



Social Influence and Facilitating Conditions Drive E-learning Adoption

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Abstract. This study aimed to investigate the factors influencing students' behavioral intentions to use e-learning in higher education after the COVID-19 pandemic using the Unified Theory of Acceptance and Use of Technology (UTAUT) model with the addition of a moderating variable, i.e., experience in using e-learning. The data were collected through a survey questionnaire from 200 higher education students in Indonesia. The results indicated that Social Influence and Facilitating Conditions had a significant effect on a person's Behavioral Intention to use e-learning, while the experience moderation variable had no significant effect. This finding implies that universities should focus on providing a supportive social environment and user-friendly technology infrastructure to enhance students' intention to use e-learning. Moreover, the result suggests that universities should provide equal access and opportunities for students, regardless of their previous experience in using e-learning.

Keywords: UTAUT model · e-learning · behavioral intentions · Social Influence · Facilitating Conditions

1 Introduction

Learning can be defined as any effort or a teaching and learning process with the aim of creating an effective and efficient teaching and learning process. In the learning process there is an interaction between educators and students and then there is reciprocal communication that takes place in educative situations to achieve learning objectives. The process of learning activities participates in determining the success of students because the level of understanding of students depends on the learning process carried out [1]. As a result of the Covid 19 Pandemic, of course it has had an impact on various fields, both in the health, economic, socio-cultural fields, especially in the education sector. Various government policies have been implemented to break the chain of transmission of the Covid 19 virus [2].

In the education sector, the government implements online learning or better known as online learning. Online learning that is widely used by several universities is online

learning with e-learning media. E-learning can be defined as a form of indirect or distance learning that uses computer and internet technology. E-learning or internal enabled learning is a container that contains knowledge that combines learning methods and electronic media. Learning using e-learning focuses on students, because students are directed to be more independent by studying learning material in e-learning. E-learning requires students to be more active in learning activities. E-learning is a form of educational technology transformation during the Covid 19 pandemic [3].

Nowadays, as the pandemic is slowly ending, e-learning remains a learning medium that is used at the university level. One of them is at the Muhammadiyah University of Sidoarjo. In the 2022/2023 Academic Year, the learning process has been carried out face-to-face but still accommodates learning that is carried out online. From a total of 16 meetings in one semester at the Muhammadiyah University of Sidoarjo, online learning is carried out in 4 meetings either through Zoom, G-Meet or E- learning media.

In face-to-face learning, e-learning is still being put to good use, such as being used to link lecture material, both books, articles and modules. In addition, e-learning is also used as a medium for collecting assignments for students. In terms of the high value of using e-learning, a study was conducted to find out the behavioral intentions of students in using e-learning which is included in the use of technology in education. The behavioral intention of students in using e-learning was examined using Structural Equation Model-Partial Least Square (SEM-PLS) analysis with the Unified Theory and Use Technology (UTAUT) model. The UTAUT model is a technology acceptance model that emphasizes four key constructs, namely performance expectancy, effort expectancy, social influence and facilitating conditions that have an influence on a person's behavior towards the use of a technology, in this case the technology in question is the use of e-learning [4].

Several previous studies regarding the use of the UTAUT model in Learning Management Systems include research by [5] with the title "An Implementation of the UTAUT Model for Understanding Students' Perceptions of Learning Management Systems: A Study With Tertiary Institutions in Saudi Arabia", research by [6] with the title "The Extended Utaut Model And Learning Management System During Covid-19: Evidence From Pls-Sem And Conditional Process Modeling" and research by [7] with the title "Novel Extension Of The UTAUT Model To Understand Continued Usage Intention Of Learning Management Systems: The Role Of Learning Tradition". In the application of the UTAUT model to determine a person's behavioral intentions in using the LMS, it can be accompanied by the involvement of a moderating variable. The moderating variable can be defined as a variable that can strengthen or weaken the effect of the independent variable on the dependent variable. In this study the moderating variable used was experience in using e-learning.

2 Methodology

The UTAUT model is an acceptance model for the use of the Learning Management System (LMS) or better known as E-Learning at the Muhammadiyah University of Sidoarjo which emphasizes four key constructs namely performance expectancy, effort expectancy, social influence and facilitating conditions that have an influence on a person's behavior towards the use of a technology. Performance expectancy is an indicator

used to determine the extent to which an individual believes that using the system will help to achieve profits in certain activities. Effort expectancy is an indicator used to determine the level of ease associated with using a system or technology by users. Social influence is an indicator used to determine the extent to which an individual perceives the interests that are trusted by other people that will influence him using a new technology. Facilitating conditions are indicators used to determine the extent to which an individual believes that the technical and organizational infrastructure is available to support the use of a system or technology. The UTAUT model as a technology acceptance model is analyzed using the Structural Equation Model - Partial Least Square (SEM PLS). Structural Equation Model (SEM) is a statistical analysis that is used to test a series of relationships that are generally difficult to measure simultaneously. SEM is a technique in multivariate analysis that combines factor analysis and regression analysis with the aim of examining the relationship between variables in a structural model [8]. In this study, the analysis technique was carried out using the Structural Equation Model - Partial Least Square (SEM PLS) with the smartPLS 3.0 program. The PLS SEM stage consists of measuring reflective models, measuring formative models and measuring structural models. The first stage is the measurement of the reflective model, the stages of measuring the reflective model include the following:

1. Variable reflective must have score Consistency Reliability (CR) should be more big from 0.7. If more CR value big of 0.7 then variable the has been reliable and can be used in the process of further analysis.
2. Variable reflective must have more Convergent Validity (AVE) value big from 0.5. If more AVE value big of 0.5 then variable the said to be valid.
3. Reliability indicators can be measured with method see Outer Loading value, if outer loading > 0.7 then indicator the used. If there is outer loading 0.4 to 0.7 then need running repeat for see effect disposal indicators on AVE and CR
4. Discriminant Validity (Former Larcker Criterion). Discriminant Validity uses the Fornell -Larcker Criterion. The root value of AVE (diagonal matrix) must be more big than all score good to left nor to lower [10].

The second stage is formative examination. There are two stages in the measurement of formative models, namely:

1. Collinearity issue (Outer VIF value). The Outer VIF value should be not enough from 5.
2. Significant Outer Weight (P-value Outer Weight. P-value outer weight must not enough of 0.05 to be variable formative could said significant.

The next stage is an examination of the completed outer model, followed by an assessment of the measurement results of the structural model (inner model). There are 5 stages in the examination of the structural model, namely:

1. Collinearity Assessment (VIF value). The Outer VIF value for each latent variable must be not enough out of 5 that can interpreted that no there is multicollinearity on latent variables

2. Structural Model Path Coefficients (t-test). Structural model coefficients could be used for knowing connection variable influential response and predictors significant. If the $p\text{-value} < \alpha$ (0.05) then connection is significant.
3. Coefficient of Determination (R^2). The magnitude influence predictor variables involved in models.
4. Effect Size (value f^2). The value of f^2 0.02 is considered has a small effect size, 0.15 has a medium effect size and 0.35 has a large effect size.
5. Predictive Relevance (using Q^2). Value of Q^2 0.02 has relevance small predictive value, 0.15 has relevance predictive being and 0.35 having relevance great predictor [11].

3 Results and Discussion

In the process analysis of this study using Partial Least Squares Structural Equation Modeling (PLS-SEM), three stages were conducted to examine the reliability and validity of the reflective model measurement, formative model measurement, and the structural model (Inner Model). The reflective model measurement consisted of four stages of inspection, namely Internal Consistency Reliability, Indicator Reliability, Convergent Validity, and Discriminant Validity. The Internal Consistency Reliability was measured using the Composite Reliability (CR) value, and the Convergent Validity was measured using the Average Variance Extracted (AVE) score. The results showed that the Behavioral Intention (Y) variable had a CR value greater than 0.7 and an AVE value exceeding 0.5, indicating that the variable is reliable and valid for the next analysis process.

The reliability of indicators was measured by the Outer Loading value, where all indicator reflective on the Behavioral Intention (Y) variable had an outer loading value above 0.7, indicating that all reflective indicators were reliable to measure the variable Behavioral Intention (Y). The Discriminant Validity was measured using the Fornell-Larcker Criterion, where the root value of AVE for the Behavioral Intention (Y) variable was higher than the correlation of Behavioral Intention with other variables, indicating that the measuring indicator of Behavioral Intention was valid. Overall, these findings demonstrated the reliability and validity of the reflective model measurement in the PLS-SEM process analysis.

3.1 Formative Model Measurement

The second stage of the process analysis in this study was formative model measurement, which was performed on the variables X1, X2, X3, and X4 that had formative indicator characteristics. The formative model measurement involved two steps: Collinearity Issue and Significant Outer Weight. The Collinearity Issue was measured using the Outer VIF value, where the Outer VIF value for each formative indicator must be below 5, indicating no indication of multicollinearity in each of the formative indicators for all variables used. The Significant Outer Weight was measured using the P-value, where the value must be below 0.05 to indicate that the formative indicator is significant and can be used. The results of the analysis showed that all formative indicators had significant outer weights with P-values below 0.05, demonstrating the validity of the formative model measurement. Presented in Table 1.

Table 1. Indicator P-Value Formative

Indicators -> Variables	P Values
X1.1 -> Performance Expectancy	0.534
X1.2 -> Performance Expectancy	0.165
X1.3 -> Performance Expectancy	0.425
X2.1 -> Effort Expectancy	0.731
X2.2 -> Effort Expectancy	0.179
X2.3 -> Effort Expectancy	0.566
X3.1 -> Social influence	0.923
X3.2 -> Social influence	0.147
X4.1 -> Facilitating Conditions	0.112
X4.2 -> Facilitating Conditions	0.756
X4.3 -> Facilitating Conditions	0.261

Table 2. Results of Outer Loading and P-Value Outer Loading Formative Indicators

Indicators -> Variables	P Values
X1.1 -> Performance Expectancy	0.921
X1.2 -> Performance Expectancy	0.852
X1.3 -> Performance Expectancy	0.864
X2.1 -> Effort Expectancy	0.904
X2.2 -> Effort Expectancy	0.721
X2.3 -> Effort Expectancy	0.828
X3.1 -> Social influence	0.992
X3.2 -> Social influence	0.580
X4.1 -> Facilitating Conditions	0.674
X4.2 -> Facilitating Conditions	0.971
X4.3 -> Facilitating Conditions	0.730

Based on Table 1 is known that there is indicator p-value formative on all variables not significant ie score p-values are more big from 0.05. Next conducted checking the outer loading indicators for each indicator presented in Table 2.

Based on Table 2 it is known outer loading values for all indicators have score above 0.5. So it can be said that all indicators X1, X2, X3 and X4 are feasible to use.

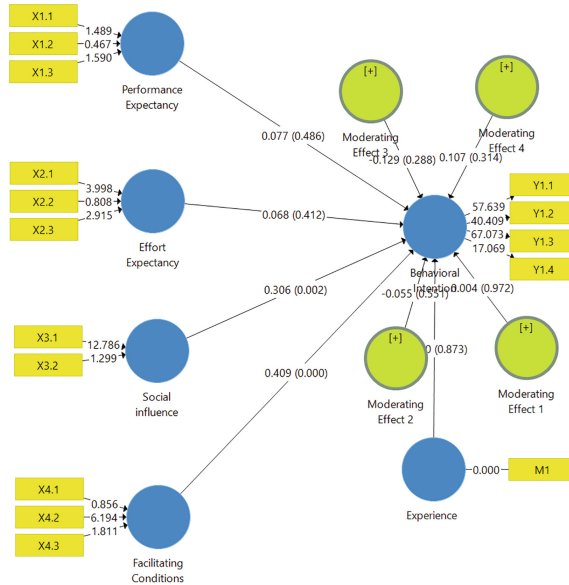


Fig. 1. Coefficient of Structural Model (Inner Model)

3.2 Measurement of the Structural Model (Inner Model)

Next after the inspection of the outer model is complete, it is followed by an assessment of the measurement results of the structural model (inner model). There are 5 stages in structural model measurement (inner model) namely Collinearity Assessment, Structural Model Path Coefficients, Coefficient of Determination, Effect Size and Predictive Relevance.

Collinearity Assessment

Stage The first is the measurement of the structural model (inner model). Collinearity Assessment was used for knowing there is nope multicollinearity in all latent variable to all variable response Y. Outer VIF value for each latent variable should be not enough out of 5 that can interpreted that no there is multicollinearity on latent variables. Based on the analysis known that for fourth variables X1, X2, X3 and X4 have VIF value is less of 5, so could said that no there is multicollinearity on the latent variables used.

Structural Model Path Coefficients

Stage The second is the measurement of the structural model (inner model). structural analysis model path coefficients or normal called with analysis structural model coefficients Analysis results structural model coefficients (Inner Model) are presented in Fig. 1 and Table 3.

Based on Fig. 1 it is known that Performance Expectancy variable (X1) has a p-value (0.486), Effort Expectancy (X2) has a p-value (0.412), Social Influence (X3) has a p-value of (0.002), Facilitating Conditions (X4) has a p-value of (0.000). Two variables X3 and X4 have more p-values small from $\alpha(0.05)$, so could said that Social Influence (X3) and

Table 3. Effect Size

Latent Variable	f value 2
Performance Expectancy (X1)	0.009
Effort Expectancy (X2)	0.000
Social Influence (X3)	0.128
Facilitating Conditions (X4)	0.188

Facilitating Conditions (X4) variables have a significant effect on Behavioral Intention (Y). While Performance Expectancy (X1) and Effort Expectancy (X2) have no significant effect on Behavioral Intention (Y) because have more p- value big from $\alpha(0.05)$. So that could concluded that the more Social Influence (X3) and Facilitating Conditions (X4) increase, the more one’s Behavioral Intention (Y) increases in using e-learning. Whereas based on score coefficient on each variable is known that variable Facilitating Conditions (X4) has score coefficient biggest ie (0.409), so that could conclude that variable Facilitating Conditions (X4) has influence biggest on Behavioral Intention (Y). Variable Experience moderation has the p-value (0.873) is more big from $\alpha(0.05)$ so that it can be concluded that the Experience moderation variable has no significant effect on Behavioral Intention (Y).

Coefficient of Determination

Coefficient determination used for measure accuracy prediction. Value results coefficient determination for variable Behavioral Intention (Y) is of 0.325. Result value R^2 could interpreted that 4 latent variables namely X1, X2, X3 and X4 provide influence on Behavioral Intention (Y) of 52.7% while the remaining 47.3%. influenced by other variables that are no including in research.

Effect Sizes

In addition to evaluating the R^2 value of all endogenous variables we can use f^2 . The difference between f^2 and R^2 is that f^2 is more specific for each exogenous variable. The results of the f^2 test can be seen in Table 3. In general, a value of 0.02 is considered to have a small effect size, 0.15 has a medium effect size and 0.35 has a large effect size. The effect size for each variable is presented in Table 3.

Based on results f value² in Table 3. Can is known that all latent variables used in research this that is variable Performance Expectancy (X1) and Effort Expectancy (X2) has a small effect size on Behavioral Intention (Y), while Social Influence (X3) and Facilitating Conditions (X4) have a large effect size on Behavioral Intention (Y).

Predictive Relevance

Predictive Relevance is used in addition to evaluating the value of R^2 as a criterion of predictive accuracy. Measurement accuracy prediction can use the Stone-Geissers Q^2 value. The Q^2 value was obtained using a blindfolding procedure. As a relative measure of predictive relevance, a value of 0.02 is considered to have little predictive relevance, 0.15 to have moderate predictive relevance and 0.35 to have high predictive relevance.

The results of predictive relevance (Q^2) on the Behavioral Intention (Y) variable are of 0.371. So that could said that predictive relevance for Behavioral Intention is big.

4 Conclusion

Based on the results of the analysis it is known that the variable that influences Behavioral Intention is that variable Social Influence (X3) and Facilitating Conditions (X4). Latent variables namely X1, X2, X3 and X4 give influence on Behavioral Intention (Y) of 52.7% while the remaining 47.3%. influenced by other variables that are no including in research. Variable Performance Expectancy (X1) and Effort Expectancy (X2) has a small effect size on Behavioral Intention (Y), while Social Influence (X3) and Facilitating Conditions (X4) have a large effect size on Behavioral Intention (Y). The results of predictive relevance (Q^2) on the Behavioral Intention (Y) variable are of 0.371. So that could said that predictive relevance for Behavioral Intention is big.

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