

---

## **An integrated model of e-learning continuance intention in Indonesia**

---

**Ramadiani, Ramadiani\***,

Faculty of Computer Science and Information Technology,  
Mulawarman University, Indonesia

Email: [ilkom.ramadiani@gmail.com](mailto:ilkom.ramadiani@gmail.com)

**Azainil, Azainil**

Faculty of Teacher Training and Education,  
Mulawarman University, Indonesia

Email: [nil\\_smd@yahoo.com](mailto:nil_smd@yahoo.com)

**Frisca, Frisca and Achmad Nizar Hidayanto**

Faculty of Computer Science,  
Universitas Indonesia, Indonesia

Email: [frisca@cs.ui.ac.id](mailto:frisca@cs.ui.ac.id), [nizar@cs.ui.ac.id](mailto:nizar@cs.ui.ac.id)

**Herkules, Herkules**

Informatics Engineering Program at the College of Information  
and Computer Management, Palangka Raya, Indonesia

Email: [herkules11282@gmail.com](mailto:herkules11282@gmail.com)

\*Corresponding author

**Abstract:** There had been some research concerning behaviour in using e-learning system. Most of the analysis focuses on the students' behavioural intention to use the system, without doing further analysis to find out their continuance intention to use it again. Therefore, this research aims to develop a model that describes the influencing factors on e-learning continuance intention of Indonesian students. Analysis in this research is focused on the investigations of the e-learning satisfaction, e-learning usefulness, and e-learning effectiveness, from the four main aspects: e-learning materials/multimedia, service quality, interaction, and learner's characteristics. By using Structural Equation Modelling approach, several analyses were conducted to 635 respondents' data, obtained from various university in Indonesia. This research found that almost all of the factors analysed in this research have a significant influence on continuance intention of Indonesian students, with e-learning satisfaction and e-learning usefulness as the main factors that influence directly, and navigation, reliability, tangibles, self-efficacy, and learner-content interaction as the main factors that influence indirectly.

**Keywords:** E-learning; continuance intention; Structural Equation Modeling; satisfaction; benefits; effectiveness; service quality; interaction; user characteristics. information technology;

**Reference** to this paper should be made as follows: Ramadiani et al. (2018) '.....', *Int. J. Innovation and Learning*, Vol. 26, No.1, 2019.

**Biographical notes:** Ramadiani, Ramadiani currently works as Chairman of the Computer Science Department in Mulawarman University. Lecturer at Faculty of Computer Science and Information Technology in Mulawarman University since December 2001. She does research in Software Engineering, Information Systems (Business Informatics) and Human-computer Interaction. Her current project is 'e-Learning'. She graduated from Computer Doctor of Universiti Putra Malaysia in 2015.

Azamine, Azainil is a Lecturer in Mulawarman University Samarinda since 1991. He teaches in Master of Management and Education Technology with expertise in Higher Education, e-Learning, Teaching Methods, TQM and Educational Technology.

Friska, Friska was a Magister student of information system department in Indonesia University with main research interests within problems in Information System, User behavior, Multivaried Analysis and communication technology.

Achmad Nizar Hidayanto is Vice Dean for Resources, Ventura, and General Administration of University of Indonesia. Lecturer at Faculty of Computer Science University of Indonesia since December 2000. He graduated from Computer Doctor of Indonesian University in 2008. His research Interest is Information Systems and Information Technology (Adoption of Technology, E-Government, E-Commerce, Knowledge Management, Human Behavior in Information Systems, Innovation Management).

Herkules, Herkules is a Lecturer in STMIK Palangkaraya, Indonesia. He graduated from Gajah Mada University in 2010. His research interests are Information system, digital forensic and web development.

---

## 1 Introduction

As good as any technology, certainly will not escape the shortcomings, as well as e-learning system. Although web-based environments can provide students with flexibility in learning, some research suggests that students who are accustomed to traditional learning will find it hard to adapt to web-based learning systems (Katherine et al, 2016).

To overcome this, it is essential to examine the factors that affect the intention of students in using e-learning system. The students' intention to accept the e-learning system means that they are confident it will give benefit to their learning performance (Ramadiani et al., 2016). Previous research suggests the importance of users' attitude variables such as perceived ease use, perceived usefulness, and utility as good predictors of e-learning acceptance (Ramadiani, et al., 2015). Furthermore, it is also necessary to trace the factors that can sustain the students' intention to continue to use e-learning system, because a system can be said to succeed if users choose to persist in using the system on an ongoing basis, not only use it temporarily (Ramadiani, et al., 2013).

Web-based applications with Internet utilization have been introduced to meet today's educational needs, namely to minimize the gap between traditional learning systems and technology-based learning systems. The Internet also creates a need for learning innovation in the university environment, using a more modern, effective and efficient alternative with e-learning systems (Hamzah et al., 2017).

E-learning is a system that provides various services to handle all aspects of the learning process, through an intuitive and consistent web interface (Manal, 2017). The e-learning system begins to change the learning orientation, from which it relies on the teacher to become an independent learning process by the students, thus enabling a student to play an active and responsible role for himself (Ramadiani, et al., 2017). E-learning is expected to facilitate the weakness that existed or found in the conventional education. Through e-learning is hoped education become more accessible, cheaper, more fun and easier to share and to learn. E-learning provides flexibility for students to be able to study anytime and anywhere (Wong. 2015).

Although web-based environments can provide students with flexibility in learning, some research suggests that students who are accustomed to traditional learning will find it difficult to adapt to web-based learning systems (Seters et al., 2012). In reality, the e-learning was not entirely successful as expected. Some students are not interested to use it then try to retrieve their references from others websites. There are many causes why the students rarely use e-learning: first it is not in accordance with the user need, the second it is not to answer the difficulties were faced by students, third the user interface is still weak and does not the user interface expect (Ramadiani et al, 2013). This can lead to the loss of student motivation to continue using the e-learning system. The results of previous research, indicating the tendency of students to stop using e-learning because it is not in accordance with their need (Ramadiani, et al., 2015).

To overcome this, it is necessary to trace the factors that can maintain the intention of students to continue using the e-learning system (continuance usage intention), because a system can be said to succeed if the user chooses to persist in using the system in a sustainable manner, on a temporary basis (Shiau, 2012; Paul and Jacob, 2017).

A number of studies have produced several theories in analyzing the behavior of users of an information system, including Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Social Cognitive Theory (SCT), and Innovation Diffusion Theory (IDT) to these basic theories such as Three-Tier Technology Use Model (3-TUM), Decomposed Expectation Disconfirmation Theory (D-EDT), and Unified Theory of Acceptance and Use of Technology (UTAUT). Similarly, in the context of e-learning, various models have also been proposed to *predict the behavior of re-use of e-learning* such as (EDT theory). However, in general the study also still only sees from one or two perspectives only, such as from the perspective of user characteristics or from system quality (Chiu et al., 2005). The results of Chiu et al. (2005) shows that the three factors have a great correlation to satisfaction, and satisfaction also has a great correlation to e-learning continuance intention. This indicates that benefits, quality, and value are important factors for the fulfillment of user desire of e-learning system. Though e-learning is a complex ecosystem, involving teachers, students, content, and systems used for interaction that determine the attitude and behavior of students in using e-learning.

Unfortunately, a holistic understanding of the reuse of e-learning systems is still not widely found in the literature. In this study, we developed an integral model from which focused on investigating the level of *satisfaction, benefits, and effectiveness* of the use of e-learning systems in the long term, looking at the four main aspects of material / multimedia, service quality, and user characteristics. By adopting several theories related to the acceptance of e-learning, the models in this study are grouped into three tiers: tier 1 in this research model describes the characteristics of learner and quality attributes, especially related to the quality of e-learning materials, service quality, and interaction, tier 2 that describes the affective and cognitive aspects which cover satisfaction, perceived usefulness, and perceived effectiveness (Liaw, 2008) and tier 3 as the main focus in this study, which is e-learning continuance intention (Shiau, 2012).

## 2 E-Learning Effectiveness

As explained earlier, e-learning today is a trend in the development of teaching and learning process. This resulted in the emergence of various theories and practices in the field of information systems and engineering related to the development of effective e-learning (Lee, 2008). One popular theory says that there are four factors that must be considered when developing an e-learning system, namely *environmental characteristics, environmental satisfaction, learning activities, and learners characteristic* (Liaw, 2008).

In the development of e-learning, a *high level of communication development* can be created by *environmental characteristics*, such as by creating a synchronous interaction. This allows learners to not only share information, but also to determine how to retrieve other useful information for it. Furthermore, *environmental satisfaction* factors will increase students' perceptions of technology that can support their participation in teaching and learning. While the factors of learning activities need to be considered so that learners and teachers can share their experiences and knowledge whenever and

wherever, by using e-learning. Things that may be the lack of interest to use the internet media for teaching and learning process, thus causing e-learning to be not very effective in its development. Because that is the last factor that learners' characteristics also need to be considered in the development of e-learning.

Liaw (2008) also mentioned that another important factor to influence one's willingness in using internet media to support teaching and learning process is *personal attitude*. Development of e-learning will work well if there is a *clear understanding of personal attitude*. Understanding of personal attitude can be divided into three categories of measurement, namely *affective*, *cognitive*, and *behavioral*. Affective measures (such as perceived enjoyment) and cognitive measures (such as perceived self-efficacy and perceived usefulness) have a positive correlation with behavioral measurements or behavioral intention (Liaw, 2008). According to Chow (2014) how to effectively use the e-learning system in order to maximize user confirmation of expectation, and further to increase user satisfaction. Among the four factors of PAE, students' perception of learning process has the most significant impact on satisfaction and continuance intention.

In this study, affective dimension is assessed from three factors: *e-learning satisfaction*, *perceived usefulness* and *effectiveness*. Satisfaction and perceived usefulness are the two main constructs of expectation-confirmation theory that have been shown to influence the user's intention to continue using the information system. It has been widely used to model the behavior of the use of information systems emphasis on usability, quality, and value factor. While e-learning effectiveness also proved as one of the important predictors in information system return.

Furthermore, Liaw (2008) also stated that there are three main factors that can build the effectiveness of e-learning, namely learner's *self-efficacy*, *multimedia formats*, and *interaction environment*. *Learner's self-efficacy* is needed because the e-learning system will be useful when users have the confidence to use the system. Therefore, e-learning users should have confidence in themselves to use the system. *Multimedia formats* are needed because the e-learning system uses multimedia display in operation, so the multimedia format is good and easy to use will facilitate the process of teaching and learning through the internet media itself. Therefore, good multimedia formats are necessary in establishing an effective e-learning system. *Interaction environment* is needed because the e-learning system is held in an academic environment, so there needs to be good socialization to e-learning users related to the use of the system. The process and activity of participatory engagement has been conceptualized by key participatory components are explored 1) interactions of learners 2) interaction of educators and learners 3) Interaction with content 4) self-reflection and 5) collaborative learning in e-alllearning community (Haryani et al, 2017).

In addition to the above three aspects, the effectiveness of e-learning is also influenced by *the quality of service* from e-learning as a medium for online learning process. Service quality is used to know and understand the user's expectations and perceptions of a product or service (Parasuraman et al, 1988). In the context of e-learning, users will assess the quality of services according to their perceptions, which can be seen from the technical or non-technical factors given to them (Carol, 2015). Service quality has five dimensions that can be assessed, namely; responsiveness, assurance, reliability, tangibles, and empathy (Parasuraman et al 1988; Udo et al, 2011). Some studies have suggested that student satisfaction and motivation is higher in courses that use multimedia materials (Gilakjani,2012).

Considering the above, this research will evaluate the factors that encourage the *effectiveness, satisfaction and perception of e-learning benefits* from 4 aspects:

**Table 1.** E-learning effectiveness model

Variables	Description	Indicators	References
<i>e-learning materials,</i>	to assess multimedia content in an e-learning system	Attention, Deliverable, Media use, Navigation,	Keller & Suzuki (2004); Liaw (2008); Chow (2014); Ramadiani, et al., (2015);

Variables	Description	Indicators	References
<i>service quality</i>	to measure the level of satisfaction of users (knowing the user's expectations and perceptions of e-learning)	responsiveness, assurance, reliability, tangibles, empathy	Parasuraman, Zeithaml, & Berry (1988); Lee (2008); Udo, Bagchi, & Kirs (2011); Carol (2015);
<i>interaction</i>	to measure the level of e-learning satisfaction and e-learning usefulness.	learner-content, learner-instructor, learner-learner	Burnett (2007); Sher (2009); Zhang (2009); Shiao (2012); Chow (2014);
<i>learner characteristics</i>	User confidence and awareness that arise to use the e-learning system	self-efficacy, self-directedness	Huang, (2008); Liaw (2008); Hsu, (2012). Ramadiani, et al., (2015);
<i>continuance intention</i>	the user's desire to use e-learning system in a sustainable and continuous manner	e-learning satisfaction, e-learning usefulness, e-learning effectiveness	Davis, (1989); Chiu et al. (2005); Liaw, (2008); Sanam, (2009); Chow (2014);

Furthermore, Liaw (2008) also stated that there are three main factors that can build the effectiveness of e-learning, namely learner's *self-efficacy*, *multimedia formats*, and *interaction environment*. *Learner's self-efficacy* is needed because the e-learning system will be useful when users have the confidence to use the system. Therefore, e-learning users should have confidence in themselves to use the system. *Multimedia formats* are needed because the e-learning system uses multimedia display in operation, so the multimedia format is good and easy to use will facilitate the process of teaching and learning through the internet media itself. Therefore, good multimedia formats are necessary in establishing an effective e-learning system. *Interaction environment* is needed because the e-learning system is held in an academic environment, so there needs to be good socialisation to e-learning users related to the use of the system. The process and activity of participatory engagement has been conceptualised by key participatory components are explored

1. interactions of learners
2. interaction of educators and learners
3. interaction with content
4. self-reflection
5. collaborative learning in e-learning community

In addition to the above three aspects, the effectiveness of e-learning is also influenced by *the quality of service* from e-learning as a medium for online learning process. Service quality is used to know and understand the user's expectations and perceptions of a product or service (Parasuraman et al., 1988). In the context of e-learning, users will assess the quality of services according to their perceptions, which can be seen from the technical or non-technical factors given to them. Service quality has five dimensions that can be assessed, namely; responsiveness, assurance, reliability, tangibles, and empathy (Parasuraman et al., 1988; Udo et al., 2011). Some studies have suggested that student satisfaction and motivation is higher in courses that use multimedia materials (Gilakjani, 2012). Considering the above, this research will evaluate the factors that encourage the effectiveness, satisfaction and perception of e-learning benefits from four aspects.

### 3 Hypotheses Development

The proposed integrative model for e-learning continuance usage intention in this research consists of three tiers. As mentioned, the first tier in this research model consists of four groups: e-learning materials, service quality, interaction, and learner's characteristics, each of which has several variables to assess the level of satisfaction, perceived usefulness, and effectiveness in the use of e-learning systems.

The four groups in tier 1 will be used to evaluate how the characteristics of users and the quality of a system can affect the affective and cognitive aspects of the second tier, which comprise of satisfactions, perceived usefulness, and perceived effectiveness of e-learning system. These three variables were shown to be strong predictors of a system acceptance, including 3-TUM and D-EDT (Liaw, 2008).

Furthermore, the second tier will be used to investigate how the affective and cognitive components can influence the continuance intention of e-learning system, which in our case is placed as the third tier. Continuance intention describes the user's desire to use e-learning system continuously. The third tier illustrates the behavioral intention used to understand the intention of users in using technology for a particular purpose (Liaw, 2008).

#### 3.1 Impact of e-learning materials on e-learning satisfaction, usefulness, and effectiveness

The hypotheses in this study were based on theories in some previous studies. To facilitate in viewing the hypothesis representation in the above research model, the model is divided into four sub models. The first sub-model illustrates the correlation between the variables in the e-learning materials group in tier 1 with the variables in tier 2, and the correlation between the variables in tier 2 and the continuance intention variables in tier 3. The representation of material or multimedia in a system will affect the benefits (usefulness) and satisfaction of the user (satisfaction) to the system. There are several categories of material on the website that are considered to affect the benefits and user satisfaction, including navigation, screen appearance, media use, attention, and accessibility. Some studies have suggested that student satisfaction and motivation is higher in courses that use multimedia materials (Gilakjani, 2012). Ramadiani, et al., (2016) found that good navigation on e-learning systems provides a positive perceived usefulness or benefits derived from the system. The navigation system is one aspect of multimedia material that is important and affect the effectiveness of the system. The way a system in presenting the material (information presentation) will affect the benefits and effectiveness of the system. In other research related to the evaluation of e-learning materials mathematics found the fact that attention has an influence on satisfaction and is the most important factor that can affect the value of learners. Keller & Suzuki (2004) says that attention can affect the benefits of e-learning systems, and can improve learners' effectiveness through the system, thereby increasing their value. Ramadiani, et al., (2016) concluded that the use of good multimedia content (media use) on e-learning systems contributes to the user's satisfaction, benefits, and effectiveness of the system. Two factors of learning process and course design significantly influence satisfaction and continuance intention also was mention in Chow (2014).

The first sub-model has 12 hypotheses that aim to know the correlation between the variables in the e-learning materials in tier 1 to the variables in tier 2, which can be formulated as follows:

**Table 2** Sub-model one has 12 hypotheses

No.	Hypothesis	Description
1	H1a	Attention positively affects e-learning satisfaction
2	H1b	Attention positively affects e-learning usefulness
3	H1c	Attention positively affects e-learning effectiveness
4	H2a	Deliverable positively affects e-learning satisfaction
5	H2b	Deliverable positively affects e-learning usefulness
6	H2c	Deliverable positively affects e-learning effectiveness

<i>No.</i>	<i>Hypothesis</i>	<i>Description</i>
7	H3a	Media use positively affects e-learning satisfaction
8	H3b	Media use positively affects e-learning usefulness
9	H3c	Media use positively affects e-learning effectiveness
10	H4a	Navigation positively affects e-learning satisfaction
11	H4b	Navigation positively affects e-learning usefulness
12	H4c	Navigation positively affects e-learning effectiveness

### 3.2 Impact of service quality on e-learning satisfaction, usefulness, and effectiveness

Parasuraman, Zeithaml, & Berry (1988) one of the previous studies that analyzed the dimensions of service quality (responsiveness, assurance, reliability, tangibles, empathy) to measure the level of satisfaction of users. Another study by Udo, Bagchi, & Kirs (2011) also revealed a positive and significant correlation between service quality and e-learning system effectiveness. The dimensions of service quality also affect the effectiveness of information system, research on the measurement of system effectiveness using the service quality principle. Based on research conducted by Lee (2008) with case studies in Korea and America, it can be concluded that service quality has a significant positive effect on the usefulness of e-learning systems.

Sub model two has 15 hypotheses that aims to determine the correlation between the variables in the service quality group in tier 1 with the variables in tier 2, which can be formulated as follows:

**Table 3** 15 hypotheses service quality on e-learning satisfaction, usefulness, and effectiveness

<i>No.</i>	<i>Hypothesis</i>	<i>Description</i>
13	H5a	Responsiveness positively affects e-learning satisfaction
14	H5b	Responsiveness positively affects e-learning usefulness
15	H5c	Responsiveness positively affects e-learning effectiveness
16	H6a	Assurance positively affects e-learning satisfaction
17	H6b	Assurance positively affects e-learning usefulness
18	H6c	Assurance positively affects e-learning effectiveness
19	H7a	Reliability positively affects e-learning satisfaction
20	H7b	Reliability positively affects e-learning usefulness
21	H7c	Reliability positively affects e-learning effectiveness
22	H8a	Tangibles positively affects e-learning satisfaction
23	H8b	Tangibles positively affects e-learning usefulness
24	H8c	Tangibles positively affects e-learning effectiveness
25	H9a	Empathy positively affects e-learning satisfaction
26	H9b	Empathy positively affects e-learning usefulness
27	H9c	Empathy positively affects e-learning effectiveness

### 3.3 Impact of interactions on e-learning satisfaction, usefulness, and effectiveness

Burnett et al. (2007) in research related e-learning states that interaction is an element that has an important influence in the success and effectiveness of an e-learning system. In the context of e-learning, assessment of interaction can be done by looking at different types of points of view, namely learner-content, learner-instructor, and learner-learner. In his research stated that there is a positive correlation of learner-content interaction to e-learning satisfaction and e-learning usefulness. The Chow (2014) study show that students' confirmation of expectation is significant in predicting user e-learning PAE in terms of learning process, tutor interaction, peer interaction, and course design. two PAE factors (learning process and course design) significantly influence satisfaction and continuance intention. There is a positive correlation of learner-content interaction to e-learning effectiveness. Sher (2009) in his research says that there is a positive correlation of learner-instructor interaction to e-learning usefulness and e-learning satisfaction. While Zhang (2009) said that the learner-learner interaction has a positive influence on e-learning satisfaction and e-learning effectiveness. Therefore, we posit nine hypotheses as can be seen in Table 4.

**Table 4** 9 Hypotheses interactions on e-learning satisfaction, usefulness, and effectiveness

No.	Hypothesis	Description
28	H10a	Learner-content interaction positively affects e-learning satisfaction
29	H10b	Learner-content interaction positively affects e-learning usefulness
30	H10c	Learner-content interaction positively affects e-learning effectiveness
31	H11a	Learner-instructor interaction positively affects e-learning satisfaction
32	H11b	Learner-instructor interaction positively affects e-learning usefulness
33	H11c	Learner-instructor interaction positively affects e-learning effectiveness
34	H12a	Learner-learner interaction positively affects e-learning satisfaction
35	H12b	Learner-learner interaction positively affects e-learning usefulness
36	H12c	Learner-learner interaction positively affects e-learning effectiveness

### 3.4 Impact of learner's characteristics on e-learning satisfaction, usefulness, and effectiveness

Liaw (2008) that self-efficacy positively affects perceived satisfaction. In his research, Liaw also found that self-efficacy positively affects perceived usefulness. In addition to self-efficacy, other characteristics that also affect the satisfaction, benefits, and effectiveness of the e-learning system is self-directedness (Huang, 2008). Sub-model four has 6 hypotheses that aims to determine the correlation between the variables in the learner's characteristics group in tier 1 with the variables in tier 2, which can be formulated as follows.

The fourth sub-model aims to find out the correlation between the variables in the learner's characteristics group in tier 1 with the variables in tier 2, and the correlation between the variables in tier 2 and the continuance intention variables in tier 3. Liaw (2008) that self-efficacy positively affects perceived satisfaction. In his research, Liaw also found that self-efficacy positively affects perceived usefulness. In addition to self-efficacy, other characteristics that also affect the satisfaction, benefits, and effectiveness of the e-learning system is self-directedness (Huang, 2008).

**Table 5** Hypotheses learner's characteristics on e-learning satisfaction, usefulness, and effectiveness

No.	Hypothesis	Description
37	H13a	Self-efficacy positively affects e-learning satisfaction
38	H13b	Self-efficacy positively affects e-learning usefulness
39	H13c	Self-efficacy positively affects e-learning effectiveness
40	H14a	Self-directedness positively affects e-learning satisfaction
41	H14b	Self-directedness positively affects e-learning usefulness
42	H14c	Self-directedness positively affects e-learning effectiveness

### 3.5 Impact of e-learning satisfaction, usefulness, and effectiveness on continuance usage intention

Chow (2014) said that user satisfaction is an important element and as a strong predictor of the factor continuance intention. She also concluded that improvements to user satisfaction have a positive effect on students' desire to use e-learning system in a sustainable manner. Davis (1989) says that perceived usefulness has a positive effect on behavioral intention. Ramadiani et al (2016) which concludes that the usability of the e-learning system positively affects the students' desire to use the system. Liaw (2008) that e-learning effectiveness positively influence toward behavioral intention of using e-learning. A high level for degree's usefulness has a positive effect on retention. Further, cognitive gains and supportive environment positively impact degree's usefulness. Negative feelings (personal values) are found to reduce student retention. The correlation between the variables in tier 2 and the continuance intention variable can be formulated in the following three hypotheses:

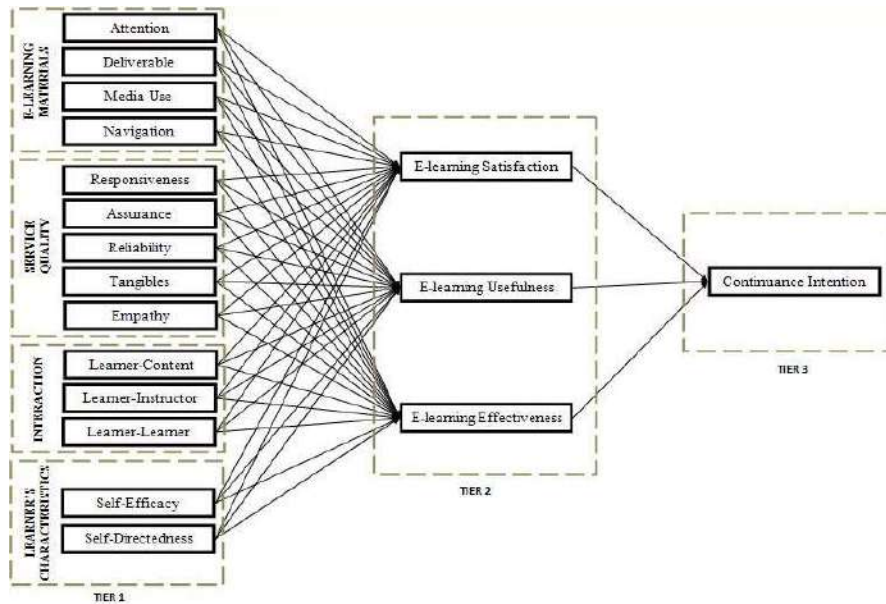


**Table 6** Hypotheses *e-learning satisfaction, usefulness, and effectiveness on continuance usage intention*

No.	Hypothesis	Description
43	H15a	e-learning satisfaction positively affects <i>continuance intention</i>
44	H15b	e-learning usefulness positively affects <i>continuance intention</i>
45	H15c	e-learning satisfaction positively affects <i>continuance intention</i>

The proposed research model can be seen in Figure 1.

**Figure 1** Research hypothesis model



## 4 Research Methodology

### 4.1 Research Instrument

This instrument used in this research is in form of a questionnaire that was made using a Likert scale of 1 to 5, 1 for 'Very Disagree', 2 for 'No Agree', 3 for 'Neutral', 4 for 'Agree', and value 5 for 'Strongly Agree' answer. Likert scale is used because it is considered effective in measuring behavior that is subjective, as in research related to the measurement of perceptions or expectations of someone.

The questionnaire is divided into 6 sections:

Section A: Personal data of respondents

Section B: Statements relating to E-learning Materials

Section C: Statements related to Service Quality factors

Section D: Statement related to Learners Characteristics factor

Section E: Interaction Factor-related Statements

Section F: Statements related to Affective, Cognitive, and Continuance Intention factors

Table 7 shows the variables and indicators used in the questionnaire, particularly for section B - section F.

**Table 7** Research variables and indicators

No	Variable	Indicator Variables	Reference
1.	Attention (AT)	AT1. The materials in the e-learning system drew my attention to study it. AT2. The materials in the e-learning system are displayed through various types of media (video,	Keller, (2004);

<i>No</i>	<i>Variable</i>	<i>Indicator Variables</i>	<i>Reference</i>
		audio, and text) with great interest <i>AT3</i> . The materials that exist in the e-learning system can arouse my interest to stay focused on learning it.	
2.	Deliverable (DE)	<i>DE1</i> . The materials that exist in the e-learning system use easy-to-understand grammar. <i>DE2</i> . The materials on the e-learning system are packaged in a file that allows me to access them (eg: .pdf, .doc, .ppt, etc.). <i>DE3</i> . The materials in the e-learning system convey the object of lecture purpose clearly, making it easier for me to understand it.	Parasuraman et al, (1998); Ramadiani, et al., (2017)
3.	Media Use (MU)	<i>MU1</i> . The e-learning system already has good sound media for displaying information or course material. <i>MU2</i> . The e-learning system already has good video media to display information or course material. <i>MU3</i> . The e-learning system already has good text media to display information or course material.	Sun & Cheng, (2007); Ramadiani, et al., (2015); Ramadiani, et al., (2017);
4.	Navigation (NA)	<i>NA1</i> . The materials on the e-learning system have user-friendly navigation, making it easier for me to move from one material to another. <i>NA2</i> . The materials that exist in the e-learning system require simple steps (simple) to be able to access. <i>NA3</i> . The material and information I want can be easily found with the help of search feature in the system e-learning	Parasuraman et al, (1998); Ramadiani, et al., (2015);
5.	Responsiveness (RS)	<i>RS1</i> . The e-learning system does not require long loading time, so I am easy to access it when internet connection is available. <i>RS2</i> . Accessing material on an e-learning system does not require long loading time, so I can access it quickly. <i>RS3</i> . The process of uploading or downloading material on an e-learning system does not require long loading time so I can upload or download material quickly	Parasuraman et al, (1998); Daniel & Berinyuy, (2010); Ramadiani, et al., (2015);
6.	Assurance (AS)	<i>AS1</i> . In my opinion, experts (eg helpdesk) provided for e-learning systems have good experience in their field. <i>AS2</i> . The e-learning system is supported by experts (eg helpdesk) which can be a place to ask if I have difficulty using it. <i>AS3</i> . My personal data contained in the e-learning system is secure and never misused by the system administrator	White, (1998); Daniel & Berinyuy, (2010); Hossein, (2015); Ramadiani, et al., (2015);
7.	Reliability (RE)	<i>RE1</i> . The e-learning system has provided a complete and accurate service for students' learning needs at my university. <i>RE2</i> . I feel the functionality of e-learning system that use is in accordance with the needs of the lecture process. <i>RE3</i> . I feel the e-learning system has helped a lot in the process of finding the information I need.	Parasuraman et al, (1998); Daniel & Berinyuy, (2010); Ramadiani, et al., (2015);
8.	Tangibles (TA)	<i>TA1</i> . I feel the selection of LMS types (eg Moodle, Atutor, Claroline, Saki Project, Blackboard, etc.) on e-learning system at my university is appropriate compared to other LMS types.	Parasuraman et al, (1998); White, (1998); Daniel & Berinyuy, (2010);

<i>No</i>	<i>Variable</i>	<i>Indicator Variables</i>	<i>Reference</i>
		<i>TA2.</i> I feel the LMS used in my university's e-learning system is up-to-date (not old-fashioned)	Ramadiani, et al., (2015);
		<i>TA3.</i> Experts for e-learning systems (eg helpdesk) are friendly and friendly when I ask questions.	
9.	Empathy (EM)	<i>EM1.</i> The system manager always gives good responses every time I do complain or give input related to e-learning system. <i>EM2.</i> Experts (eg helpdesk) often ask users of e-learning systems about problems they encounter in using e-learning systems. <i>EM3.</i> The e-learning system gives me the freedom to change the look of the system according to my needs (eg changing the default display color of the system, choosing the list of courses who wants to be displayed, etc.)	Daniel & Berinyuy, (2010); Ramadiani, et al., (2015);
10.	Self-Efficacy {SE}	<i>SE1.</i> I feel confident to use the e-learning system as a media sharing or discussion in the learning process <i>SE2.</i> I feel confident to use e-learning system as an online exam / quiz media <i>SE3.</i> I feel confident to operate the menus/features of the e-learning system I use	Burnett (2007); Sher (2009); Zhang (2009);
11.	Self-Directedness (SD)	<i>SD1.</i> I use an e-learning system on my own initiative, without invitation or coercion from others <i>SD2.</i> I feel able to adapt well to using e-learning system, without need of help from other party <i>SD3.</i> I find it easier to learn on my own with e-learning systems, without much involvement of faculty	Burnett (2007); Sher (2009); Zhang (2009);
12.	Learner-Content Interaction (LC)	<i>LC1.</i> I feel the material and information that exist in the e-learning system is easy to understand. <i>LC2.</i> I feel the material and information that exist in the e-learning system can help improve the quality of my learning. <i>LC3.</i> I do not feel any technical problems while accessing the material or information that is in the e-learning system.	Kelsey & Souza, (2004); Sharp & Huett, (2006); Chow (2014);
13.	Learner-Instructor interaction (LI)	<i>LI1.</i> I feel my learning interaction with the teacher through the e-learning system really helps me in the learning process. <i>LI2.</i> I am easy to conduct discussions and provide input or criticism related learning materials to teachers through e-learning system <i>LI3.</i> Teachers are always responding to questions related to the learning materials I am proposing to the e-learning system.	Sharp & Huett, (2006); Chow (2014);
14.	Learner-Learner Interaction (LL)	<i>LL1.</i> I feel my learning interaction with other students through e-learning system really helps me in the learning process. <i>LL2.</i> I am easy to conduct discussion related learning materials with other students through e-learning system <i>LL3.</i> Other students are always responding to questions related to the learning materials I am proposing to the e-learning system.	Sharp & Huett, (2006); Chow (2014);
15.	E-learning Satisfaction	<i>ES1.</i> I am satisfied with the quality of the e-learning system service I use.	Liaw, S. S. (2008); Ramadiani, et al.,

No	Variable	Indicator Variables	Reference
	(ES)	ES2. I feel confident to use e-learning system as an online exam / quiz media ES3. I feel my decision to use e-learning system is the right decision.	(2017);
16.	E-learning Usefulness (EU)	EU1. The e-learning system has helped me to get additional new learning materials every day. EU2. I find it easier to learn on my own with e-learning systems, without much involvement of faculty. EU3. The e-learning system has helped me to get better grades	Davis, (1991); Liaw, S. S. (2008); Ramadiani, et al., (2017);
17.	E-learning Effectiveness (EF)	EF1. The e-learning system has helped improve my learning performance. EF2. The e-learning system has helped improve my learning motivation. EF3. The e-learning system has helped me in the process of completing my task The e-learning system has helped me in the process of completing tasks,	Liaw, S. S. (2008); Sanam, (2009); Ramadiani, et al., (2017);
18.	Continuance Intention (CI)	CI1. For the future, I want to continue to use e-learning system to help my learning process. CI2. For the future, I plan to increase the intensity of using e-learning system to help my learning process CI3. For the future, I plan to use the e-learning system as my top priority in helping the learning process.	Davis, (1989); Venkatesh, et al. (2003); Liaw, S. S. (2008); Chow (2014); Hossein, (2015)

#### 4.2 Data collection procedures

The population in this study is the user of e-learning system at universities in Indonesia. Respondents cover all students who are actively using e-learning system, which comes from various regions, all over Indonesia. The total number of respondents in this study is as many as 635 respondents who came from various universities in Indonesia. Although there is an opinion that the ideal number of samples is about five times the number of indicators/questions (Ramadiani, 2010), but researchers have a target sample size of 500 respondents. This target is based on several considerations, one of which is the consideration that the sample can actually represent the condition of the entire population of e-learning system users from various islands in Indonesia, considering that each region may have different infrastructure.

Before the questionnaires were distributed to all respondents, the researcher tested the legibility to 20 people who had been or were using e-learning system and pretest to 100 respondents to test the reliability and validity of the questionnaire. After doing the pretest, the questionnaire distributed to respondents amounted to the respondents. The process of distributing questionnaires was done in a longtime span from February 25th until May 5th. The spread of the questionnaire was conducted online, through providing a questionnaire link to several known students, by contacting several lecturers from various universities, spreading links to several mailing lists, as well as by emailing to prospective respondents through known relatives or lecturers.

#### 4.3 Data analysis

Data analysis is done by covariance-based SEM technique, that is by using LISREL application. Before performing further analysis, the SEM-based covariance technique in this study begins by entering the primary data obtained from the questionnaire into an excel file. This research uses Microsoft Excel 2007 application to enter data into excel format. This application is also used to perform data processing of respondent's profile.

Once entered into the excel file, the primary data is then imported into the SPSS application to pre-test the pilot study and test the normality of the entire data. After that

LISREL is used to create a model and test it, by creating a SIMPLIS Syntax File that is filled with commands. If the test results prove that the model does not fit, then modification will be made to find the best possible model. The SEM analysis comprises of two main steps: measurement model evaluation and structural model evaluation (Ramadiani, 2010).

The measurement model evaluation is done using Confirmatory Factor Analysis (CFA) by looking at the values of standardized loading factor of indicators ( $\lambda$ ) ( $\geq 0.50$ ), Construct Reliability (CR) ( $\geq 0.70$ ) and Variance Extracted (VE) ( $\geq 0.50$ ) values (Ramadiani, 2010). The structural model is evaluated by looking at the goodness of fit values which comprise of the chi-square and its p-values, Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), Root Mean Square Error of Approximation (RMSEA), Adjusted Goodness of Fit Index (AGFI), as well as some other goodness of fit index, whether it meets the criteria of a good match size or not. Although there are many methods of measurement, there are only a few commonly-used goodness of fit indexes, including CFI, GFI, NFI, and NNFI (Hooper et al., 2008; Ramadiani. 2010).

## 5. Results and Discussions

### 5.1 Demography of respondents

Respondents who participated in the study consisted of 405 male respondents or 64%, and 230 female respondents or 36%. The majority of respondents came from undergraduate level that is a number of 607 respondents or about 96%. While the respondents in post-graduate only amounted to 28 respondents or about 4%. Based on frequency of use, frequent respondents (about 4-6 times a week) constitute the majority using e-learning system that is equal to 222 respondents or 35%. Students of this research respondents come from various regions, the majority of respondents came from Java Island which amounted to 338 respondents or by 53%. The majority of these research respondents are students from the Institute of Technology Sepuluh Nopember, which amounted to 251 respondents or 40%. and the majority are students who come from Information Systems department amounting to 285 respondents or by 45% (Table. 8).

**Table 8:** The demographic characteristics of Respondents

Respondents	No. of respondents	Percentage of respondents	Total
male	405	64%	635
female	230	36%	
<hr/>			
level of education			
bachelor	607	96%	
postgraduate	28	4%	
<hr/>			
frequency of e-learning use			
everyday	167	26%	
4-6 per week	222	35%	
2-3 per week	170	27%	
rarely	76	12%	
<hr/>			
Respondent's Island of residence			
Jawa	338	53%	
Bali	138	22%	
Nusa Tenggara	109	17%	
Sulawesi	32	5%	
Sumatera	18	3%	
<hr/>			
University of Respondents			
ITS	251	40%	
STMIK Bumigora Mataram	108	17%	
Universitas Indonesia	59	9%	
Universitas Sam Ratulangi	26	4%	
Universitas Udayana	14	2%	
Other universities	55	15%	
<hr/>			
courses			

Respondents	No. of respondents	Percentage of respondents	Total
Infomation system	285	45%	
Informatics Engineering	149	23%	
Informatics Management	106	17%	
Computer science	45	7%	
Others courses	50	8%	

## 5.2 Results

From Table 9 we can see all t value of reseach indicators have greater value than 1.96, that means the research hypothesis are accepted. The modification of the model is commonly done with the aim of getting a more fit and appropriate model compared to the previous model, since a model that has been tested and proven valid is not the only fit model with existing data. Modification of the model is usually done by adding the relationship between constructs which can later decrease the value of chi-square, because if the chi-square value of a research model is smaller, then it indicates that the model is more in line with existing data (Ramadiani, 2010).

Reliability analysis is done by calculating Construct Reliability (CR) and Variance Extracted (VE) values of standardized loading factors and error variances. In this study, all variables have a value of  $CR \geq 0.70$  and have a value of  $VE \geq 0.50$ , so it can be concluded that all variables in this study reliable value (Table 9).

**Table 9.** Variance Extracted and Construct Reliability of variables

Indicators	Loading factor ( $>0.70$ )	T value ( $\geq 1.96$ )	Means	Construct Reliability ( $>0.70$ )	Variance Extracted ( $>0.50$ )
Attention (AT)				0.806	0.58
AT1	0.76	19.67	3.62		
AT2	0.66	16.80	3.53		
AT2	0.86	28.28	3.52		
Deliverable (DE)				0.830	0.620
DE1	0.78	21.13	3.81		
DE2	0.78	21.17	4.25		
DE3	0.80	21.79	3.83		
Media Use (MU)				0.856	0.667
MU1	0.79	14.0	3.14		
MU2	0.92	18.00	3.21		
MU3	0.70	13.28	3.94		
Navigation (NA)				0.816	0.600
NA1	0.83	22.05	3.74		
NA2	0.84	22.21	3.88		
NA3	0.64	16.49	3.58		
Responsiveness (RS)				0.824	0.612
RS1	0.83	22.15	3.64		
RS2	0.85	22.94	3.34		
RS3	0.64	17.10	3.53		
Assurance (AS)				0.798	0.575
AS1	0.85	21.33	3.53		
AS2	0.83	20.60	3.45		
AS3	0.58	14.51	3.76		
Reliability (RE)				0.877	0.704
RE1	0.84	25.54	3.68		
RE2	0.88	26.01	3.75		
RE3	0.80	23.32	3.68		
Tangibles (TA)				0.794	0.565
TA1	0.80	20.17	3.56		
TA2	0.80	20.23	3.53		
TA3	0.65	16.41	3.46		
Empathy (EM)				0.814	0.59
EM1	0.69	17.58	3.48		
EM2	0.93	24.22	3.23		
EM3	0.68	17.37	3.07		
Self-Efficacy (SE)				0.838	0.634
SE1	0.79	21.59	3.62		
SE2	0.76	20.66	3.58		
SE3	0.84	23.18	3.78		
Self-Directedness (SD)				0.751	0.504
SD1	0.75	17.49	3.58		

<i>Indicators</i>	<i>Loading factor (&gt;0.70)</i>	<i>T value (≥ 1.96)</i>	<i>Means</i>	<i>Construct Reliability (&gt;0.70)</i>	<i>Variance Extracted (&gt;0.50)</i>
SD2	0,76	17,67	3,73		
SD3	0,61	14,68	3,44		
Learner-Content Interaction (LC)				0.797	0.573
LC1	0.86	21.83	3.68		
LC2	0.81	29.59	3.72		
LC3	0.57	14.36	3.49		
Learner-Instructor Interaction (LI)				0.835	0.631
LI1	0.66	17.61	3.62		
LI2	0.90	24.84	3.35		
LI3	0.81	21.29	3.40		
Learner-Learner Interaction (LL)				0.901	0.752
LL1	0.86	26.00	3.36		
LL2	0.90	28.05	3.29		
LL3	0.83	24.96	3.23		
E-Learning Satisfaction (ES)				0.871	0.693
ES1	0.90	26.68	3.59		
ES2	0.79	22.50	3.48		
ES3	0.80	22.59	3.74		
E-Learning Usefulness (EU)				0.866	0.685
EU1	0.83	24.02	3.73		
EU2	0.90	26.69	3.70		
EU3	0.74	20.62	3.57		
E-Learning Effectiveness (EF)				0.866	0.685
EF1	0.90	36.45	3.60		
EF2	0.84	24.24	3.48		
EF3	0.73	20.35	3.72		
Continuance Intention (CI)				0.875	0.701
CI1	0.82	23.59	3.83		
CI2	0.90	27.01	3.72		
CI3	0.79	22.62	3.63		

The result of matching test which generally has a match value with good criterion, except GFI, AGFI, and Normed Chi-Square with marginal fit criteria. However, there is a theory that the value of  $GFI \geq 0.8$  can actually be considered good fit (Ramadiani, 2010). Therefore, it can be concluded that the results of this research model as a whole have a good match value (Table 10).

**Table 10.** Goodness of fit evaluation model

Goodness of Fit	Statistics Measurement Target	First model	Final model
Absolute Fit Measures			
$\chi^2$	Smaller grades is better	4235.87	4166.82
NCP	Smaller grades is better	3751.63	4357.72
SNCP	Smaller grades is better	3537.93	4129.06
GFI	$GFI \geq 0.90$	0.76	0.80
RMSR	$RMSR \leq 0.05$	0.065	0.058
RMSEA	$RMSR \leq 0.05$	0.070	0.074
ECVI	Smaller grades is better	8.67	9.58
Incremental Fit Measures			
TLI or NNFI	$NNFI \geq 0.90$	0.98	0.98
NFI	$NFI \geq 0.90$	0.98	0.98
AGFI	$AGFI \geq 0.90$	0.72	0.73
RFI	$RFI \geq 0.90$	0.97	0.97
IFI	$IFI \geq 0.90$	0.98	0.98
CFI	$CFI \geq 0.90$	0.98	0.98
Parsimonious Fit Measures			
PGFI	Higher grades is better	0.64	0.64
Normed $\chi^2$	Minimum grades: 1.0 Maximum grades: 3.0	3.299	3.334
PNFI	Higher grades is better	0.84	0.85
AIC	Smaller grades (positive) is better	5497.63	6074.72
CAIC	Smaller grades (positive) is better	6921.02	7339.96

After goodness of fit values were examined, the last step it to evaluate the causal relationship between variables as stated in the hypotheses. Table 10 summarizes the results of causal correlation test (t-value) based on structural model test on LISREL. This causal relationship test is done to know the significance of the influence of a variable to another variable to conclude whether a hypothesis is accepted or rejected. As can be seen in Table 11, all hypotheses are accepted.

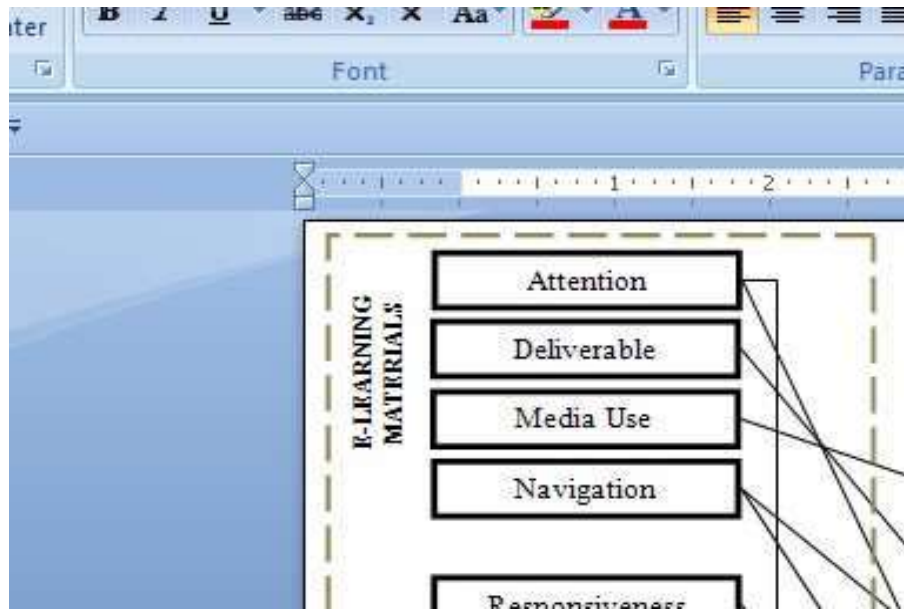
**Table 11.** Research hypothesis results

<i>No.</i>	<i>Hipotesis</i>	<i>Path</i>	<i>Estimates</i>	<i>T-value</i>	<i>Hypothesis</i>
1	H1a	AT → ES	0.23	-0.17	Rejected
2	H1b	AT → EU	0.41	1.13	Rejected
3	H1c	AT → EF	0.58	2.99	Accepted
4	H1d	AT → LC	9.43	9.43	Accepted
5	H2a	DE → ES	0.07	1.28	Rejected
6	H2b	DE → EU	-0.02	1.97	Accepted
7	H2c	DE → EF	-0.28	0.19	Rejected
8	H3a	MU → ES	-0.08	2.53	Accepted
9	H3b	MU → EU	0.01	-0.05	Rejected
10	H3c	MU → EF	-0.02	-0.31	Rejected
11	H4a	NA → ES	-0.03	-1.30	Rejected
12	H4b	NA → EU	0.05	2.71	Accepted
13	H4c	NA → EF	-0.07	2.01	Accepted
14	H5a	RS → ES	-0.02	-0.12	Rejected
15	H5b	RS → EU	0.02	0.32	Rejected
16	H5c	RS → EF	-0.08	2.32	Accepted
17	H6a	AS → ES	0.05	2.37	Accepted
18	H6b	AS → EU	-0.02	-0.21	Rejected
19	H6c	AS → EF	0.04	-1.59	Rejected
20	H7a	RE → ES	0.14	2.53	Accepted
21	H7b	RE → EU	0.03	3.68	Accepted
22	H7c	RE → EF	0.05	-1.14	Rejected
23	H8a	TA → ES	0.18	3.52	Accepted
24	H8b	TA → EU	0.14	-1.28	Rejected
25	H8c	TA → EF	0.03	1.99	Accepted
26	H9a	EM → ES	0.17	-1.36	Rejected
27	H9b	EM → EU	0.01	-0.89	Rejected
28	H9c	EM → EF	-0.02	-0.13	Rejected
29	H10a	LC → ES	0.05	1.77	Rejected
30	H10b	LC → EU	0.19	2.96	Accepted
31	H10c	LC → EF	0.11	3.34	Accepted
32	H11a	LI → ES	-0.05	-0.01	Rejected
33	H11b	LI → EU	0.01	2.72	Accepted
34	H11c	LI → EF	0.25	-1.34	Rejected
35	H12a	LL → ES	0.14	2.04	Accepted
36	H12b	LL → EU	-0.11	-1.81	Rejected
37	H12c	LL → EF	0.27	1.70	Rejected
38	H13a	SE → ES	0.16	2.66	Accepted
39	H13b	SE → EU	0.45	1.98	Accepted
40	H13c	SE → EF	0.20	1.64	Rejected
41	H14a	SD → ES	-0.52	-0.89	Rejected
42	H14b	SD → EU	-0.24	-0.90	Rejected
43	H14c	SD → EF	-0.13	2.53	Accepted
44	H15a	ES → CI	0.13	4.53	Accepted
45	H15b	EU → CI	1.07	4.34	Accepted
46	H15c	EF → CI	0.24	2.33	Accepted
47	H15d	EU → ES	0.34	3.95	Accepted

Figure 2 below is the final model result that is formed as a representation of factors affecting the desire of students in Indonesia to use e-learning system in a sustainable manner.



**Figure 2** Final Model of Research



### 5.3 Discussion

The main objective of this research is to develop a model of acceptance of e-learning system on a continuous basis, focused on investigating the level of satisfaction, benefits, and effectiveness of system use by looking at the four main aspects, i.e. material/multimedia, service quality, interaction in system, and the characteristics of user. It is intended to provide comprehensive input on the factors that shape the desire of students in Indonesia to use e-learning system in a sustainable way to assist their lectures.

Based on the results of study that has been done, it can be seen that all the factors in tier 2; e-learning satisfaction, e-learning usefulness, and e-learning effectiveness have a positive effect on continuance intention. This indicates that the level of satisfaction, benefits, and effectiveness of the use of e-learning system has a strong correlation with the desire of students in Indonesia to use the system in a sustainable manner. As for the three factors, e-learning satisfaction factor has the greatest influence to continuance intention. This illustrates the importance of satisfaction factors for e-learning system students in Indonesia, so the fulfillment of these factors should be a top priority in developing e-learning systems that can attract students to use them sustainably. E-learning usefulness is the second most important factor to be considered in the development of e-learning system, followed by e-learning effectiveness factor.

This study has the same results with the previous research before, that show continuance intention of blog use was predicted collectively by user involvement, satisfaction and perceived enjoyment Shiau, et.al., (2012). Chow et.al., (2014) expanded the ECM by using four quality assurance factors (learning process, tutor interaction, peer interaction, and course design) to measure students' post-adoption expectation (PAE) of e-learning, also confirm that confirmation is positively related to both PAE factors and satisfaction in using e-learning. Two PAE factors (learning process and course design) significantly influence satisfaction and continuance intention.

But according to Shiau, et.al., (2012), users' satisfaction with blog use was predicted primarily by perceived enjoyment, followed by users' confirmation of expectation and user involvement. Perceived enjoyment was predicted by users' involvement and users' confirmation of expectation. Blogging time significantly moderates the effect of habit on perceived enjoyment, not on satisfaction and continuance intention. e-learning practitioners should focus on maximizing students' confirmation of expectations, as well as facilitating their PAE by improving the design of learning process and e-learning courses (Chow et.al., 2014). Chiao (2013) found that the web quality has significantly positive influences on perceived value and user satisfaction. Perceived value and

satisfaction determines users' continuance intentions of e-learning systems in academic libraries. Other research found that the perceived ease of use, information quality and social influence were found to play important roles in predicting the continuance intention. System quality played an important role in affecting the perceived ease of use and unexpectedly, social motivations had no significant effect on attitude (Bing, 2014).

Not much different from e-learning satisfaction, e-learning usefulness is also most influenced by factors that come from service quality, that is reliability. This indicates that the ability of e-learning system in providing services consistently and accurately is the most important thing that can improve the assessment of the benefits of the system in Indonesia. While the factor of e-learning effectiveness is most influenced by factors derived from the interaction group, namely learner-content interaction. This indicates that the effectiveness of an e-learning system is strongly influenced by the fulfillment of good interaction between students with content in the system.

The four groups in tier 1 (e-learning materials, service quality, interaction, and learner's characteristics) have a positive influence on continuance intention. The four groups on the tier 1 indirectly influence the continuance of intention, through mediation with the factors on tier 2. The analysis on tier 1 is done by looking at the correlation of each variable of each group with the factors. Results analysis shows all main factors in tier 1 that have the most significant influence on continuance intention.

The navigation factor as a variable of the e-learning materials group illustrates the ease of navigation in the e-learning system. This factor has a significant correlation to e-learning usefulness and e-learning effectiveness, thus indicating that this factor also indirectly affects the continuance intention. Based on this, it can be concluded that ease of navigation in the e-learning system can affect the user's desire to use the system in a sustainable manner.

Reliability and tangibles are two factors of the service quality group that have the most significant influence on continuance intention. This is evident from the significant positive correlation between reliability with e-learning satisfaction and e-learning usefulness, as well as between tangibles with e-learning usefulness and e-learning effectiveness. This indicates that the ability to deliver a service consistently and accurately, and the appearance of the features available in the e-learning system are factors that indirectly affect the continuance intention. The next factor that has a great influence on continuance intention comes from the interaction group, namely the learner-content interaction. This indicates that improving the interaction between students and lecture materials contained in the e-learning system is an important thing to note in the development of e-learning system, in order to attract student interest in Indonesia to use it in a sustainable. The last factor on tier 1 which has the most significant influence on continuance intention is self-efficacy, derived from the learner's characteristic group. This is evident from the significant correlation between self-efficacy with e-learning satisfaction and e-learning usefulness. Based on this, it can be concluded that all condition of e-learning users' self-confidence can also increase them to continue to use the system in a sustainable manner.

#### ***5.4 Implications***

This study provides the implications that can be seen from several points of view, namely:

##### ***5.4.1 For e-learning Developers***

There are several factors that should be prioritized by e-learning system developers as an effort to develop the system in order to attract student interest in Indonesia. The main priority factor is the understanding of how to improve the benefits of e-learning system and how to improve student's satisfaction with the system (e-learning satisfaction and e-learning usefulness). To improve the benefits of the system is to optimize the reliability factor, to provide a consistent, update and accurate service in e-learning system. The improvements to the fulfillment of system satisfaction can be done by optimizing all research indicators, such as by providing an interesting view on the features of e-learning system.

#### *5.4.2 For Teachers and Tutors*

The effectiveness of an e-learning system is an important factor that teachers need to prioritize to create an effective learning through the system. This effectiveness can be improved by focusing on interaction factors in the system, for example in learner-content interaction, by providing the easily understood materials and easily accessible by students, to improve the quality and performance of their learning. Another factor that should also be considered by the teachers is the interaction between the teacher and his students. The example of a simple thing that can be done by the teacher is by responding to questions related to learning materials. Another thing that can be done is to trigger a discussion material in the e-learning system, so that students can actively participate in the online discussion.

#### *5.4.3 For University Management*

As one of the parties providing e-learning services, university management should pay particular attention to the implementation of this system. One of the important aspects that university management needs to consider is how to increase student awareness to be active in using university e-learning system. To achieve this, the university management actively organizing socialization related to the importance of e-learning system and e-learning process. Socialization the e-learning system how to use it also needs to be done by the university. By doing so, students' confidence in using e-learning systems (self-efficacy) will increase, so that the benefits and effectiveness of the system can also increase.

#### *5.4.4 For Research and Sciences*

The results of this study can provide input for research purposes or further research related to the acceptance of e-learning, especially in research that focuses on the analysis of user desire to use e-learning system in a sustainable manner. For further research purposes, the researcher can perform the analysis by conducting further exploration of several main factors affecting the sustainability of e-learning usage. Based on the results of this study, the main factor that has the most significant impact directly to continuance intention is e-learning satisfaction, followed by e-learning usefulness factor. In addition to these two factors, there are five main factors that have the most significant influence on continuance intention indirectly, namely navigation, reliability, tangibles, self-efficacy, and learner-content interaction. By exploring these aspects, the analysis of continuance intention is expected to contribute more to the development of e-learning systems for the future.

## **6. Conclusion**

The results of this study indicate that the material or multimedia aspects, service quality, interaction, and characteristics of e-learning system users generally have a significant influence on the assessment of the satisfaction, benefit, and effectiveness of the system in Indonesia. Satisfaction, benefits, and effectiveness of the e-learning system also has a significant influence on the desire of students in Indonesia to continue to use the system in a sustainable manner. It can be concluded that almost all factors analyzed in this study have a significant influence on the desire of students in Indonesia to use e-learning system in a sustainable manner. Factors that have a direct influence of e-learning satisfaction, e-learning usefulness, and e-learning effectiveness, while the factors that have an indirect effect of attention, deliverable, media use, navigation, responsiveness, assurance, reliability, tangibles, empathy, learner-content interaction, learner-instructor interaction, learner-learner interaction, self-efficacy, and self-directedness. There are two main factors that influence continuance intention directly, e-learning satisfaction and e-learning usefulness. In addition, there are five main factors affecting continuance intention directly, navigation, reliability, tangibles, self-efficacy, and learner-content interaction.

## Acknowledgements

The research was funded by the Directorate of Research and Community Service of the Directorate General of Research and Development of the Ministry of Research, Technology and Higher Education of the Republic of Indonesia in accordance with the Research Contract No.146 / UN17.41 / KL.2018

## References

- AP Gilakjani, (2012) The Significant Role of Multimedia in Motivating EFL Learners' Interest in English Language Learning, *I.J.Modern Education and Computer Science*, **4**, pp. 57-66 DOI: 10.5815/ijmecs.2012.04.08
- Bing Wu & Chenyan Zhang (2014) Empirical study on continuance intentions towards E-Learning 2.0 systems, *Behaviour & Information Technology*, **33**(10): pp.1027-1038.
- Burnett, K et al., (2007) *Frequency, Intensity and topicality in online learning: an exploration of the interaction dimensions that contribute to student satisfaction in online learning*. *Journal of Education for Library and Information Science*, **48**(1): pp. 21-35.
- Carol L, Celine B, Michael W. Marek, Brendan C, (2015) "Service quality and customer satisfaction: qualitative research implications for luxury hotels", *International Journal of Culture, Tourism and Hospitality Research*, **9**(2): pp. 168-182,
- Chiu, C et al. (2005). *Usability, quality, value and e-learning continuance decisios*. *Computers and Education*, **45**(4) pp. 399-416.
- Daniel, C., & Berinyuy, L. (2010) *Using the SERVQUAL model to assess service quality and customer satisfaction* [Master thesis]. UMEA University.
- Davis, F.D. (1989) *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*. *MIS Quarterly*, **13**(3) pp. 318-340.
- Hooper, et.al., (2008) Structural Equation Modelling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods*, **6**(1), 53-60.
- Hossein Mohammadi, (2015) Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers, in Human Behavior* **45**, (April) pp. 359-374
- Hsu, P.S. (2012) Learner Characteristic Based Learning Effort Curve Mode: The Core Mechanism on Developing Personalized Adaptive E-Learning Platform. *Turkish Online Journal of Educational Technology - TOJET*, **11**(4): pp. 210-220.
- Huang, M. (2008) *Factors influencing Self-directed Learning Readiness amongst Taiwanese nursing students*. Queensland University of technology. School of Nursing. Institute of health and Biomedical Innovation.
- J.R.van Seters, M.A.Ossevoort, J.Tramper, M.J.Godhart, (2012) The influence of student characteristics on the use of adaptive e-learning material, *Computers & Education* **58**(3) April, pp. 942-952.
- Katherine M, Kimberly O, Roxanne R, Maria K.H, John J.F & Katherine B (2016) Teaching in a Digital Age: How Educators Use Technology to Improve Student Learning, *Journal of Research on Technology in Education*, **48**(3): pp. 194-211.
- Keller, J. M., & Suzuki, K. (2004). *Learner motivation and e-Learning design: A mutinationally validated process*. *Journal of Educational Media*, **29**(3): pp. 229-239.
- Kenneth Wong; Reggie Kwan; Fu Lee Wang; Louise Luk, (2015) A pilot study on students' learning experience on the e-learning using social networking. *Int. J. of Innovation and Learning*, **18**(3): pp. 299-312. DOI: 10.1504/IJIL.2015.071501
- Lee, J. & Lee, W. (2008) The relationship of e-learner's self-regulatory efficacy and perception of e-learning environmental quality. *Computers in human Behavior*, **24**(1): pp. 32-47.
- Liaw, S. S. (2008) Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Comput. Educ.* **51**, pp. 864-873
- Parasuraman, A., Zeithaml V. A., Berry L. L., (1988) *A conceptual model of services quality and its implication for future research*, *Journal of Marketing*, **49**(4): pp. 41-50.
- Ramadiani (2010) Structural Equation Model Untuk Analisis Multivariate Menggunakan LISREL. *Jurnal Informatika Mulawarman*, **5**(1): pp.14-18 DOI: <http://dx.doi.org/10.30872/jim.v5i1.48>
- Ramadiani, et al., (2013) E-Learning User Acceptance based on Analysis of User's Style, Usability, and User Benefits, *Jurnal Sistem Informasi (JSI)*, **9**(1): pp. 6-12

- Ramadiani, et al., (2015) *Integrated Acceptance Model for E-Learning*. International Conference on Engineering and Technology for Sustainable Development (ICET4SD) 11-12 Nov, Indonesia. *IOP Conference Series: Materials Science and Engineering*, **105**(1): pp. 1-9.
- Ramadiani, et al., (2016) *User difficulties in e-learning system*, 2nd International Conference on Science in Information Technology (ICSITech), Balikpapan, pp. 158-162.
- Ramadiani, et al., (2017). *User Satisfaction Model for e-Learning Using Smartphone*. *Procedia Computer Science*. **116**, pp. 373-380. <https://doi.org/10.1016/j.procs.2017.10.070>
- Sanam, A. (2009) *Learners intention to continue use of E-learning Technology case of Iranian universities*, Master Thesis, Lulea University of Technology, Iran.
- Sharp, J., & Huett, J. (2006) Importance of learner-learner interaction in distance education. *Information Systems. Education Journal*. **4**(46).
- Sher, Ali (2009). Assessing the relationship of student-instructor and student-student interaction to student learning and satisfaction in Web-based Online Learning Environment. *Journal of Interactive Online Learning*, Vol. 8, No. 2, Summer 2009, pp:102-120, ISSN: 1541-4914
- Shiau, Wen-Lung. and Luo, Margaret Meiling. (2012) 'Continuance intention of blog users: the impact of perceived enjoyment, habit, user involvement and blogging time', *Behaviour & Information Technology*, Vol. 32, No. 6, pp.570-583.
- Sun, P. C., & Cheng, H. K. (2007). The design of instructional multimedia in e-learning: A media richness theory-based approach. *Computers and Education*, **49**, no.3 pp. 662-676.
- Thomas John Paul; Jayanth Jacob, (2017) Information system continuance usage: moderating role of habit. *Int. J. of Business Information Systems*, **26**(2): pp.166-184
- Udo, G. J., Bagchi, K. K., & Kirs, P. J. (2011). Using SERVQUAL to assess the quality of e-learning experience. *Computers in Human Behavior*, Vol. **27** (3), pp.1272-1283.
- Wing S. Chow and Si Shi (2014) Investigating Students' Satisfaction and Continuance Intention Toward E-Learning: An Extension of The Expectation-Confirmation Model. *Procedia - Social and Behavioral Sciences* **141**: 1145 - 1149
- Zhang, C. and Zigurs, I. (2009). "An Exploratory Study of the Impact of a Virtual World Learning Environment on Student Interaction and Learning Satisfaction" *AMCIS Proceedings*. 424. <https://aisel.aisnet.org/amcis2009/42>