Adopt E-Learning for High School or Vocational School Students by Using Extended Unified Theory of Acceptance and Use of Technology

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Abstract

This study uses the fundamental Unified Technology Acceptance and Use of Technology (UTAUT) model, which is based on earlier research, to identify potential characteristics that influence high school or vocational school students' success in embracing e-learning. The theoretical model is predicated on earlier studies that integrate elements from the UTAUT acceptance model with elements deemed pertinent to e-learning (computer anxiety and perceived enjoyment). 593 people from the Indonesian city of Gresik made up the sample. Theoretical models are developed and analyzed using structural equation modeling. Based on the examination of the six hypotheses put out, six of them can be accepted. Behavioral intention is positively and significantly impacted by performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived enjoyment, while behavioral intention is negatively and significantly impacted by computer anxiety. Although there are numerous research models on the uptake of e-learning, internet, and computer use are already widely prevalent in developing nations like Indonesia. However, e-learning's acceptability in many educational sectors is still in its infancy, particularly among students in high school or vocational schools. Thus, this study offers a thorough analysis of the variables influencing Indonesian high school or vocational school students' acceptance of e-learning.

Keywords: E-Learning, Unified Theory of Acceptance and Use of Technology, Structural Equation Model, AMOS.

I. INTRODUCTION

In today's digital era, everyone has access to adequate media or devices, the development of electronic gadgets with internet connectivity characteristics is expanding rapidly and extensively, allowing users to overcome information-gathering limits. The Indonesian Internet Service Providers Association (APJII) reports that internet usage in Indonesia grew by 77.02% in 2021–2022, after rising sharply from 64.8% in 2018 to 73.7% in 2019–2020 [1].

The world of education has had a very good impact along with the development of technology. A mobile lifestyle requires a person to move quickly and be able to do many things at the same time. Learning activities are also one of the activities whose level of need is increasingly high at this time. A student today, apart from studying at school or a formal educational institution, also has academic support activities that take up quite a lot of time. This causes a reduction in traditional study time [2].

For the past 20 years, the phrase "electronic learning" (E-Learning) has been used to describe the use of the internet in the field of education. Information and communication technology is used to support and facilitate the learning process known as e-learning [3]. expansion of the e-learning market in Asia in 2016, which produced 7.1 billion USD in sales with a 17.3% growth rate. When it comes to the use of e-learning, which is expanding quickly among emerging nations, Indonesia comes in at number eight. According to a 2011 independent E-Learning growth survey covering five years (2010-2015), Indonesia ranks seventh in the world with a growth rate of 25% annually. In addition to Indonesia, other Asian nations including China, India, and Malaysia are expected to see considerable growth in e-learning [4].

In today's digital era, E-learning is one of the main solutions in supporting a flexible and efficient learning process. However, the level of acceptance and use of E-learning still varies among users. Therefore, this study was built using the Unified Theory of Acceptance and Use of Technology (UTAUT) model to analyze the factors that

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influence user intentions and behavior in adopting E-learning. The three primary goals of this study are to: (a) determine the factors that affect the adoption of e-learning in Indonesian educational institutions in this case, high school students; (b) understand the connections between these factors, and; (c) understand the theoretical and practical ramifications of these factors.

The literature that has already been written uses a number of fundamental models, including the Innovation Diffusion Theory (IDT), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Technology Acceptance Model (TAM). The application of UTAUT as a foundational model in developing theoretical models is highlighted in this study. The special features of the e-learning system have not yet been completely mapped by UTAUT. In this study, we coupled two external factors perceived enjoyment and computer anxiety with the fundamental UTAUT constructs performance expectancy, effort expectancy, social influence, facilitating condition, and behavioral intention.

The purpose of this study is to identify the variables that may affect high school or vocational school students' acceptance of online learning. The Unified Theory of Acceptance and Use of Technology (UTAUT) fundamental model is used in the theoretical model, which was developed based on earlier research. It is envisaged that it would be able to contribute significantly to the creation of a more effective theoretical model of the adoption of e-learning.

II. LITERATURE REVIEW

This section summarizes earlier studies. According to the suggested theoretical model analysis, the Unified Theory of Acceptance and Use of Technology (UTAUT) is used to gauge how well a technology is accepted in relation to the adoption of e-learning and its application. Since smartphones and other mobile devices with internet connection started to gain popularity on the market ten years ago, research in the subject of e-learning has grown in popularity. Additionally, more educational institutions are eager to use e-learning. When used properly, e-learning aligns with education's strategic goals of raising student achievement, accommodating learning needs, fostering greater student collaboration and interaction, increasing student participation, and bridging the gap between formal and informal learning [5].

Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions are the four main elements of UTAUT that affect behavioral intentions to use or not use technology. The function of each key component in UTAUT is used to describe how UTAUT is used to study E-Learning. Social Influence (SI) is the degree to which a believes that other people who are significant to him, such as family and friends, think they should use the technology; Performance Expectancy (PE) is a standard for using a technology that will benefit consumers in carrying out a particular activity; and Effort Expectancy (EE) is the degree of ease associated with using technology by consumers. The term "facilitating condition" (FC) describes how customers view the tools and assistance they need to engage in a behavior [6], [7]. In Figure 1, the original UTAUT build is shown.

E-Learning is an innovative approach to an interactive learning process that is student-oriented, can be done anywhere and at any time by utilizing technology that can be connected to the internet. E-Learning is a flexible interactive teaching and learning process for obtaining learning materials [8]. According to Hartley, e-learning is a teaching and learning technique that enables the delivery of instructional materials to students via computer networks, intranets, or the internet [9].

Based on definitions from previous researchers, this research can be concluded that E-Learning is a process of delivering learning to students interactively using digital technology connected to an internet connection, where a student can obtain learning material without meeting directly in class.

The Unified Technology Acceptance and Use of Technology (UTAUT) model was developed to examine and comprehend the variables that affect an individual's use of technology. UTAUT was created by Venkatesh as a thorough synthesis of earlier studies on technology acceptance.

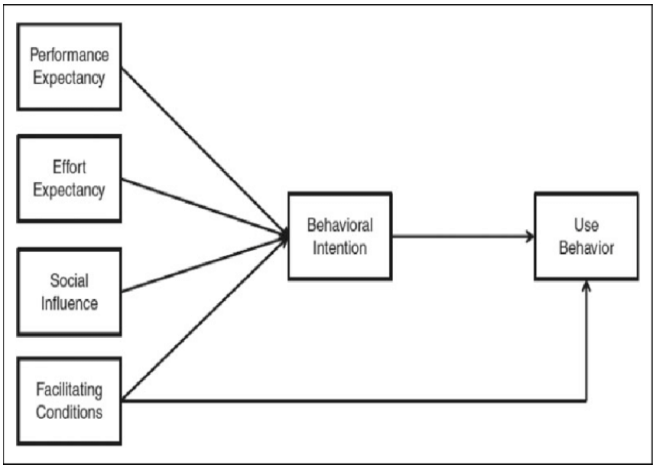


Figure 1. Unified Technology Acceptance and Use of Technology (UTAUT) [6]

Table 1 summarizes a number of earlier research that have been conducted in relation to e-learning. According to earlier studies, a number of factors are thought to be significant and important in influencing the adoption of e-learning, including performance expectancy, effort expectancy, social influence, facilitating conditions, perceived enjoyment, and computer anxiety. It was discovered that studies on the adoption of e-learning systems mostly exploited a number of external factors. These outside variables include computer anxiety (CA) and perceived enjoyment (EN). There are still discrepancies in a number of parameters that affect the adoption of e-learning, despite the fact that most research indicates positive outcomes.

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Table 1. Similar Research That Has Been Carried Out Previously.

Research Title	Researcher
The Moderating Effect of Age and Gender on the Adoption of E-Learning During the COVID-19 Pandemic	[10]
Factors Using the UTAUT and Structural Equation Modeling Approaches that Affect Students' Acceptance of E-Learning Systems in Higher Education	[11]
The Structural Equation Modeling Approach is one of the factors influencing students' adoption of e-learning.	[12]
factors affecting Indonesian students' usage of mobile learning platforms.	[13]
Using PLS-SEM and Conditional Process Modeling, the UTAUT model and learning management system were developed at COVID-19.	[14]
Determine the elements that affect students' adoption of e-learning platforms in a blended learning setting.	[15]
A structural equation modeling approach to the factors influencing Nigerian higher education students' use of e-learning technology	[16]

It is intended that this research can offer more substantial and practical data for future research, as there are similarities and discrepancies between various conclusions from earlier studies on a number of other issues.

A. Performance Expectancy

An individual's impression of using an information system to finish a task and get good performance from that information system is known as performance expectation [6]. Performance Expectancy encompasses system correctness, efficiency, and task completion speed [7]. According to earlier studies, in the context of e-learning, Performance Expectancy and Behavioral Intention are significantly correlated [10], [11], [12], [14], [16], and [17]. Research has shown that behavioral intention for the adoption of e-learning is positively impacted by performance expectations.

H1 : Behavioral intention is directly, favorably, and significantly impacted by performance expectation.

B. Effort Expectancy

The Unified Theory of Acceptance and Use of Technology (UTAUT) defines effort expectancy as the degree of system usability [8]. In line with earlier studies, it claims that in the context of e-learning, Effort Expectancy significantly affects Behavioral Intention [11], [13], and [14]. It has been investigated that behavioral intention is significantly impacted by effort expectation.

H2 : Behavioral intention is directly, favorably, and significantly impacted by effort expectation.

C. Social Influence

The Unified Theory of Acceptance and Use of Technology (UTAUT) defines social influence as the number of users and the confidence that other users have in the system [6]. Social Influence is comparable to Social Norms in the Theory of Reasoned Action (TRA) and Subjective Norms in the Technology Acceptance Model (TAM2). According to estimates, the most significant and determining element in forecasting whether new technology will be accepted is social influence. Existing research on the adoption of e-learning has shown that behavioral intention to embrace e-learning technology is significantly influenced by social influence [10], [11], [12], [14], [16], and [17]. It has been investigated that social influence has a major impact on behavioral intention in the setting of e-learning.

H3 : Behavioral intention is directly, favorably, and significantly impacted by social influence.

D. Facilitating Condition

The term "facilitating conditions" describes how a person views the tools and assistance available to carry out a behavior [6], [7]. The degree to which a person believes that the technological and organizational infrastructure is in place to make the system easier to use is known as the "facilitating conditions" [6]. Prior studies have demonstrated a strong correlation between Behavioral Intention and Facilitating Conditions [10], [14]. The availability of technological operational infrastructure and support for e-learning can boost behavioral intents to use it. Facilitating conditions have been found to have a major impact on behavioral intention in the setting of e-learning.

H4 : Behavioral intention is directly, favorably, and significantly impacted by facilitating conditions.

E. Perceived Enjoyment

The degree to which utilizing an information technology is regarded as delightful, notwithstanding potential performance repercussions, is known as perceived enjoyment [18]. Previous studies have shown that Hedonic Motivation and Perceived Enjoyment are comparable [17], [19], and [20]. According to earlier studies, there is a substantial correlation between behavioral intention and perceived enjoyment [13], [17]. Perceived enjoyment has been shown to have a major impact on behavioral intention in the setting of e-learning.

H5 : Behavioral intention is directly, favorably, and significantly impacted by perceived enjoyment.

F. Computer Anxiety

Computer Anxiety refers to generating anxious or emotional reactions when doing something [8]. It can be said that Computen Anxiety is an emotional reaction caused by fear of negative outcomes after using a computer. According to previous research, it shows that Computer Anxiety and Behavioral Intention show a significant relationship [10]. It has been investigated that computer anxiety significantly affects behavioral intention in the setting of e-learning.

H6 : Behavioral intention is directly, negatively, and significantly impacted by computer anxiety.

Based on the 6 hypotheses described previously, a theoretical model can be described as shown in Figure 2.

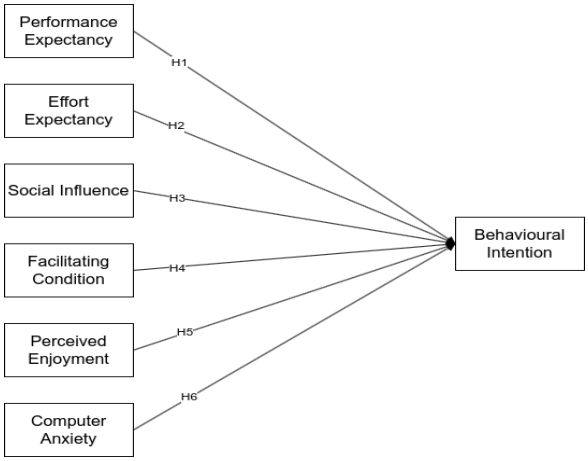


Figure 2. Theoretical Model

III. RESEARCH METHODOLOGY

The research approach will be described in this chapter. AMOS and SPSS are used as analytic software in the UTAUT analysis approach.

A. Introduction

Data collection was carried out using a self-administered questionnaire. The approach taken in this research was purposive sampling and a snowball sampling approach to speed up the distribution of questionnaires. This is done with the aim that the data obtained will be more representative. Method. Purposive sampling was used to filter respondents.

There are several specific criteria that are recommended to be able to take part in this survey about E-Learning, including that you must be a high school/vocational school student and have or are currently studying E-Learning. Table 2 is a questionnaire for each indicator of each factor in this research.

Table 2. Questionnaire

Variable	Ind	Item	Reference
Performance Expectancy	PE1	I find that I can finish learning assignments faster with the help of the e-learning system.	[13]
	PE2	My learning performance is enhanced when I use the e-learning system	
	PE3	I find it easier to learn specialized material when I use an e-learning system	
	PE4	My productivity is increased when I use e-learning	
	PE5	I learn more effectively when I use the e-learning system	
Effort Expectancy	EE1	I had no trouble learning how to use e-learning platforms	[13]
	EE2	I had easy-to-understand encounters with the e-learning system	
	EE3	The e-learning system is simple to use, in my opinion	
	EE4	I can easily get proficient using e-learning platforms	
Social Influence	SI1	According to my instructor, I ought to take part in online learning activities	[13]
	SI2	According to my acquaintances, I ought to engage in online learning activities	
	SI3	My school's administration believes that I should engage in e-learning activities	
	SI4	Important people in my life encourage me to use e-learning	
Facilitating Condition	FC1	I am knowledgeable enough to operate the e-learning system	[13]
	FC2	My school has upgraded the computers, cables, modems, and other equipment needed for internet access and e-learning	
	FC3	I have the tools I need to utilize the online learning platform	
	FC4	I could get assistance when I needed it via the E-Learning system	
Perceived Enjoyment	EN1	The advantages of the e-learning method, in my opinion, are enjoyable	[11]
	EN2	My way of thinking is made easier by using E-Learning	
	EN3	The setting of the e-learning system is comfortable	
	EN4	Utilizing the e-learning platform is enjoyable	
	EN5	My interest was piqued by the utilization of the E-Learning system	
Computer Anxiety	CA1	Computers don't scare me at all	[10]
	CA2	Computers make me feel uncomfortable	
	CA3	Studying on a computer makes me nervous	
	CA4	Computers make me feel uncomfortable	
Behavioural Intention	BI1	In the future, I will make frequent use of the e-learning platform	[12]
	BI2	I want to make the most of the E-Learning system's features and material in order to improve my academic performance	
	BI3	I will advise others to make use of the e-learning platform	
	BI4	I will use the E-Learning system regularly in the future	

B. Research Procedures

The procedures used in this research will be discussed sequentially, according to the recommended work steps.

1. Theoretical Model Development

This stage includes a review of theories that have been carried out in previous studies, namely regarding factors that can influence the level of E-Learning adoption.

2. Questionnaire Development

A self-administered questionnaire is a method of gathering data in which a set of questions is sent to respondents to complete on their own. The purpose of this survey is to gauge the variables in the theoretical framework. All high school or vocational school students who have previously participated in or are now enrolled in online learning are the target audience for this quiz. An online form is used to prepare this questionnaire.

3. Sampling Procedure

High school or vocational school students in Indonesia who are between the ages of 15 and 19 who have used the E-Learning learning system are the research's target audience. Although the exact number of persons living in Indonesia is unknown, it is expected to be more than 100,000. A minimum sample size of 400 is needed with a 95% confidence level and a 5% precision [21]. This sample size guarantees the study's statistical validity, particularly when SEM is used.

4. Data Preparation and Descriptive Analysis

The data that has been collected from the questionnaire is then prepared and analyzed by following the steps as follows:

a) Data entry, Missing values, and Outliers

The accuracy of data entry in the data spreadsheet is checked manually by looking for missing values or data that is filled in incompletely. Variables from correspondence that are incomplete or contain missing values will be deleted. The next examination carried out is outliers. Data having values that deviate significantly from the average, or data with extreme values, are known as outliers. The results of assumption tests like the normality, linearity, and homogeneity of variance tests may be impacted by the existence of outliers. Eliminating questionnaire replies from the data is one way to deal with outliers.

b) Construct validity

Construct Validity uses factor analysis, which aims to find the main factors that most influence endogenous variables from a series of exogenous variables through a series of analyzes.

c) Internal Consistence (Equivalence) Reliability.

The reliability test indicates the degree of trustworthiness of the tool's measurement results. After being conducted repeatedly on the same subjects and under the same conditions, the measurement results must be dependable, consistent, and stable.

C. Structural Equation Modeling Analysis

Structural Equation Modeling (SEM) is model creation carried out in research to see and observe the relationships created between each variable. The purpose of modeling using SEM itself is to determine the extent to which the proposed theoretical model is supported by the data that has been collected from respondents. If the data that has been analyzed supports the research model, a hypothesis can be formed. However, if it is not supported, then changes or modifications to the theoretical model are needed or even developed and tested [22].

IV. RESULTS AND DISCUSSION

A. Descriptive Analysis

Out of the 400 necessary data points, 593 were received from the results of the circulated questionnaire. Participants in this study were respondents who had taken online courses while enrolled in high school or a vocational school. The study's respondents were mostly between the ages of 16 and 17. After the data is collected, the next process is to check the respondent profile, such as age range and education. Next is checking the results from the respondents, if the same parameter value is found in all measurement indicators, the data must be removed. The last process is to remove outliers using descriptive statistics in SPSS, values above 3 and below -3 must be removed. After the process was carried out, 457 data were found. Table 3 displays the profiles of platforms and educational levels.

Table 3. Profiling of Research Respondents

Educational level	Frequency
High school	118
Vocational school	339
Total	457
Platform	**Frequency**
Zoom	41
Google Classroom	393
Google Meet	8
Microsoft Teams	2
Edmodo	5
Schoology	8
Total	457

The gender of the respondents in this study consisted of 65% women and 35% men. The majors with the highest number of questionnaires filled in in this study were accounting majors at 22%, followed by 3 other majors with scores above 10%, and the rest with scores below 10%.

The next step is factor analysis by testing construct validity (discriminant and convergent). The results show a

discriminant and convergent position so that the data can be carried out at the next stage. At the Factor Analysis stage, it was found that the FC1 variable had to be deleted because it was below the lower threshold of 0.4. After the FC1 indicator was deleted, the Factor Analysis was repeated again and the results can be seen in Table 4.

Table 4. Factor Analysis Results

	Variable						
Indicator	Computer Anxiety	Performance Expectancy	Perceived Enjoyment	Behavioural Intention	Social Influence	Effort Expectancy	Facilitating Condition
CA4	.931						
CA2	.922						
CA3	.916						
CA1	.912						
PE2		.811					
PE4		.736					
PE5		.727					
PE1		.713					
PE3		.701					
EN4			.740				
EN3			.729				
EN2			.704				
EN1			.695				
EN5			.683				
BI1				.758			
BI4				.732			
BI2				.731			
BI3				.718			
SI3					.777		
SI1					.754		
SI2					.749		
SI4					.718		
EE1						.759	
EE2						.744	
EE3						.696	
EE4						.640	
FC2							.835
FC3							.758
FC4							.709

The latent variable must have a Cronbach Alpha value greater than 0.7, which is the lower limit, in order for the results of the reliability test to use Cronbach Alpha. According to Table 5, the latent variable in this study has a Cronbach Alpha value between 0.8 and 0.9, or good and very good.

Table 5. Cronbach Alpha Results

Variable	Value	Interpretation
PE	0.900	Good
EE	0.844	Good
SI	0.884	Good
FC	0.808	Good
EN	0.907	Very good
CA	0.940	Very good
BI	0.894	Good

B. SEM Analysis and Theoretical Model

Following factor analysis and reliability testing, AMOS software was used to examine the model, and SEM analysis was used to determine the results. In order to provide computations that validate the UTAUT hypothesis in multiple variable models, the theoretical model is reprocessed and visualized using AMOS software. The intention to employ a technology is the primary construct in UTAUT. Figure 3 illustrates the theoretical model that was developed and may be explained in AMOS.

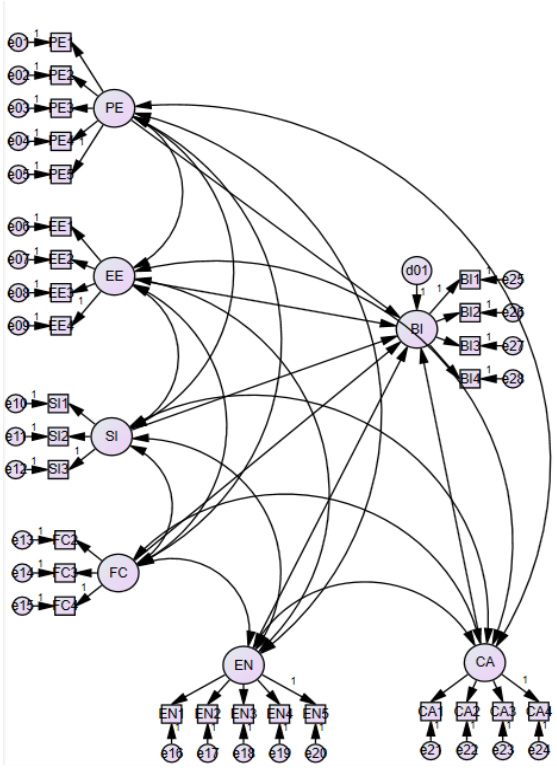


Figure 3. Theoretical Model in AMOS

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Each variable depicted in the theoretical model has an error connected to each indicator in the indicator group. In the process of drawing a model using AMOS, the naming of each item (variable name, indicator name, error and distortion) must be different and the direction of the error arrow only points to one indicator.

According to the SEM analysis's findings, Figure 4 illustrates the direct influence. This theoretical model's Direct Effect displays the Unstandardized Effect value first, then statistical significance. In statistical significance there are several symbols, including "*" meaning $p \leq 0.05$, "**" meaning $p \leq 0.01$, "***" meaning $p \leq 0.001$ and "NS" meaning > 0.05 or not statistically significant.

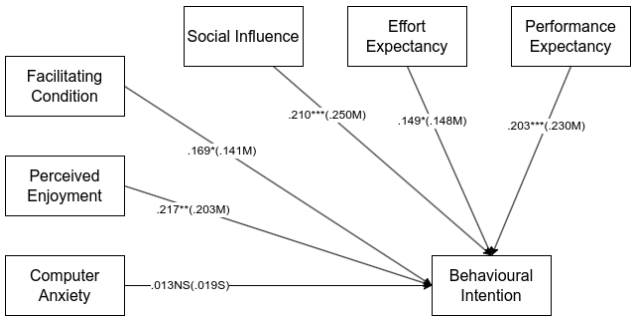


Figure 4. Direct Effect in Theoretical Model

For the "()" sign, the standardized effect value goes first, then the magnitude interpretation value of the standardized effect is shown. There are three levels of magnitude interpretation values, including Small (S) for magnitude values < 0.1, Medium (M) for magnitude values between 0.1 and 0.5 and Large (L) for magnitude values ≥ 0.5.

Tabel 6. Data Statistic Theoretical Model

Hypothesis	Path	Estimate	S.E	C.R	P-Label
H1	PE > BI	.203	.048	4.256	***
H2	EE > BI	.149	.068	2.192	.028
H3	SI > BI	.210	.047	4.468	***
H4	FC > BI	.169	.067	2.514	.012
H5	EN > BI	.217	.069	3.155	.002
H6	CA > BI	.013	.022	.571	.568

Based on Table 6, it shows quite satisfactory results. Of the six hypotheses, there is one hypothesis that shows a significant note position, namely H6, because the P value is above 0.05. Hypotheses H2 and H4 show significance "*", because the P value is below the significance of 0.05. Hypothesis H5 shows the significance of "**", because the P value is below the significance of 0.01.

Table 7 shows that the Fit Statistics figures are close to and above 0.90 for the GFI, AGFI, NFI, IFI and CFI variables. This means it is quite good and in accordance with the theoretical model. The R2 value shows a Behavioral Intention (BI) value of 0.665 (66.5%). The theoretical model with the chosen elements has a pretty high influence on individual intensity in adopting e-learning, or it can be claimed that the latent variables in the model have a 66.5% influence on behavioral intention.

Table 7. Fit Statistics of Theoretical Model

N	NC (x^2/df)	RMR	GFI	AGFI	NFI	IFI	CFI	RMSEA
457	682.159/329 = 2.073	.021	.903	.881	.927	.961	.961	.049
	R^2 : BI (.665)							

A standard path coefficient with an absolute value of less than or equal to 0.1 can indicate a "Small" (S) effect, an absolute value between 0.1 and 0.5 can indicate a "Medium" (M) effect, and a magnitude greater than or equal to 0.5 can indicate a "Large" (L) effect, according to Cohen's explanation [23]. According to a thorough direct effects study, the factors that have the biggest impact on someone is decision to adopt e-learning include social influence (H3), performance expectancy (H1), perceived enjoyment (H5), effort expectancy (H2), and facilitating conditions (H4). Therefore, it can be said that a person's use of e-learning can persuade others to adopt it, and that the performance of the e-learning platform, which supports and creates a sense of pleasure, can make online learning more comfortable. Of course, all of this must have facilities such as computer devices or smartphones and the internet.

It was found that the latent variables that have the strongest positive and significant influence are Social Influence (SI) on Behavioral Intention (BI) and Performance Expectancy (PE) on Behavioral Intention (BI) which show significance at the *** level with a Medium magnitude (M). In line with research [14], [12], [16].

Computer Anxiety (CA) does not have a significant positive effect, because what is expected in the latent variable is a significant negative so the results of this study are in line with research [10]. The more technology develops, of course, a person's anxiety in using computers is said to be decreasing, and can increase the level of adoption of new technologies, especially E-learning [8].

C. Practical Implications

The results of this research can be used by teachers and E-Learning platform developers. Such as providing a fun way of learning and even gaining insight without being limited by space and time. The developer may be able to add several features so that E-Learning users can feel the comfort and excitement of playing a game.

D. Theoretical Implications

According to this study, behavioral intention was positively and significantly impacted by the perceived

enjoyment element. Perceived enjoyment has been shown to directly affect behavioral intention in only a small number of studies [12], [13].

V. CONCLUSION

A. Conclusion

Six criteria are recognized based on the findings of the research that has been conducted. namely: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Perceived Enjoyment have a direct positive and significant influence on Behavioral Intention.

Behavioral intention is directly, negatively, and significantly impacted by computer anxiety. Of the six factors that influence Behavioral Intention positively and significantly, they are Social Influence and Performance Expectancy with a significance level of level *** and medium magnitude, for the Perceived Enjoyment factor it has a significance level of level ** and medium magnitude. Furthermore, Effort Expectancy and Facilitating Conditions have a significance level of level * and medium magnitude.
The factors that have the highest significance for Behavioral Intention are Social Influence and Performance Expectancy. Meanwhile, Facilitating Condition has the lowest value. This possibility is due to a lack of facilities within each individual or within the school. Because some schools are still not equipped with the necessary technology. In the context of Computer Anxiety, it can be accepted because the higher the rejection of this variable, the respondent is considered capable and does not experience anxiety in using computer technology.

B. Suggestion

It is hoped that in further research the target respondents can be expanded. In this study, it was found that Facilitating Condition had the lowest significance value, this needs to be carried out further research because previous research gave a higher significance level. and there is still little research related to E-Learning that examines the relationship between Perceived Enjoyment factors and Behavioral Intention.

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