Continuance Intention on Gamifikasi in E-Learning Using Extended Expectation-Confirmation Model

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ABSTRACT

In an effort to examine user continuance intentions after using gamification in e-learning, this research was conducted to identify the factors that influence gamification in e-learning using the theoretical model of ECM, then analyze the relationship between the influencing construct variables, and explain the practical and theoretical implications of the effect of gamification in e-learning on user's continued intention to reuse. The theoretical model was developed from the Extended Expectation-Confirmation model (ECM) by integrating the influencing determinants. Descriptive analysis and hypothesis testing using the SEM technique used the Amos 24 application to analyze and interpret data from 496 respondents who participated in an online questionnaire distributed via chat applications and social media. Significant test results have been found for users after using gamification in e-learning, the confirmation variable has a high positive correlation in influencing satisfaction according to the expectations felt by users. The results of the Pearson correlation test conducted show that if the value of gamification user satisfaction in e-learning increases, the intention to continue using e-learning will also increase as found in the five hypothetical determinants that have a direct effect on continuous intention, namely perceived usefulness, satisfaction, engagement, flow, perceived enjoyment. The practical meaning of the findings has a significant effect on continuous intention for educational institutions to research and develop innovative online learning models with gamification to increase the level of user participation, for teachers to ensure that the implementation of the gamification feature has a positive direct effect on sustainability intentions, for users to be able to provide confirmation of benefits obtained with a sense of satisfaction to continue using gamification in e-learning. This study predicts the continuance intention of gamification users in e-learning by analyzing theoretical models influenced by 4 basic ECM constructs plus 3 exogenous variables of engagement, perceived enjoyment and flow. Testing the construct hypothesis, presenting a comprehensive SEM analysis, producing direct and indirect positive significance tests on continuous intention.

INTRODUCTION

Conventional learning using minimum interactive modules results in a low level of understanding of the subject matter and only emphasizes the cognitive aspects of students. Students are only passive and feel bored. In line with this statement, a teacher who uses a traditional learning process by only making books as the main source of information can make students feel bored and less interested in the subject concerned.

Because it is minimum interactive than the learning media used, students become less active in finding solutions to the questions given due to the lack of interesting feedback given. The current development of information technology has had an impact on the development of online game models. This is one of the factors especially for teachers to be more creative in developing or designing their learning by utilizing the features of these online games.

One of the features of online games that can be used in learning is gamification. Online learning media or often called e-learning is a very popular media used for education in today's era. The absence of student interest in a medium used by schools is the main cause of the ineffectiveness of an e-learning

The interest or satisfaction of these students can be influenced by several factors such as the features or content contained in an e-learning cannot help students to solve their problems, so many students do not return to using the application. To overcome this problem, an e-learning application was created by applying game elements to the implementation of its features or content.

This element is called gamification which can be used to increase efficiency, effectiveness, interest, and even motivate students to continue learning online or use gamification in e-learning. Gamification is the process of using game features to be adjusted in certain fields with the aim of making it more interesting, understandable and creative (Sailer & Homner, 2020).

Where game features are used to increase student motivation, engagement and performance. Applying e-learning combined with gamification will help a learning environment that can make users feel more motivated, interested, and also provoked to complete the tasks given (Amriani et al., 2013). However, currently the impact of gamification in e-learning in increasing motivation and engagement is still unknown.

So far, many previous studies on gamification in e-learning have provided a lot of our understanding about how important it is to adopt, accept and the success factors of this e-learning system, such as information quality, system quality, service quality, or only limited to satisfaction, usability, perceived ease of use, but there is still a lack of research, especially on continued use after utilizing gamification in e-

learning (Cheng & Yuen, 2018). Recent research should focus more on the continued intention to use the technology, which plays a critical role in the success of these systems. In fact, it is said that the main determinant of the success of an Information System is its continuous use (Al-Emran et al., 2020).

It is often found that a lot of Information System literature in the context of e-learning focuses on the pre-adoption or acceptance stage only. Only a few studies have examined intention and post-adoption continuance behavior. In addition, theories, such as TAM, IDT, UTAUT, and TPB, are mainly used to explain user pre-adoption behavior (Foroughi et al., 2019) and have many limitations in predicting user continuation behavior in the post-adoption stage (Joo et al., 2018). Previous research (Oertzen & Odekerken-Schröder, 2019) argues that users may start using digital features that are more functional after they experience the technology. Thus, there is a need to study the intention of continuing use of the Information System in the post-adoption phase.

This research contributes to existing scientific knowledge in a different way. First, this study seeks to examine user continuance intentions after using gamification in e-learning. This study uses the Expectation Confirmation Model (ECM), develops what was proposed by (Bhattacherjee, 2001) in the original ECM, by adding new construct variables and proposing new causal paths with the aim (1) to identify factors that influence gamification in elearning using ECM theoretical model, then (2) analyze the relationship between the influencing construct variables, and (3) explain the practical and theoretical implications of the effect of gamification in e-learning on the user's continued intention to reuse.

In the next section, the conceptual model of research and hypothesis development will be presented. Followed by research methodology, empirical analysis then presented the results and discussion. Future research and research limitations in the concluding section conclude this paper.

METHOD
Research Model and Hypothesis Development

A theoretical model was developed based on the initial design of the basic ECM model (Fig. 1.) to predict the effect of gamification elements in the online learning environment on user engagement and its effect on the intention to continue using it. Gamification research in e-learning over the past decade has provided many constructs that might predict a user's continuing intention, which begins with confirmation of a user's attitude statement that a gamified learning system can meet their expectations.

The main rationale for this theory is that the user's continuance intention is highly dependent on the perceived level of satisfaction and usefulness of the technology. User satisfaction is also determined by the level of confirmation and

perceived usefulness. Furthermore, confirmation has a significant effect on perceived usefulness.
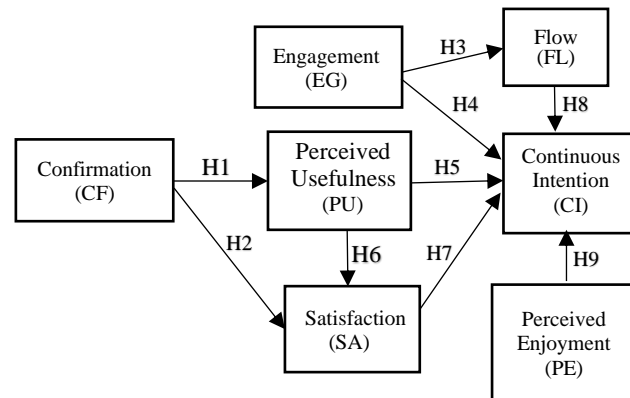

Figure 1. Theoritical Models

Based on the determinants that have been carried out in the previous literature, the research model applied above is to determine the effect of the sustainability of user intentions on gamification in e-learning. Then a hypothetical model is made by adding three exogenous factors, namely engagement, perceived enjoyment and flow to be related to the four basic constructs in the Expectation Confirmation Model theory, namely perceived usefulness, confirmation, satisfaction, continuous intention in determining the relationship between usability, satisfaction and confirmation of expectations that can influence a person's intention to continue his behavior. In the following, 9 hypotheses have been determined along with an explanation of the relationship to the construct variable.

a. Confirmation

Several studies have shown the importance of teacher understanding and learning adoption of gamification technology in e-learning and human-computer interaction. Confirmation has been concluded as an important factor for users to make sustainable decisions in accepting or rejecting various technologies (Vanduhe et al., 2020). (Chang, 2013) defines sustainable intention to use technology as the extent to which individuals are willing to use the system in the future and to recommend the system to others. (Bhattacherjee, 2001) extends the model of confirmation from users and Perceived usefulness of a System Information is the most significant factor, which can predict user satisfaction. Therefore, researchers hypothesize:

H1. Confirmation has a direct, positive and significant effect on perceived usefulness.

H2. Confirmation has a positive and significant direct effect on satisfaction.

b. Engagement

For the purpose of this study, the term engagement is defined as the inclusion of active and collaborative learning, engaging in challenging academic activities, meaningful interactions with instructors, engaging in enriching educational experiences and feeling part of a learning community (Coates, 2007). When students are more open to technology modification, they are more likely to engage in learning, find the technology effective, and consequently make decisions to accept the new technology. Previous research contributed to supporting literature that technology acceptance can positively enhance students' enjoyment of learning (Dawoud et al., 2015) and engagement (Tseng et al., 2020), which in turn, improves their willingness to continuously use ICT in the future. The workable hypotheses are:

H3. Engagement has a direct positive and significant influence on Flow

H4. Engagement has a direct, positive and significant influence on Continuous Intention.

c. Perceived Usefulness

Perceived Usefulness is one of the core factors in TAM construction. The technology acceptance model (TAM) identifies that Perceived Usefulness is a determining factor that influences continuous intention. Perceived Usefulness is "the extent to which a person believes that using a particular system will improve his job performance" (Davis, 1989). In gamification learning in e-learning, Perceived Usefulness is a significant determinant of continuous intention (Baki et al., 2018). Included in the perception of ease in learning management systems (Sanchez-Franco, 2010). To assess whether a system can be useful, a student needs to engage in uninterrupted learning. When a student is in a condition of doing online learning, high focus and concentration produce stronger motivation to appreciate the use of gamification learning in e-learning (Buil et al., 2020), then the following hypothesis is stated:

H5. Perceived Usefulness has a direct, positive and significant influence on Continuous Intention

H6. Perceived Usefulness has a positive and significant direct effect on Satisfaction

d.Satisfaction

According to (Sweeney & Ingram, 2001) satisfaction is considered as the perception of pleasure and achievement in the learning environment. Satisfaction is positively related to the user's continuous intention (Oliver, 1980). In e-commerce, satisfaction determines consumer intentions to repurchase (Marc-Julian Thomas, 2019). In education, a student has achieved satisfaction when doing online learning with gamification with high activity, so they will have the confidence to complete

MOOC (Liu et al., 2018). Thus, satisfaction can influence continuous intention to use MOOC.

Many studies have proven that satisfaction increases recommendations for information technology users because satisfaction is one of the most important factors that predicts behavior to recommend to other users (Chen et al., 2020). In MOOCs, student satisfaction is the most important evaluation of the effectiveness of online learning (Eom et al., 2006). If users are satisfied, they are more likely to offer recommendations to others.

H7. Satisfaction has a direct positive and significant influence on Continuous Intention.

e. flow

The flow factor is one of the determining constructs that has been used in many gamification and game-based learning environments to describe the psychological state of one's participation in an activity by devoting energy, thought and pleasure completely. This emotional state is considered very beneficial so that a person is continuously motivated to repeat the activity. In blended learning systems (blended learning) students have a choice of face-to-face or online systems, students want to understand the advantages of an online learning management system (LMS) compared to offline learning. Students in contemporary education need to adapt to gamification in e-learning for their educational well-being (Ramírez-Correa et al., 2019) and this can be achieved with online learning systems. Therefore, stated:

H8. Flow has a direct, positive and significant influence on Continuous Intention

f. Perceived Enjoyment

Perceived Enjoyment in gamification in e-learning is defined as the extent to which an activity using a technology system can be enjoyed and enjoyable, regardless of the impact resulting from the use of the technology system. If there is a fun use of gamification in e-learning, then in the results of this study there is a tendency to have a positive attitude towards the benefits and convenience of the system's technology. Previous studies have shown that Perceived Enjoyment has a positive and significant effect on continuous intention (Klaiber et al., n.d.). Perceived enjoyment is an example of intrinsic motivation, and has a significant influence on continuous intention. Making learning activities more enjoyable can help students and teachers in schools use gamification (Ngabiyanto et al., 2021). The reason for this is that educators and students who enjoy using gamification in elearning are more psychologically prepared to use it more widely than those who do not. (Darvishi et al., 2020). Therefore, it needs to be re-examined to prove the effect of Perceived Enjoyment on a user's desire to continue using gamification in e-learning.

The following is the formulation of the hypothesis for the exogenous latent variable Perceived Enjoyment:

H9. Perceived Enjoyment has a direct, positive and significant influence on Continuous Intention

g. Continuous Intention

According to (Davis, 1989), continuous intention is defined as the interest or desire of an individual to continue using a system. Furthermore, according to (Bhattacherjee, 2001), it is defined as an interest in continuing to participate or take part in a particular system. Meanwhile, according to Praveena & Thomas, 2014 continuance intention to use in the Information System is defined as a person's intention to use the Information System on an ongoing basis. Based on the three studies that have been described, it can be concluded that continuous intention is a condition when the user is satisfied with the Information System used so that he intends to use it on an ongoing basis in the future.

After preparing the hypothesis by adopting the Confirmation of Expectations (ECM) model in the past as a way to prove the user's intention to continue gamification activities in online learning, the researcher used a quantitative method to conduct a survey by utilizing an online questionnaire platform, which consists of a set of statement items sent online to respondents in the form of links through various chat application platforms or other social media which make sharing easier and faster. At the beginning of the questionnaire included information about the researcher and the purpose of distributing the questionnaire statements along with some instructions. The next section contains questions about the respondent's demographic data, such as age, gender, and education of the respondent. The last part is the preparation of a questionnaire by setting indicators for each ECM construct variable from previous similar studies consisting of subjective measurements on a five-point Likert scale theoretical model, namely "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". to evaluate respondents' perceptions.

The hypothesis measurement uses the Partial Least Square (PLS) approach through a sample t-test to a 95% confidence level and an accepted error rate of 0.05 (5%), so the required number is at least around 400 respondents. Questionnaire data collected in this study were analyzed using the Statistical Package for Social Sciences (SPSS) version 24 to test the hypothesized relationships. Before analyzing the main data, data preparation, cleaning and filtering are carried out such as coding, data editing, missing values, checking outlier data and normality tests to be carried out to ensure that the data collected meets the requirements for use in main data analysis.

SPSS descriptive analysis was carried out by calculating the frequency of responses, averages, and percentages to describe the profile of respondents and the distribution of the data. Correlation analysis is described as an assessment of the relationship between two variables. Regression analysis is used to test the effect of more than one independent variable on one dependent variable,

The reliability test was carried out using the final construct validity results after the associated factors were removed. Each group of indicators was analyzed using the Cronbach's Alpha coefficient to measure the level of reliability of the respondents' answers. The acceptable reliability threshold coefficient score for research reliability is 0.6 and above.

To explore the causal relationship between all constructs, (SEM) partial least squares (PLS) was adopted for the research model test with the statistical analysis software package AMOS 24, as its complementary modeling software. First, data filtering, descriptive analysis, and internal reliability tests were carried out to explore data features and demonstrate participant profiles using SPSS 24. Second, Amos 24 was used to perform Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM).

RESULTS AND DISCUSSION
Respondent Profile

In general, demographic data samples involve gender, age, level of education. After the respondents' responses were collected, a frequency analysis was carried out to identify the demographic characteristics of the respondents with the results of the analysis obtained as many as 574 responses, after going through the data cleaning process, reduced to 496 data with details of male and female participants that were almost equal. In terms of educational background, the majority of respondents had a bachelor's degree, followed by high school students, and the rest only received a few postgraduate and diploma responses. Demographic details of the frequency of the number of data and the percentage of respondents are shown in the table below.

Table 1-Gender

Gender	Frequency	Percentage	Cumulative Percent
Man	237	47,8 %	47,8 %
Woman	259	52,2 %	100,0 %
Total	**496**	**100%**	
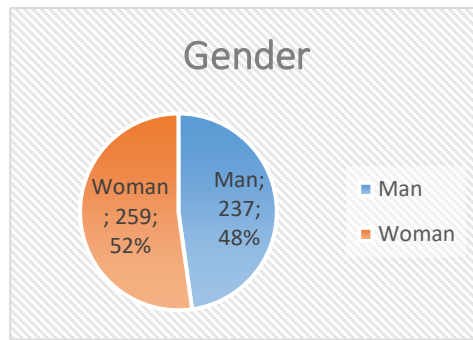
Figure 2. Respondent's Gender Diagram

Table 2-Respondent's Age

Age	Frequency	Percentage	Cumulative Percent
17	72	14,5 %	14,5 %
18	92	18,6 %	33,1 %
19	86	17,3 %	50,4 %
20	59	11,9 %	62,3 %
21	86	17,3 %	79,6 %
22	31	6,3 %	85,9 %
23	54	10,9 %	96,8 %
27	1	0,2 %	97 %
28	1	0,2 %	97,2 %
30	2	0,4 %	97,6 %
33	3	0,6 %	98,2 %
36	1	0,2 %	98,4 %
37	1	0,2 %	98,6 %
39	1	0,2 %	98,8 %
40	1	0,2 %	99 %
41	1	0,2 %	99,2 %
42	1	0,2 %	99,4 %
43	1	0,2 %	99,6 %
44	1	0,2 %	99,8 %
45	1	0,2 %	100 %
Total	**496**	**100 %**	

Respondent criteria starting from school education with the age of 17 who are in the final class of high school level with a total of 72 responses. The 92 data respondents were mostly 18 years old, followed by 86 respondents aged 19 and 21 years, and finally there were only a few respondents aged 27 to 45 years.

Table 3-Respondent's Education

Education	Frequency	Precentage	Cumulative Percent
Senior High School	164	33,1 %	33,1 %
Diploma	4	0,8 %	33,9 %
Bachelor	322	64,9 %	98,8 %
Postgraduate	6	1,2 %	100 %
Total	**496**	**100%**	

In table 3 shows the distribution of this study revealing that undergraduate students dominated the most in this study more than high school students.

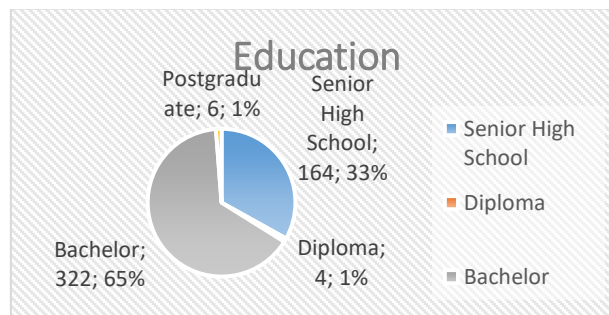| Indikator	Perceived Usefulness	Perceived Enjoyment	Satisfaction	Component Continuous Intention	Flow	Confirmation	Engagement
PU3	,754						
PU2	,730						
PU4	,716						
PU5	,703						
PU1	,700						
PE4		,738					
PE3		,734					
PE1		,688					
PE2		,669					
PE5		,661					
SA1			,785				
SA2			,784				
SA3			,768				
SA4			,725				
CI1				,896			
CI3				,883			
CI2				,879			
FL2					,772		
FL1					,749		
FL3					,733		
FL4					,697		
CF3						,861	
CF2						,848	
CF1						,812	
EG3							,845
EG1							,835
EG2							,797

Figure 3. Respondent's Education Diagram

Table 4-Factor Analysis Results

Then perform factor analysis (Table 4.), check convergent validity by looking at the loading factor values, and cronbach's alpha to test the construct validity (looking at discriminant and convergent) of the seven latent variables in the model.

Table 5-Reliability Test Koefisien Cronbach Alpha

Variabel Laten	Indikator	Alpha	Interpretasi
Confirmation	CF1, CF2, CF3	.838	Bagus
Engagement	EG1, EG2, G3	.800	Bagus
Perceived Enjoyment	PE1, PE2,	.766	Bisa Diterima

	PE3, PE4, PE5		
Perceived Usefulness	PU1, PU2, PU3, PU4, PU5	.797	Bisa Diterima
Satisfaction	SA1, SA2, SA3, SA4	.803	Bagus
Flow	FL1, FL2, FL3, FL4	.742	Bisa Diterima
Continuous Intention	CI1, CI2, CI3	.896	Bagus

The results of the reliability value of each indicator on seven variables which state that the composite reliability value must be > 0.70 from the various observation indicator items. The factor loading measured in this study all exceeded 0.55, the minimum construct reliability value was 0.70, exceeding the threshold of 0.6. There are three interpretations resulting from the Cronbach alpha coefficient, namely "Acceptable", "Good", and "Very Good". The highest Alpha value is owned by the Continuous Intention factor of 0.896 and the lowest value is at 0.742 on the Flow factor.

Descriptive Analysis

Descriptive analysis is used to show the characteristics of the data sample. This makes it easy for a sample of respondent information to define a set of constructs or items in an easy-to-understand way, such as mode, median, mean, group variation over range and standard deviation. Researchers have found the average score (mean) for each variable the average value of low agreement is between 1.00 to 2.33, also the average value of moderate agreement is between 2.34 to 3.66 and while the average value for high agreement between 3.67 to 5.00.

Tabel 6-Descriptive Statistics

Var	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
CF1	2	5	3,98	,796	-,043	-1,244
CF2	2	5	4,04	,808	-,281	-,905
CF3	2	5	3,97	,775	-,023	-1,142
EG1	2	5	4,17	,736	-,312	-1,006
EG2	3	5	4,34	,661	-,512	-,718
EG3	3	5	4,32	,657	-,445	-,735
PE1	2	5	4,24	,718	-,466	-,722
PE2	2	5	4,22	,727	-,419	-,802
PE3	2	5	4,22	,747	-,553	-,454

PE4	2	5	4,11	,765	-,347	-,745
PE5	2	5	4,13	,742	-,364	-,648
PU1	2	5	4,17	,708	-,429	-,336
PU2	2	5	4,14	,749	-,457	-,400
PU3	2	5	4,03	,759	-,221	-,791
PU4	2	5	4,09	,738	-,351	-,469
PU5	2	5	4,14	,734	-,446	-,360
SA1	2	5	4,18	,770	-,483	-,680
SA2	2	5	4,10	,784	-,413	-,646
SA3	2	5	4,18	,733	-,486	-,403
SA4	2	5	4,17	,747	-,436	-,636
FL1	2	5	3,96	,729	-,007	-,954
FL2	3	5	4,03	,708	-,049	-1,001
FL3	3	5	4,15	,692	-,206	-,910
FL4	3	5	4,05	,699	-,075	-,945
CI1	3	5	4,29	,578	-,122	-,550
CI2	3	5	4,35	,601	-,334	-,664
CI3	3	5	4,32	,613	-,319	-,651

Table 6 shows the minimum and maximum values of the construct, the average value and the standard deviation. The results show an average value of high agreement (> 3.67) for almost all items that measure this construct according to the standard deviation range above 0.596. Because all the mean values show above the Likert scale average of 5 points (2.34), it means that the mean is greater than the standard deviation, indicating good results.

Analysis of Models

After assessing the reliability and validity of the research instrument, the researcher tested the hypothesis using PLS. The results of the PLS analysis of the structural model are presented in Table 7. The next and most important step is to assess the significance of the path coefficient, namely to assess the significance of the hypothesized relationships in the structural model. The structural model predicts the relationship between latent constructs (Fig. 3).

In this study, Continuous Intention (CI) is a predictable construct. On the other hand, Confirmation (CF), Perceived Usefulness (PU), Satisfaction (SA), Engagement (EG), Flow (FL), Perceived Enjoyment (PE), are factors that are thought to predict CI. To test the hypothesis, structural equation modeling (SEM) analysis with the Amos program is required. After designing the structural model, calculations are carried out based on the data in the SPSS that has been prepared. The interpretation of Amos' calculation results will be explained further.
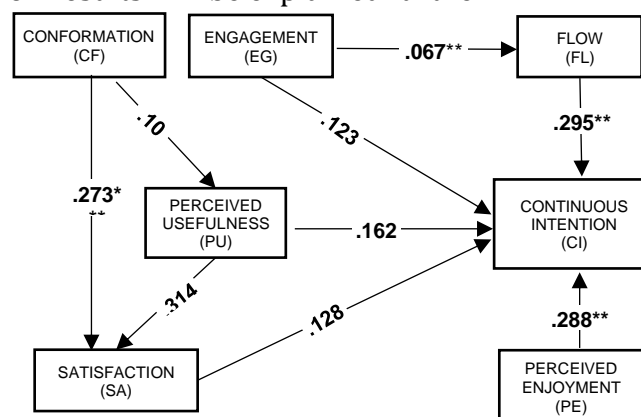
Figure 4. Direct effect Theoretical Model

After analyzing the Amos structure model with the direct effect on the construct variable in Figure 3, it can be seen that confirmation has a significant effect on perceived usefulness (β = 0.100, p <0.01), the next hypothesis is that confirmation also has a positive effect on satisfaction (β = 0.273 , p < 0.001), perceived usefulness has the highest significant effect on Satisfaction (β = 0.314 , p < 0.01), on Continuous intention (β = 0.162), Satisfaction has a positive effect on Continuous Intention (β = 0.128, p < 0.01), Engagement also has a positive effect on Continuous Intention (β = 0.123 , p < 0.01), Perceived Enjoyment has a significant effect on Continuous Intention with (β = 0.288 , p < 0.01), Flow has a significant effect on Continuous Intention (β = 0.295 , p < 0.01), while Engagement has no significant effect (NS) on Flow with (β = 0.067, p < 0.05).

Table 7. Theoretical Model Statistical Data

Variable	Estimate	S.E.	C.R.	P	Hipotess	Result
CF → PU	,100	,041	2,437	,015	H1	Significant
CF → SA	,273	,045	6,038	***	H2	Significant
EG → FL	,067	,048	1,377	,168	H3	Not significant
PU → SA	,314	,063	5,013	***	H6	Significant
PU → CI	,162	,065	2,496	,013	H5	Significant
SA → CI	,128	,059	2,148	,032	H7	Significant
EG → CI	,123	,047	2,597	,009	H4	Significant
FL → CI	,295	,061	4,821	***	H8	Significant
PE → CI	,288	,068	4,254	***	H9	Significant

The results of the hypothesis analysis of the relationship between constructs (Regression Weights) are summarized in Table 7 based on the empirical test results of the 9 hypotheses, there is only one hypothesis with details H3 p value = 1.68 with the path coefficient value of p analysis being above a significance of 5% or 0.05, then it can be said that the hypothesis is not significant. Engagement has no effect on Flow, the user's desire or curiosity does not fully make the user involved in participating in direct learning on gamification in e-learning. In accordance with the hypothesis in the previous study (Buil et al., 2020). in the next table below, is the result of the analysis of the fit statistical model that belongs to the theoretical model.

Table 8. Theoretical Statistical Model Fit

N	NC= (χ^2 / df)	RMR	GFI	AGFI	NFI	IFI	CFI	RMSEA
496	583,146 / 312 = 1,869	0,041	0,918	0,900	0,881	0,935	0,941	0,042
		Good fit	Good fit	Good fit	Good fit	Good fit	Good fit	Good fit

R^2 Variabel Endogen : FL (0,006), SA (0,225), PU (0,018), CI (0,192)

From the overall analysis in Table 8, it can be seen that good fit results require Chi-square to have a significant effect on the probability results so that there is no significant difference between the estimation model and the hypothetical model. By observing the value of the fit index (GFI) is greater than the standard 0.9, the adjusted GFI (AGFI) is worth more than 0.8, the incremental fix index (IFI) is greater than 0.9, the comparative fit index (CFI) must be greater than 0.9, the root mean square error of approximation (RMSEA) value. Based on the table data above, the results of the fit statistic show a value of 1.869 in the proposed theoretical model which is sufficiently appropriate.

Discussion & Findings

Our findings show that confirmation has a significant direct and indirect effect on e-learning gamification satisfaction. consistent with previous research (Lee, 2010). Confirmation results positively affect user satisfaction in gamification e-learning activities. Perceived usefulness shows the value of gamification e-learning relationships that are important and necessary for user satisfaction. If after using gamification it is considered useful, the user will feel satisfied.

In the Amos empirical test carried out as many as 9 hypotheses, in hypothesis H6 the perceived usefulness factor on satisfaction has the highest standardized regression value, namely 0.314, which means that the p value is below 0.05, meaning that perceived usefulness has a significant effect on satisfaction, the same as the hypothesis in research [13] previously. However, there is one H3 hypothesis, namely the engagement factor in flow with a significant value of p = 1.68 or above 0.05, meaning that the engagement variable has no significant effect on flow.

Table 9. Hypotheses Accepted by Research

	HYPOTHESIS	REFERENCE
H1	Confirmation has a direct, positive and significant effect on Perceived Usefulness	Tseng, Huangwei, et al, (2022); Aydınlıyurt, E.T, et al (2021)
H2	Confirmation has a direct positive and significant effect on Satisfaction	Yung-Ming Cheng, (2020); Aydınlıyurt, E.T, et al (2021)
H4	Engagement has a direct, positive and significant influence on Continuous Intention	Tsai et al., (2018)
H5	Perceived Usefulness has a direct, positive and significant influence on Continuous Intention	Goh, T. & Yang, B. (2021)

	HYPOTHESIS	REFERENCE
H6	Perceived Usefulness has a positive and significant direct effect on Satisfaction	Yung-Ming Cheng, (2020) Aydinliyurt, E.T. et al, (2021)
H7	Satisfaction has a direct positive and significant influence on Continuous Intention	Thongmak, Mathupayas, (2019) Yung-Ming Cheng, (2020) Alsadoon, Elham. et al, (2022)
H8	Flow has a direct, positive and significant influence on Continuous Intention	Khan, I.U, et al, (2017) Goh, T. & Yang, B. (2021); Tseng, Huangwei et al, (2022)
H9	Perceived Enjoyment has a direct, positive and significant influence on Continuous Intention	Lu,Y et al, (2019); Klaiber, Mark & de Kok, M. (2022)

Comparison with Previous Research

The hypotheses in Table 9 describe the research findings in relation to the empirical literature and the theoretical hypotheses. Before being clarified, a summary of the research findings has been given. The results of the factor analysis are based on a theoretical model built from a review of the literature, after going through a statistical and significant test process in the SEM estimation. This research was conducted to study factors such as Confirmation, Engagement, Perceived Enjoyment, Perceived Usefulness, Satisfaction, and Flow which have a direct effect on Continuous Intention in e-learning systems with gamification. Meanwhile, one hypothesis did not meet the results of previous research because it produced an effect size that did not have a significant effect.

Table 10-Hypothesis that is Not Significant

	Hypothesis	Reference	Corelation	Information
H3	Engagement has a direct positive and significant influence on Flow	Goh, T. & Yang, B. (2021)	Positif, not significant	Engagement does not have a significant direct effect on Flow

The results of the statistical analysis tests that have been carried out, change the research findings to the theoretical model, by getting one hypothesis that is proposed not to support this study. It can be found that the rejected hypothesis is related to the perception of user satisfaction when user involvement does not show any effect on continuing to reuse e-learning with gamification. Because users choose different learning models in different ways. By engaging in many learning activities due to varying learning requirements, users can become confused, tired, stressed, or overwhelmed by activities that affect their intrinsic motivation thereby reducing their intention to continue using them even though these learning activities enhance their experience.

User satisfaction with the gamification e-learning system should lead to their intention to continue using the system. In the context of online learning, satisfaction is an initial perception that causes continuance intention, and it can be predicted that when users feel online learning services are satisfactory, users will tend to

intend to continue using these services. Therefore, in this study the satisfaction factor has a significant direct effect on continuous intention. In accordance with research conducted (Cheng, Yung-Ming, 2021). Correlation with previous engagement factors that the perception of satisfaction that is felt starting from user participation to be active in learning does not make users continue to use e-learning gamification.

Practical Implications

This research has significant practical value for educational institutions at schools or universities to develop effective strategies to improve the function of online learning models with gamification and increase the level of user participation. With the findings of the perceived usefulness factor (β = 0.314) which has the most influence on the satisfaction factor, the teaching staff and managers are expected to create content material that is applied in the gamification system in e-learning more interesting and fun in order to increase user satisfaction to maintain its sustainable use. Because in this study the engagement factor did not show any effect on user achievement and progress. In this case, the system developer should consider adding a gamification feature that contains challenges and offers direct feedback to allow users to monitor the progress and results of their activities.

By looking at the results of the size effect which is still low on the moderating variables flow, satisfaction, and perceived usefulness, for all endogenous variables, the implications for educational institutions should encourage teaching staff to research and develop innovative strategies and teaching materials that are interesting and interactive so that they can easily arouse the intention to learn gamification. For educators, this study shows that the challenge and reward features implemented in the design of gamification-based learning materials have a direct, positive effect on increasing the intention to use gamification e-learning. Its users have confirmed the benefits of using gamification in e-learning as expected and provide satisfaction to continue using it.

Theoretical Implications

Based on the determinants that have been carried out in previous research, the hypothetical model uses four basic constructs in ECM theory to determine the effect of sustainability using gamification. By adding the factors of engagement, flow, and perceived enjoyment experienced when participating in learning activities have a direct significant impact on continuous intention and the results are consistent with previous research. Researchers verified the theoretical model using a structural model and found that all the hypotheses proposed in this study were valid. Starting from the formulation of the hypothesis by adopting from the previous research literature, of the seven construct variables, 9 hypotheses have been

confirmed which are thought to have an influence on the continuous intention to use gamification in e-learning.

So that in the Amos empirical test conducted on hypothesis H6 the variable perceived usefulness on satisfaction has the highest standardized regression value of 0.314 with a p-value below 0.05 meaning that the results of the hypothesis of perceived usefulness have a significant effect on satisfaction, where users feel satisfied to benefit from the experience of using gamification e-learning as the hypothesis in previous research (Alam et al., 2022).

Through statistical test data the theoretical model was decided from 9 hypotheses that were accepted and supported as in previous research literature there was one hypothesis that was not accepted. The confirmation factor greatly influences satisfaction, having the highest direct effect value of 0.378. The next construct variable with a high positive direct effect value on perceived usefulness on satisfaction strengthens research belonging to (Rohan et al., 2021), (C.-K. Huang et al., 2019), (Lee, 2010), (Lu et al.., 2019), (Cheng, Yung-Ming, 2021). Hypothesis H3 is the engagement factor on flow with a p = 1.68 above a significant 0.05, causing the engagement factor to have no significant effect on interpreting flow even though users have experience in technology by understanding various interesting features when engaging in gamification in e-learning, these conditions are not influencing user behavior to continue to participate and interact in further learning activities causing the insignificant hypothesis found in previous literature (Goh & Yang, 2021).

CONCLUSION

Regarding the findings in the report based on empirical evidence obtained from previous research, which was then processed according to scientific principles, analytical procedures and data interpretation, 9 hypotheses were determined involving seven research construct variables, namely confirmation, satisfaction, perceived usefulness, engagement, flow, perceived enjoyment, and continuous intention to continue using e-learning with gamification. From distributing questionnaires to 496 respondents and carrying out various series of significant test analyzes, conclusions were drawn to answer research problems, namely (1) It is proven that the confirmation variable is in accordance with the expectations felt by users affecting satisfaction after using it has a significant positive correlation with the highest score. The results of this Pearson correlation test show that if e-learning user satisfaction increases, the intention to continue using e-learning will also increase; (2) the perceived usefulness variable correlates significantly with satisfaction with the acquisition of a high probability score; (3) A total of five factors have a significant direct influence on the user's Continuous Intention, caused by curiosity, interest and enthusiasm (Engagement) to be involved (Flow) in gamification features and with feelings of pleasure (Perceived Enjoyment) and satisfaction (satisfaction).) get benefits (perceived usefulness) in increasing their

learning activities to continue to intend to use gamification in e-learning; (4) The results of the size effect analysis on the endogenous variables perceived usefulness, satisfaction, Flow on the dependent variable, have a low effect strength; (5) of the 9 hypotheses that the relationship between constructs is confirmed to have a significant effect, there is one hypothesis that the engagement construct does not have a significant effect on flow.

Limitations and further research

Because this research is an attempt to determine the effect of the construct variable from determined sustainability intentions on the use of gamification in e-learning, the research is limited to the relationship between these variables through quantitative methods with questionnaire techniques to respondents who are still active in the high school and college education environment. started at the age of 17 and have used or are currently using learning with gamification.

Therefore, further research is expected, to (1) develop the ECM method by combining other methods by incorporating other construct factors in the same context; (2) the scope of research subjects should be limited specifically to one level of student education at school or for students at tertiary institutions only; (3) Data collection techniques are not only through online questionnaires, it is better if accompanied by interviews or face to face with respondents so as to reduce the results of indiscriminate responses.

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