valid
	SP2	0.874	Valid
	SP3	0.853	Valid
	SP4	0.847	Valid
	SP5	0.842	Valid
Teachers' preparedness (TP)	TP1	0.905	Valid
	TP2	0.887	Valid
	TP3	0.848	Valid
	TP4	0.871	Valid
	TP5	0.819	Valid
IT infrastructure (IT)	IT1	0.847	Valid
	IT2	0.903	Valid
	IT3	0.899	Valid
	IT4	0.868	Valid
Management support (MSI)	MSI1	0.857	Valid
	MSI2	0.908	Valid
	MSI3	0.849	Valid
University culture (UC)	UC1	0.918	Valid
	UC2	0.916	Valid
	UC3	0.831	Valid
Preference to meet face to face (MF)	MF1	0.765	Valid
	MF2	0.896	Valid
	MF3	0.892	Valid
	MF4	0.828	Valid

Table 4. Results of Validity Test (Average Variance Extracted)

	Average variance extracted (AVE)
E-learning	0.545
Student Preparedness	0.774
Teachers' preparedness	0.717
IT infrastructure	0.760
Management support	0.700
University culture	0.751
Preference to meet face to face	0.791

The first step in the outside loading analysis is to assess the reliability of the construct. Construct reliability evaluates the consistency of a measuring instrument, ensuring that it produces stable and consistent results when measurements are repeated on the same study. In this outer model analysis, reliability is tested by testing Cronbach's alpha and Composite Reliability values. If the value exceeds 0.7 then the instrument is considered reliable (Hair, 2019).

Table 5. Reliability Test Results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Information
E-Learning	0.965	0.965	0.968	reliability
IT	0.903	0.903	0.932	reliability
MF	0.867	0.867	0.910	reliability
MSI	0.842	0.842	0.905	reliability
SP	0.914	0.915	0.933	reliability
HCMC	0.917	0.918	0.938	reliability
UC	0.867	0.866	0.919	reliability

The value *of Cronbach's Alpha* and *Composite Reliability* for all variables was above 0.7. This proves that all variables have met the reliability test requirements and are declared reliable. Next, reliability is assessed on the indicator by looking at the value of the *loading factor* of each variable. The indicator is reliable if the *loading factor* value of each variable has a value above 0.7 (Hair, 2019). The validity test consisted of convergent *validity* by looking at the AVE value (>0.5) and discriminant *validity* by looking at the HT/MT value (<0.9) (Hair, 2019). The following are the results of *convergent validity* on actual research conducted on research samples. It is known that if the indicators in each dimension have an AVE value greater than 0.5, it means that all variables meet the validity criteria and are ready for further analysis. Next, the validity of discrimination is assessed by testing the heterotrait-monotrait ratio (HT/MT ratio). The following is a table of HT/MT value results:

Table 6. HT/MT Values

	E-Learning	IT	MF	MSI	SP	HCMC	UC
E-Learning							
IT	0.919						
MF	0.924	0.732					
MSI	0.920	0.827	0.795				
SP	0.942	0.733	0.778	0.739			
HCMC	0.911	0.786	0.721	0.688	0.769		
UC	0.923	0.753	0.815	0.865	0.788	0.701	

The HT/MT ratio was used as an assessment of the validity of discrimination, with the value of each variable found to be below 0.9. The results show that all indicators in this research model are well discriminated. The indicator is appropriate to measure the construct of each and all variables that pass the validity test.

Based on the reliability and validity test of *the outer model*, which considers the values of outer loading, construct reliability (on *Cronbach's Alpha* and *Composite Reliability*), convergent validity (on *Average Variance Extracted*/AVE), and discriminatory validity (on HT/MT values), it can be concluded that all indicators used in this research model are reliable and valid to measure the construction is every. Therefore, the research model is considered valid and reliable so that the analysis can be continued to the next stage, namely the analysis of the structural model (*inner model*).

The *inner model* test aims to predict the relationship between latent variables by determining the direction of the relationship. In this research, hypothesis testing was carried out using *the one tailed re-sample* method on the *bootstrapping* procedure implemented using *SmartPLS* software.*Bootstrapping* is a non-parametric statistical technique that uses the resampling method as an assessment of significance and coefficients within the framework of SmartPLS (Hair, 2019; Memon et al., 2021).

The model quality parameters used in the *inner model* are *Variance Inflation Factor* (VIF) and *R-square* (Hair, 2019). This *Q-square* test is used as an assessment of the predictive *ability* of the recommended model in accordance with the consideration of the use of PLS-SEM. To assess whether the hypothesis is supported, a significance test is carried out which is followed by the mediation pathway analysis on the specific indirect

effect test. This makes it possible to evaluate the role of mediating variables in the relationship between independent and dependent variables.

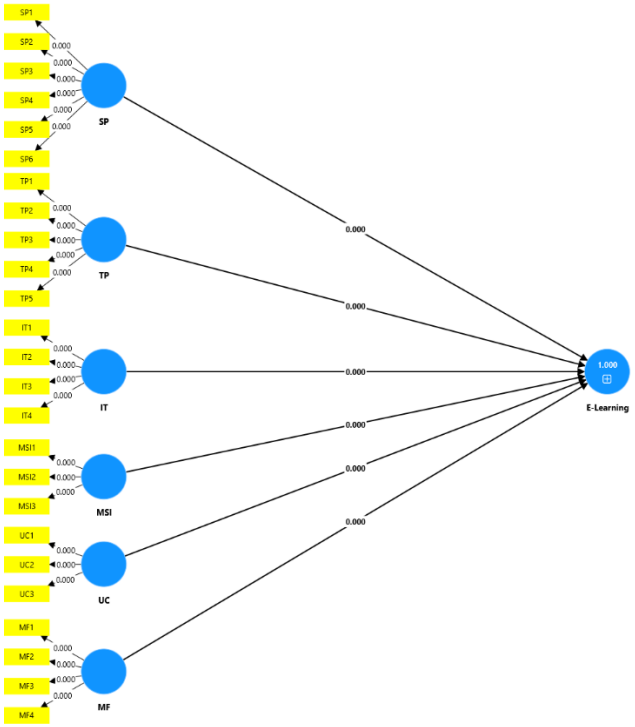

Figure 3. Inner Model

The multicollinearity test is carried out as an assessment of the degree of correlation between variables in a study, to determine whether the variables are independent or show an interrelated relationship. This test helps identify redundancy or overlap issues between predictors, which can affect the stability and interpretation of the model (Hair, 2019), The multicollinearity test is evaluated on the *Variance Inflation Factor* (VIF) value. A VIF value of <5 indicates an acceptable collinearity, while a value above >5 indicates a serious multicollinearity problem. If the VIF is greater than 5 then it can negatively impact the accuracy and Hypothesis Testing.

Table 7. Variance Inflation Factor (VIF)

	BRIGHT
IT1	2.271
IT1	3.879
IT2	3.101
IT2	4.656
IT3	4.552
IT3	3.284
IT4	4.189
IT4	2.681
MF1	1.581
MF1	4.170
MF2	3.012
MF2	4.509
MF3	2.946
MF3	4.590
MF4	2.035
MF4	4.755
MSI1	2.043
MSI1	3,249
MSI2	2.576
MSI2	4.538
MSI3	1.832
MSI3	4.202
SP1	3.377
SP1	2.795
SP2	4.373
SP2	3.473
SP3	3.381
SP3	4.192
SP4	3.472
SP4	4.386
SP5	2.786
SP5	3.454
SP6	2.693
SP6	3.721
TP1	4.851
TP1	4.310
TP2	4.707
TP2	4.129
TP3	3.892
TP3	2.785
TP4	4.789
TP4	3.365
TP5	3.467
TP5	2.793
UC1	4.961
UC1	3.638
UC2	4.592
UC2	3.573
UC3	4.413
UC3	1.661

Based on the analysis of the Variance Inflation Factor (VIF) values in the given table IV-7, all VIF values are below the threshold of 5, which indicates that there are no serious multicollinearity problems in the model. Thus, the collinearity between independent variables is acceptable, and the accuracy of the regression model is maintained. This means that each independent variable can be interpreted properly without worrying about the negative impact on hypothesis testing.

In this study, hypothesis testing was carried out using the Bootstrapping method on SmartPLS4 software, the analysis results showed that the t-statistic value exceeded the value of 1.96 and the p-value was less than 0.05, then the research hypothesis was accepted.

Table 8. Hypothesis Testing

	T-statistics	P-values	Information
SP -> E-Learning	18.342	0.000	H1 Accepted
TP -> E-Learning	18.969	0.000	H2 Accepted
IT -> E-Learning	18.960	0.000	H3 Accepted
MSI -> E-Learning	16.406	0.000	H4 Accepted
UC -> E-Learning	16.314	0.000	H5 Accepted
MF -> E-Learning	14.800	0.000	H6 Accepted

The results of hypothesis testing on H1 showed a t-statistical value of 18.342 and a p-value of 0.000, so it can be concluded that Student Preparedness has a significant impact on e-learning readiness. The results of the hypothesis test on H2 showed a t-statistical value of 17.256 and a p-value of 0.000, which indicates that H2 is accepted. This means that Teachers' Preparedness has a significant effect on e-learning readiness. The results of hypothesis testing on H3 showed a t-statistical value of 15.789 and a p-value of 0.000, so H3 was accepted. This shows that IT Infrastructure has a significant influence on e-learning readiness. The results of the hypothesis test on H4 showed a t-statistical value of 16.406 and a p-value of 0.000, which means that H4 was accepted. This shows that Management Support contributes significantly to e-learning readiness. The results of the hypothesis test on H5 showed a t-statistical value of 14.800 and a p-value of 0.000, so H5 was accepted. This shows that University Culture has a significant impact on e-learning readiness. The results of hypothesis testing of H6 showed a t-statistical value of 13.456 and a p-value of 0.000, which indicated that H6 was accepted. This means that Preference to Meet Face to Face has a significant effect on e-learning readiness.

Conclusion

Various factors contribute significantly to the readiness of e-learning. Student Preparedness has a strong positive impact on e-learning readiness, indicated by a very significant value. Teachers' preparedness also showed a significant positive influence on e-learning readiness. IT infrastructure has subsequently proven to contribute positively, strengthening the importance of technology support in the online learning process. Management support is no less important, with results showing a significant positive impact on e-learning readiness. University culture also plays a role in influencing this readiness, with results supporting the hypothesis. Preference to meet face to face shows a positive impact, even in the context of online learning.

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Author Contributions
Conceptualization, C.AP.P.S. and S; methodology, C.AP.P.S. and S.; software, C.AP.P.S. and S; validation, C.AP.P.S. and S.; formal analysis, C.AP.P.S. and S; investigation, C.AP.P.S. and S; resources, C.AP.P.S. and S; data curation, C.AP.P.S. and S; writing—original draft preparation, X.X.; writing—review and editing, C.AP.P.S. and S; visualization, C.AP.P.S. and S; supervision, C.AP.P.S. and S; project administration, C.AP.P.S. and S; funding acquisition, C.AP.P.S. and S. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest
The authors declare no conflict of interest.

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