AN ACCEPTANCE MODEL FOR CONTRIBUTING FACTORS OF CONTINUOUS INTENTION TO USE E-LEARNING SYSTEMS IN OMAN HIGHER EDUCATION INSTITUTIONS

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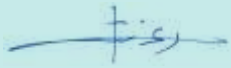

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ABSTRAK

E-pembelajaran telah menjadi salah satu pendekatan yang paling ketara dalam bidang pendidikan. Walau bagaimanapun, e-pembelajaran berhadapan dengan beberapa masalah seperti kesukaran kursus, pengetahuan subjek guru dan jenis penggunaan teknologi yang terhad yang mempengaruhi niat berterusan pelajar untuk menggunakan e-pembelajaran. Kejayaan sistem e-pembelajaran bergantung pada bagaimana pembelajaran berlangsung, penyebaran faktor penilaian sokongan, niat tingkah laku, dan persepsi pelajar untuk digabungkan untuk niat berterusan untuk menggunakan sistem e-pembelajaran. Penyelidikan ini juga berpendapat bahawa sistem e-pembelajaran yang digunakan untuk mengesahkan hasil pembelajaran pelajar seperti keberkesanan, prestasi akademik, kepuasan pelajar, dan penggunaan sistem. Tinjauan literatur mengenai niat berterusan untuk menggunakan sistem e-pembelajaran menunjukkan bahawa bidang ini masih dalam tahap awal kerana banyak kajian yang difokuskan untuk menilai sistem e-pembelajaran dari satu model penerimaan daripada meningkatkan kombinasi faktor dari banyak teori penerimaan model e-pembelajaran untuk tujuan penggunaan berterusan. Tujuan kajian ini adalah untuk mencari model penerimaan faktor penyumbang yang mempengaruhi niat berterusan untuk menggunakan sistem e-pembelajaran. Penyelidikan ini mencadangkan penggabungan secara berkesan semua hasil sistem e-pembelajaran untuk mengenal pasti faktor penyumbang untuk niat berterusan untuk menggunakan sistem e-pembelajaran. Oleh itu, objektif utama kajian ini adalah untuk mengembangkan model penerimaan faktor penyumbang untuk niat berterusan untuk menggunakan sistem e-pembelajaran. Kajian ini memberi tumpuan untuk memahami semua faktor yang mempengaruhi yang berkaitan dengan penggunaan berterusan system E-pembelajaran dengan mengkaji kemungkinan faktor yang digunakan dalam model penerimaan sebelumnya seperti Technology Acceptance Model (TAM), Task-Technology Fit (TTF) serta Expectation terpilih- Teknologi Pengesahan (ECT) dan lain-lain. Untuk mengembangkan model, faktor dari TAM, TTF dan juga faktor ECT terpilih digabungkan dalam Model Penerimaan kepada faktor bebas dan bergantung yang dikenal pasti. Model penerimaan dirumuskan berdasarkan tinjauan model sebelumnya dengan faktor bergantung dan bebas. Untuk menguji model, empat universiti Oman telah dipilih sebagai kajian kes. Data dikumpulkan menggunakan borang soal selidik yang dikembalikan oleh 295 pelajar untuk menilai maklum balas mereka mengenai system e-pembelajaran, setelah itu Partial Least Squares-Structural Equation Modeling (PLS-SEM) digunakan untuk menilai hipotesis model penerimaan yang dikembangkan untuk meningkatkan niat berterusan untuk menggunakan e-pembelajaran. Hasil dari data tinjauan menunjukkan bahawa 12 dari 16 hipotesis menunjukkan bahawa faktor bebas dan bersandar adalah penting untuk niat berterusan untuk menggunakan sistem e-pembelajaran di Institusi Pengajian Tinggi. Penyelidikan ini menunjukkan keperluan untuk mengembangkan model penerimaan untuk faktor penyumbang niat berterusan untuk menggunakan sistem e-pembelajaran untuk institusi pendidikan tinggi Oman yang dapat dilaksanakan untuk peningkatan masa depan untuk model e-pembelajaran.

ABSTRACT

E-learning has become one of the most significant approaches in the educational area. However, e-learning is faced with several problems such as course difficulty, teacher-subject knowledge and limited types of technology integration used that affect students' continuous intention to use e-learning. The success of the e-learning system depends on how the learning takes place, the deployment of factors of support assessment, behavior intention and student perceptions to be combined for continuous intention to use the e-learning system. This research also argues that e-learning systems used to validate learners' learning outcome such as effectiveness, academic performance, student satisfaction, and system use. A review of the literature on the continuous intention to use e-learning systems shows that this area is still in its infancy as many studies focused on assessing e-learning systems from one acceptance model rather than enhancing the combination of factors from many theories of acceptance e-learning models for the continuous intention of use. The purpose of this study is to find the acceptance model of contributing factors that affect the continuous intention to use e-learning systems. This research proposes on merging effectively all e-learning systems outcome to identify the contributing factors for continuous intention to use the e-learning system. Therefore, the main objective of this study is to develop an acceptance model contributing factors for the continuous intention to use the e-learning systems. This study focuses on understanding all influencing factors that related to the continuous use of e-learning system by studying the possible factors used in previous acceptance models such as Technology Acceptance Model (TAM), Task-Technology Fit (TTF) as well as selected Expectation-Confirmation Technology (ECT) and others. To develop the model, factors from TAM, TTF as well as selected ECT factors were combined in the Acceptance Model to the identified independent and dependent factors. An acceptance model was formulated based on the previous model's reviews with dependent and independent factors. To test the model, four (4) Oman universities have been selected as a case study. Data were collected using questionnaires that were returned by 295 undergraduates to assess their feedback on e-learning system, after which Partial Least Squares-Structural Equation Modelling (PLS-SEM) was employed to evaluate the hypotheses of the developed acceptance model to improve continuous intention to use e-learning system. Results from the survey data show that 12 of 16 hypotheses suggested that the independent and dependent factors are significant for the continuous intention to use e-learning system in higher education institutions. This research reveals the need to develop an acceptance model for contributing factors of continuous intention to use e-learning system for Oman higher education institutions that could be implemented for future enhancement for e-learning models.

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LIST OF SYMBOLS

A	Alpha Cronbach's'
B	Bias
F	Function error
H	Hypothesis
O	Original value
P	Path value
Q	Quadratic error
R	Regression Coefficient values
T	Testing value

LIST OF ABBREVIATIONS

AP	Academic Performance
BI	Behavior Intention
BUC	Buraimi University College
CC	Course Content
CFA	Confirmatory Factor Analysis
CI	Continuous Intention
ECT	Expectation-Confirmation Technology
E-Learning	Electronic Learning
GCC	Gulf Cooperation Council
GPA	Grade Point Average
HEI	Higher Education Institution
HTMT	Heterotrait-Monotrail Ratio
INT	Interactivity
IS	Information System
IT	Information Technology
MOOC	Massive Open Online Courses
Moodle	Modular Object-Oriented Dynamic Learning Environment
PEOU	Perceived Ease of Use
PLS	Partial Least Square
PU	Perceived Usefulness
R^2	Coefficient
SA	Support Assessment
SEM	Structural Equation Model
SLO	Student Learning Outcomes
SPSS	Statistical Package for the Social Sciences
SQU	Sultan Qaboos University
SS	Student Satisfaction
T3	Teaching, Transforming, And Technology
TAM	Technology Acceptance Model
TI	Technology Integration
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TSK	Teacher-Subject Knowledge
TTF	Task- Technology Fit
UoB	University of Buraimi
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1

INTRODUCTION

1.1 Background

An e-learning system is a type of learning utilizing electronic technology to assist, and support learning in the educational sector (MacDonald, et al., 2001; Engelbrecht, 2003). The exponential growth of the number of students that used developed communication technologies and different tools, versions, capacity, has opened doors to some changes in an e-learning system (Vasileva-Stojanovska et al., 2015). The e-learning system is growing to support active learning collaboration among students via web-based technologies and e-learning practice (Yu & Jo, 2014). Therefore, it refers to any course, or material, or program delivered by an online system. Another definition *" A learning system based on formalized teaching but with the help of electronic resources is known as E-learning."*, Ping, (2015). Over the years, several studies have been published that investigated the relationship of e-learning development and its effects in the educational sector (Vasileva Stojanovska et al., 2015). E-learning aims to add new knowledge of technologies used in higher education institutions (Yu & Jo, 2014). Therefore, e-learning refers to learning objectives, courses, assessment, and participants of Learning Management Systems (LMS) (Daradoumis, et al., 2013). Moreover, there were a need to focus on three areas of successful e-learning, content, people and context (Costa, & Silva, 2010). The content area identifies the type of material and what ease of content you want to deliver to your students (Fisher, Rothenberg, & Frey, 2008). The people are the key part to get an effective learning benefit. In this thesis the undergraduate students are the key (Daradoumis, et al., 2013). The third area was the context, that is important to link between the content and students to deliver the knowledge as connected to everyone, or for some groups or individual context (Costa, & Silva, 2010). This practice is used to derive the benefits to improve the continuous intention to use that is measured by student satisfaction, support assessment, academic performance and effectiveness of continuous intention to use e-learning.

Technological development of educational institutions from year 2000 to 2018 shows that there have been changes that are closely linked to differences in technology development. These changes started with simple training in classical education to virtual education where the educational system reflects the educational needs of technology learning (Benson, 2011). Moreover, e-learning systems are utilized nowadays to mediate, support active learning and create collaboration among students via web-based technologies such as Wiki, video blogs and social media. Many of these e-learning applications are increasingly used for learning as they offer flexibility to the students to study autonomously with confidence and improve their learning methods that will be assessed by the teachers.

Prior studies in e-learning mainly focused on exploring important factors that relationship institutional effectiveness in Higher Education Institutions (HEIs) (Volkwein, 2010). Many platforms are used for student learning outcomes which include Technology Enhanced Learning (TEL), Massive Open Online Courses (MOOC) and Modular Object-Oriented Dynamic Learning Environment (Moodle), which are the most common platforms utilized by universities. These electronic applications provide information to teachers and administrators on the current state of their students in terms of the learning achieved (Stojanovska et al., 2015). However, continuous intention to use the e-learning systems was not evaluated with all the important factors related to student perceptions (Volante and Fazio, 2007). Thus, it is apparent that it should include the continuous intention of using an application or system through the whole learning identification or criteria for supporting assessment, and improvement of student satisfaction items (Amrein-Beardsley, et al, 2007; Al-Maroof, &El-Emran, 2018).

According to Walker (2012) and Pennings et al. (2014), it is evident that technology usage in learning and assessment causes students to work in an unlimited time, brings about peer assistance, teacher guidance, and teamwork which trigger student learning and assessment as initial step for continuous intention to use. Moreover, the results provide information to teachers regarding their students' learning achievement and their participation in the continuous intention to use e-learning. This use of e-learning applications improves students' confidence and develops their knowledge and skill of using technology in a way that increases collaborative learning and continuous usage.

Earlier e-learning studies carried out by Wolfe et al. (2007), Wilson and Youngs (2005), Volante and Fazio (2007), and Pennings et al. (2014) argued that the existing e-learning studies are more concerned about the features related to teacher knowledge and

their experience as a main factor with less focusing on the student relationship to increase continuous intention of using the systems. Similarly, studies carried out by Wilby et al. (2017), Weinrib and Jones (2014), Strang (2013), Stivers and Phillips (2009), Rjaibi and Rabai (2011), Reich et al. (2016), Yu and Jo (2014), Zakaria et al. (2009), Walker (2102), and Vernadakis et al. (2012) stated that fewer studies were found to focus on the reputation intention to use or to determine the factors to derive the continuous intention to use an e-learning system.

Lastly, findings from researchers such as Zhao et al. (2013), Wu and Tai (2016), Wang and Hannafin (2005), Vasileva-Stojanovska et al. (2015), Tsay and Luo (2018), Spanjers et al. (2015), Sánchez and Hueros (2010), Maas et al. (2014), Lee Hsieh and Chen (2013), Lee (2010), Le and Bonk (2016), and Wu and Chen (2017) suggested that the use of technologies such as Wiki chats, video blogs, MOOC, and online learning models of university portals is only applicable to describe the outcome of e-learning system use factors of perceived usefulness, perceived ease of use, and behavioural intention in each approach. However, the authors mentioned that the aforementioned approaches are only partially explaining the effects of the factors related to the continuous intention to use the e-learning system (Stojanovska et al., 2015; Debicki et al., 2016; Chmiel et al., 2017).

A lot of studies like Külli et al. (2014), Walker (2012), Davis (1989), and Fishbein and Ajzen (1975) utilized technology testing and acceptance theories in exploring factors that relationship e-learning adoption. Only a few theories like those by Mullen et al. (2017), and Ifinedo, Pyke, and Anwar (2018) were constructed in the continuous intention of users. However, these theories focused more on significant factors. There are many models and theories which present the technology theories adoption, including Theory of Planned Behaviour (TPB) by Ajzen (1991), Theory Acceptance Model (TAM) by Davis (1989), Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1973), Task-Technology Fit (TTF) by Islam (2016), Expectation Confirmation Theory (ECT) by Oliver (1980), Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh (2003).

The theories goal is to understand the relationship amongst factors used in the models. Various studies described the significant relationship between factors in the process of adoption, and technology acceptance which lead to continuous intention to use e-learning system. ECT model was used for continuous intention to use a system while

TAM and TTF are used as complementary model factors to indicate the contributing factors to be continuous intention to use e-learning system.

Therefore, this study is based on the continuous intention to use e-learning systems to test the positive factors derived from TAM, TTF, partial ECT and a combination of the models. Furthermore, models proposed by Hone and El Said (2016), Huang, Zhang, and Liu (2017), and Joo, So, and Kim (2018) as they provide flexibility and freedom to teachers and students in selecting the most proper e-learning system to support teaching and learning through the main target of the continuous intention to use e-learning systems. Moreover, application features of Wiki, peer-observation, and video contacting in learning are appropriate as they provide benefits for teacher assessment towards developing courses and integrated technologies requirements for educational institutions. To this end, the main contribution of this study is to focus on the theoretical development of the e-learning acceptance model with factors of the TAM and more significant instruments from TTF, and partial ECT factors which can be adopted to improve the continuous intention to use e-learning system in the educational sector. This study also investigates the relationship among the independent and dependent factors in analysing how the integration of technology model factor can be applied to develop better continuous intention of using e-learning system.

Unlike previous studies (Salajan & Mount, 2012; Aldiab et al., 2017), this research has proposed the integration of the learning requirement factors of many theories such as Technology Acceptance Model (TAM), Task-Technology Fit (TTF) and partial Expectation-Confirmation theory (ECT) factors to develop an improved comprehensive model of the factors required to examine the continuous intention to use of e-learning system. This research is mostly focused on the impact of the continuous intention to use e-learning system based on students' perception to improve e-learning use in terms of teacher-subject-knowledge, course content, satisfaction, supporting assessments, effectiveness and technology integration.

1.2 Research Motivation

This study investigates the current e-learning practices in the context of higher education institutions. The e-learning system in the e-learning market is going through a period of secular decline and its expected revenues fall by 6.1 % per year until 2021 (Perry, 2017). The solutions were first set up by increasing the e-learning systems to provide the students with additional flexibility. E-learning systems were moving good in this area, but the continuous intention to use e-learning system found it's not particularly

useful. Literature shows that there is a need to develop a model to determine the factors that will contribute to the continuous intention to use e-learning system (Park, 2009; Liao, & Lu, 2008).

Presently, students use different e-learning systems employed by teachers such as Wiki, video blog programs or Web 2.0 technology tools (Salajan & Mount, 2012; Sher, 2009; Kleebbua & Siriparp, 2016; Joo, So, and Kim, 2018). Additionally, the incorporation of technologies in the existing systems might improve the current generation of students and also enhance their continuous intention to use e-learning activities in supporting their ability to learn while being surrounded by computers in their daily life (Lancaster, Wong, & Roberts, 2012).

For several years, considerable effort of developing e-learning system used to study the contributing factors that provide continuous intention to use e-learning system which relates to HEIs (Karaali, Gumussoy, & Calisir, 2011; Ferdousi, 2009). Nevertheless, the more adoption on the e-learning system does not necessarily imply the development is being used or qualified enough for HEIs needs. Moreover, many studies have demonstrated that HEI achievements cannot be easily derived from technologies attached at the implementation stage (Lee, Hsieh, & Hsu, 2011; Park, 2009; Liao, & Lu, 2008). This variety of technologies used and acceptance of e-learning system can be effected to determine the contributing factors for continuous intention to use e-learning system in HEIs (Lee, Hsieh, & Hsu, 2011).

This research focuses on which contributing factors that used directly or indirectly to assess the continuous intention to use e-learning system which include student satisfaction to measure the impact of course content in continuous intention to use e-learning system. Also, teacher-subject knowledge and technology integration as indirectly connected to enhance continuous intention to use e-learning system (Kleebbua & Siriparp, 2016).

The development of the acceptance model for factors contributing to the continuous intention to use e-learning system is assessed in this study because it helps to provide a self-assessment approach that students can use in evaluating teacher-subject-knowledge, academic performance level, and course content material evaluation in relation to the needed requirements of continuous intention to use e-learning system. Also, student's behaviour intention has its impact on e-learning system from the factors of perceived ease of use, perceived usefulness that used (Davis, 989).

At present, most studies have focused on 'e-learning system use' and works on devoted of adoption and use, and limited evidence of significant research on the impact of the contributing factors on the continuous intention to use e-learning system on the HEIs values. Therefore, the present study aims to determine the contributing factors of acceptance model for continuous intention to use e-learning system within Omani HEIs context. This study can help HEIs to maximise the value of e-learning systems by identifying the contributing factors for continuous intention to use.

Thus, it is hoped the developed model can assess the important factors that had a contributing with continuous intention to use e-learning system. These factors derived from different related existing models used especially for the continuous intention to use purpose and their factors already derived from a variety of learning style requirements. As a type of these important factors, the support assessment, student satisfaction, effectiveness, and academic performance of students that will enable teachers to monitor the continuous intention to use e-learning system. If the continuous intention to use is low, therefore teachers should improve their delivery, support assessment which hopefully improves learning and the students' grades.

1.3 Problem Statement

E-learning systems are significantly important in supporting the daily operation of the educational sector (Vasileva-Stojanovska et al., 2015). The e-learning systems have become common in education and sharing knowledge between students and teachers. Besides, the e-learning systems could be employed to monitor the whole teaching and learning process (Miri & Ariella, 2016; Maas et al., 2014).

The literature analysis shows the continuous intention to use e-learning system can be configured from expectation-confirmation-theory (ECT) model by Oliver (1980) is the most important model to test the continuous intention to use a system, however, this model perfectly works with organizational level and not a concern with the individual level. Moreover, the most recommended model for e-learning system is technology acceptance model (TAM) developed by Davis (1989) is suitable to use by individual level but still it's for system acceptance only and not for continuous intention to use.

In this context, considering the gaps of these two (2) models in the existing body of knowledge, an acceptance model for contributing factors of continuous intention to use e-learning system in HEIs must be designed and provided from individual use perception (Liu, 2016; De Wever et al., 2015). These will entail deploying the use of technology

applications for electronic assessment in addition to course content materials, use of video-based explanation programs, and Wiki application to enhance the continuous intention to use e-learning (Kleebbua & Siriparp, 2016).

The students' continuous intention to use e-learning system could be measured but not limited only to the factors of the existing acceptance model. For example, TAM model includes perceived usefulness, perceived ease of use, attitude and behaviour intention to get system acceptance (Davis, 1989). Moreover, TTF model used different factor such as of teacher-subject-knowledge, technology integration, and course content towards continuous intention to use e-learning (Huang, Zhang, Liu, 2017; Trochim, et al., 2008). Also, ECT model used perceived usefulness, confirmation, and satisfaction towards continuous intention to use. Therefore, these models used are not sufficient individually for all courses and teacher's knowledge to enhance the continuous intention to use e-learning. Furthermore, students do have issues with continuous intention to use e-learning system in terms of support assessment available, effectiveness, their satisfaction, and the improvement of student academic performance (Goodhue, & Thompson, 1995; MacDonald, et al., 2001; Engelbrecht, 2003). For this reason, the above existing models cannot be sufficient enough to determine the common contributing factors for continuous intention to use e-learning system.

This research problem is articulated to mention three major concerns. The first concern is, several previous pieces of research have studied the factors that affect the e-learning system on the different technologies of the system (Liu, 2016; De Wever et al., 2015). However, studies on the adoption include the factors that affect the continuous intention to use e-learning system have remained lacking. The second concern is regarding the literature on the contributing factors on continuous intention to use e-learning system on the organizational level of HEIs and still extensive lack of individual students. The third concern is that literature shows that there lack findings from determined contributing factors in HEIs that give adaptation to continuous intention to use e-learning system .

1.4 Research Question

Research questions were identified for this study as:

i. What are the factors that contribute to the continuous intention to use e-learning system?

ii. How can the contributing factors to the continuous intention to use an e-learning system be constructed in the acceptance model?

iii. How can the developed model be assessed in the e-learning system?

1.5 Research Objectives

The main aim of this study is to develop an acceptance model contributing factors for continuous intention to use the e-learning system for Oman higher education institutions. To accomplish this aim, the research questions were identified followed by the research objectives are articulated as follows:

i. To identify the factors that contribute the continuous intention to use the e-learning system.

ii. To develop an acceptance model that examines the contributing factors of the continuous intention to use the e-learning system in higher education institutions.

iii. To validate the proposed acceptance model .

1.6 Scope

The focus of this research is mainly on the acceptance model for contributing factors of continuous intention to use e-learning system to be tested from students' sides. Therefore, the unit of analysis is the undergraduate students as users of e-learning system in selected Omani universities, specifically the universities that already have their e-learning system in place.

According to Al-Mahrooqi et al., (2016), in the context of Oman, this digital revolution has negative effects on students' continuous intention to use e-learning systems with different technologies, learning performance thus, affecting university approvals in Gulf Cooperation Council (GCC). Besides, it still mis-continuous intention to use e-learning systems, even with extending new combination of original TAM with external factors as technology use and student satisfaction that affect the e-learning system use and acceptance.

Therefore, this research distributed the survey among 4 Omani Universities. AlBuraimi University College (BUC), University of Buraimi (UOB), Sohar University, and Sultan Qaboos University (SQU). These four universities selection based on mixed criteria of demographic information as gender variety between male and female, age differences from 18 to above 26, and financial sponsorship assistance as governmental or private sponsors. Besides, these institutions offered various courses in Information Technology, Engineering, Law, Business and administrations, with different level of

undergraduate degrees categorised as Diploma, higher diploma, and bachelor. All of them were using Moodle as e-learning system.

This quatitative survey explores different assumptions on the quality of higher education with continuous intention to use the e-learning system from undergraduate students' perspectives.

Quantitative methods are used to gather data at each institution. A survey method using online and paper-based questionnaire are distributed between the selected universities. A pilot study conducted to collect random data and analyzed to validate the coefficient of the survey distributed among 58 participants. Later a full survey distributed among 370 participants and only 295 students gave full responses to analysis the real data from the final version after all improvements on the remarks from the expert evaluators. The collected data will be tested by Structural Equation Modelling (SEM) using the Partial Least Squares (PLS) to perform the validation of the developed model. Smart PLS 2.0 software is utilized as a data analysis tool.

1.7 Thesis Outline

This thesis is structured into five chapters as follows:

Chapter 1 presents the introduction and motivation of the study. This chapter constructs the problem statement based on previous studies. It also presents the research objectives, as well as research questions, the research scope and finally, the organization of the chapters.

Chapter 2 reviews the literature related to this study. It discusses e-learning in higher education institutions, e-learning system acceptance, e-learning acceptance theories like technology acceptance model (TAM), Expectation-Confirmation Technology (ECT), Task-Technology Fit (TTF), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Planned Behaviour (TPB) models, and E-learning model features, related frameworks and models used in e-learning, as well as the factors used in this study, This chapter also discusses extracting causal relationship between factors and the factor attributes within higher education institutions to improve the continuous intention to use e-learning systems of the selected universities.

Chapter 3 presents four complementary phases of research flow and descriptions. In addition, it discusses the research conceptual model developed model and related hypotheses based on the model presented to improve the integration and harmonization

of research model in using continuous intention of use is presented. Followed by a discussion of the research design. Next, the construction of instrument validation tested with three parts of pre-testing, pilot study, and measurement development are discussed. Then, the instrument validation and target population are discussed. Next, the data collection method, sampling size, ethical issues, statistical analysis techniques, descriptive analysis, and reliability are discussed. Then, the results of the data analysis from PLS-SEM are presented to accurately categorize university outcomes: accepted, modified, or not accepted. Lastly, a discussion regarding the research design and methods is presented.

Chapter 4 discusses data analysis types and demographics. This chapter also presents a discussion of the survey data and construct validity. It also presents the results collected from the survey of forty-four items developed from the independent factors. Moreover, results analyzed followed by a discussion on path value and other statistical analysis to validate the developed acceptance model.

Chapter 5 entails discussion and recommendation in relation to research objectives, research questions, and hypotheses validation. Then, the theoretical and practical implications are presented. Next, the contributions of the study, limitations and future work are presented to provide an idea of the usefulness and importance of the developed approach for students' continuous intention to use e-learning system, suggestions for future works.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of the past research, in order to achieve the research objectives proposed in the earlier chapter. Thus, this chapter includes literature to identify the suitable models, standard practices, techniques, and tools adopted in learning, in order to be carried out the enhancement of continuous intention to use e-learning. This chapter includes many sub-sections with regards to how e-learning can improve academic outcomes based on the continuous intention to use e-learning system. In addition, this chapter revises the common types of acceptance technology models that help in improving the continuous intention to use of e-learning systems. These acceptance models include the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Task-Technology Fit (TTF), Theory of Reasoned Action (TRA), Expectation Confirmation Theory (ECT), and Unified Theory of Acceptance and Use of Technology (UTAUT). Even though there exists a variety of models, TAM, TTF, and ECT are identified as most relevant for this study.

Furthermore, Figure 2.1 shows the path map of Chapter 2, consisting of e-learning in higher education, with e-learning acceptance model. followed by the background of the acceptance models and factors like TAM, ECT, TTF, UTAUT, and TPB. Subsequently, this chapter describes models which utilized previously existing models in a variety of research disciplines, which are useful to the conceptual model development for this research. In addition, this chapter provides a discussion that encompasses the different factors used in this study, followed by the causal relationships between factors and factors attributes. Lastly, the summary of the chapter is presented.

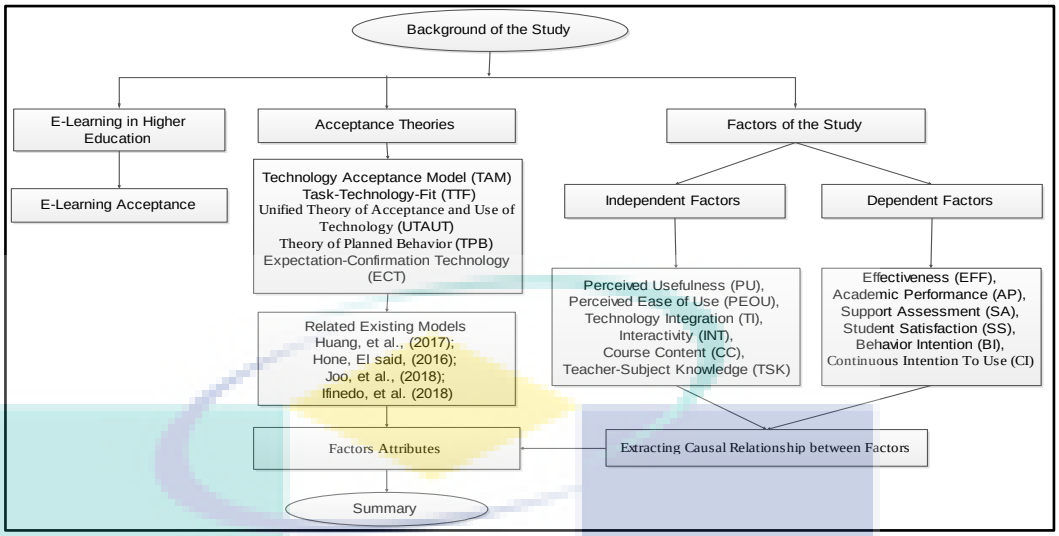

Figure 2.1 Path map of Chapter 2

2.2 E-learning In Higher Education Institution

E-learning has many definitions; one of which is a combination of face-to-face and online learning to decrease classroom time and improve enjoyment and interest within the education processes (Spanjers et al., 2015). E-learning has become one of the popular educational solution time (Hone & El Said, 2016; MacDonald, et al., 2001). E-learning offers an opportunity for universities to enhance the teaching methodologies to improve learning outcomes in universities (Hutchinson & Wells, 2013). The e-learning mechanism is suitable for higher education students that have experience in using technology and are familiar with filling its needs (Hamidi & Chavoshi, 2018). The overall use of e-learning is required a new development in technology and education to increase the deliver outcomes of continuity of students through various platforms, communication, and creativity that leads to the continuous intention to use e-learning. Researchers have argued that it is vital to know how students learn and collaborate in groups, programs and courses to help in students' learning development (Singh, 2010; MacDonald, et al., 2001; Engelbrecht, 2003; Ifinedo, Pyke, Anwar, 2018). Extensive efforts needed to understand the adoption, implementation of continuous intention to use e-learning. However, gaps exist of our students to enhance the continuous intention to use e-learning. Figure 2.2 illustrates the main factors used in the e-learning model by MacDonald et al. (2001) that can be applied to enhance the continuous intention to use e-learning system in education.

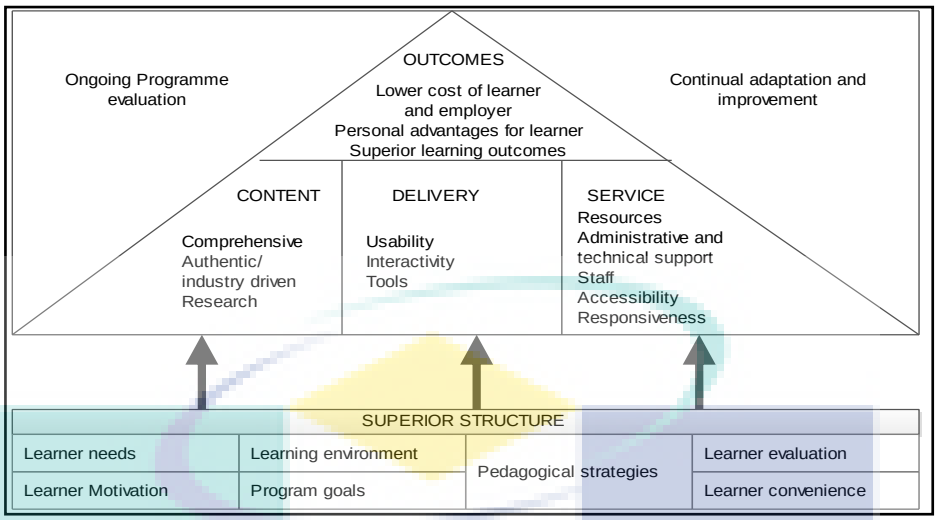

Figure 2.2 Demand-Driven Learning Model (DDLM)

Source: MacDonald, et al., (2001)

The Demand Driven model in Figure 2.2 was used to evaluate quality standard of educational demands. In the model, there are five dimensions highlighted namely structure, content, delivery, service, and outcomes. These dimensions must all work in concert to implement a quality e-learning course through on-going programme evaluation and continual adaptation and improvement. Macdonald et al. (2001) considered them significant in the growth of traditional learning through adoption of technology use in the teaching process. As a result, the institutions will build, adapt and improve services in education in alignment with the factors of continuous intention to use e-learning. Figure 2.3, illustrate another model of equity education: schools as agents of mobility and change of inclusive schools that include traditional and e-learning with technologies.

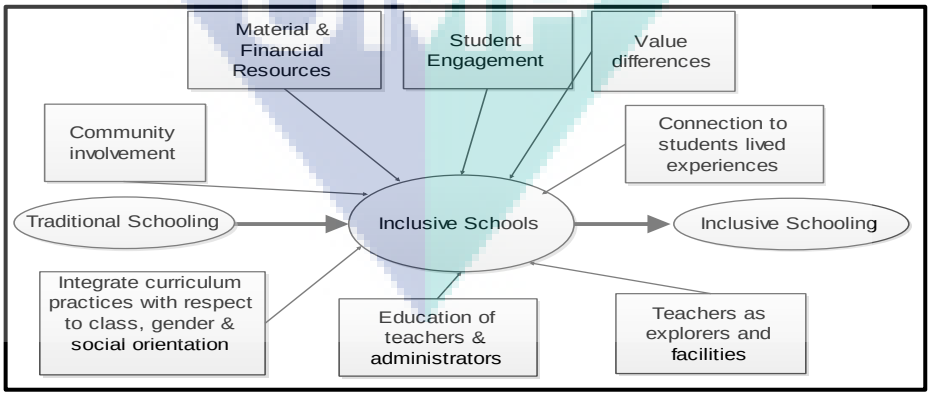

Figure 2.3 Equity Education: Schools as Agents as Mobility and changes

Source: MacDonald, et al., (2005).

E-Learning model proposed in Figure 2.3 was used in testing the validity and improving the accuracy of e-learning models. This model has different types of factors that make E-learning effective, namely improved learning, greater student satisfaction and higher retention rates. The factors of teacher-knowledge, course content, interactivity with community, and student technology experience have significant relationship for inclusive use of e-learning system at schools to enhance the continuous intention of e-learning use.

In addition, the relationship of peer-student interaction between themselves through using technology integration helps to improve e-learning continuous use (Kearsley, 1995; King & Doerfert, 1996; Karnouskos, 2017). Interaction factor is important to give feedback and indicate the satisfaction level of the educational process. Interaction indicates the level of interactivity between peer-students and teachers (MacDonald, 2001; Hashim & Majid, 2015). Thus, interactivity should be explored to achieve the goals of continuous intention to use e-learning system.

According to Hashim & Majid (2015), the e-learning system is an innovation for accomplishing the required learning outcomes. It is widely believed that interaction produces positive effects on education. Therefore, using e-learning is important to determine interaction model factors among students, teachers through the use of internet services (Kearsley, 1995) such as wiki, videos and social media platforms. King and Doerfert (1996) mentioned that interaction is important between e-learning and student satisfaction to enhance learning and teaching goals (Strang, 2013). Limitless boundaries are exercised in enabling students to freely enrol into their courses by applying e-learning system. E-learning supporters however, considered student motivation in joining the course with ease of use and usefulness. Both factors increase the level of student's interest to complete the course and student's continuous intention to use e-learning as a learning platform (Dabbagh & Kitsantas, 2012; Rodrigues et al., 2018).

Furthermore, e-learning system measures the processes applied for academic activities such as teaching methods, assessments, and satisfaction through technology enhanced learning techniques to increase the accuracy of results and examine the student perceptions towards continuous intention to use it. Thus, the continuous use of integrated technologies with e-learning system increases the teaching and learning outcome of universities (Howieson et al., 2014). Thus, e-learning can improve the online evaluation of student satisfaction and the continuous intention to use it with regards to their grades (Halverson et al., 2012; Terry, et al., 2009). E-learning provides the flexibility and

freedom to students in selecting the proper support assessment to improve academic performance, effectiveness, and student satisfaction requirements for continuous intention to use e-learning system in higher education institutions (Benson, 2013; Strang, 2013).

For an e-learning system to be accepted for fulfilling e-learning needs, there are many acceptance models, namely TAM, TTF, and ECT. The e-learning system is accepted and adopted in different ways in the Gulf Cooperation Council (GCC) area in which Oman is leading the modernization of education in the Middle East. In addition, this study needs to highlight on e-learning system difficulties, and how to enhance the system for continuous intention to use e-learning especially when this e-learning system needs to extract the contributing factors from integrated models such as TAM, TTF, ECT, and adopted models, which will be explained in Sections 2.3 and 2.4. This study proposes to combine TAM and TTF models as well as some factors of the ECT model with constructivism features grouped towards attaining an acceptance model for the continuous intention to use the e-learning system. The next sub-sections explain the different types of e-learning systems used within common e-learning system such as khan academy, virtual classroom, webinar, open and distance learning (ODL), MOOC and Moodle. Theses technologies are generally a portable tool, which is accessible through independent browsers that emphasize e-learning systems for communication and continuous intention to use (Dabbagh & Kitsantas, 2012). It is believed that within these e-learning systems, students will increase their knowledge and improve the continuous intention to use e-learning system. Because students with digital e-learning system are heavily exposed to many emerging technologies and systems information accessed at anywhere and any time, the role might be to help students to configure their knowledge and produce new knowledge with continuous intention to use the e-learning system.

2.2.1 E-Learning System

E-learning systems are the educational enablers of the 21st-century and have a huge impact on the educational ecologies (Ellis, & Goodyear, 2013; Aparicio, Bacao, & Oliveira, 2016). Researchers use different terms to identify the e-learning system as Web 2.0 (Lin, et al, 2017), application software (Rahman et al., 2017), or the internet use (Harasis, Qureshi, & Rasli, 2018). Web 2.0 is the most frequently used in relation to e-learning system. According to Terry, et al., (2009), e-learning system is defined as " *technology -enhancement describes the use of technology to support and enhance learning practice*". Besides Liu (2016) definition of an e-learning system is " *a group of*

internet-based applications that build on the technological foundation of Web 2.0 and that allow the creation and exchange of students generated content". These applications or systems like Blogs, Wikis, and video sharing enable the students to connect among each other's for the purpose of continuous intention to use e-learning system (Anderson, 2013).

E-learning system has become a part of university students' services that help them build their connections with others to share, communicate, collaborate the knowledge and continuous intention to use e-learning. The use of e-learning system among students in universities has been a great discussion among researchers throughout the world. Many studies find the relationship to the effectiveness of learning that be part of continuous intention to use e-learning system (Rahman et al., 2017; Schmid, et al, 2014; Naidu And Derani, 2016;). E-learning system has several features such as create a new method of interaction, enhancing the relationship, can share contents and developing the communication between students. These features are important to thecontinuous intention to use e-learning system in the educational environment. These features also can be identified clearly with the same important factors determined by e-learning theoretical models of TAM, TTF, and ECT.

The e-learning system created basically from many important factors identified by TAM2 which are: openness, persistence and distant structure. These factors can be referred to the original TAM and TTF as perceived usefulness, re-fashioned on access and use issues (Toven-Lindsey, Rhoads, & Lozano, 2015). Besides, teacher-subject knowledge, the teacher persistence to deliver the course with the revolution of internet development. In addition, technology integration allows the teacher to contact different students in wide area and distance (Rhoads, et al., 2015). This part illustrates the related and common factors between practical application systems and the theoretical models used to validate the acceptance models that all work for the benefits of HEIs. These existing models used to assess the acceptance of all technologies as wiki, web 2.0, blog of applications can be tried to enhance their performance for all students moving towards the continuous intention to use e-learning systems.

For example, Web 2.0 application factors, this e-learning system provides an interactive course with persistence factor to support the social interaction between students and teachers. This factor represented as interactivity and course content form the TTF model (Rodriguez, 2012; Rodrigues, Zárate, & Isotani, 2018). One more factor was Teacher assistance that matches with Teacher-subject knowledge in theoretical models in

addition to immediate feedback of assessment quizzes and assignments that already matched with support assessment, effectiveness, and student satisfaction from the theoretical model factors. Web 2.0 application emphasized the features to promote the reuse and remixing the resources that compulsory needed for this research to indicate the real need for continuous intention to use the e-learning system (Terry, et al., 2009; Lin, et al., 2017).

The e-learning system has challenges and critical issues that need efforts to overcome such as "Relying on user-generated content can create a chaotic learning environment. The time and effort required from participants may exceed what students are willing to commit to a free online course. Participants must self-regulate and set their own goals" (Al-Freih, 2017). That is why this research proposed to develop an acceptance model of contributing factors for continuous intention to use the e-learning system. This gap of web 2.0, blog and wiki application systems help users to determine the enhancing to continuous intention to use e-learning system.

In previous studies proposed by Damnjanovic, Jednak, & Mijatovic, (2015); Liaw, (2008) identified eight (8) factors that will affect the effectiveness and continuous intention to use e-learning system. These factors were the behavioural intention, continuous intention to use, communicative, information quality, academic performance, perceived usefulness, satisfaction, and system quality to initiate an e-learning system (Liaw, 2008). Even in this model, it missed the important factor contributing as the information quality (as of course content) not influence the satisfaction factor. While, satisfaction factor has a significant effect on the intention to use in the future (Continuous intention to use) (Damnjanovic, Jednak, & Mijatovic, 2015). Also, academic performance factor has contributing to the effectiveness. Contrast, academic performance factor not contributing to the continuous intention to use e-learning system.

For this reason of missing factors contributing such as satisfaction and academic performance, this research tries to explain the e-learning acceptance models in additions to the e-learning system used to find the contributing factors that affect continuous intention to use e-learning systems..

2.2.2 E-learning System Acceptance

The e-learning system is a type of self-assessment that is used to carry out benchmarking or rating of a particular domain. In the context of universities, the e-learning standard assessment checks if the HEI has attained a required level of

acceptance. For an e-learning system, many factors are used to assess system acceptance. One factor is the teacher-subject-knowledge which is based on pedagogical strategies, qualification and experience of teachers (MacDonald, et al., 2001). Another important factor includes the Technology integration, which is based on the type of technology-enhanced learning platforms and applications used by the teachers to deliver the material, that are easily accessed and followed by the students (MacDonald, et al., 2001). These aforementioned factors are employed to measure the outcomes of student learning in high ranking universities across the world (Alkharusi, 2011; Kleebbua & Siriparp, 2016).

The outcome of this acceptance step is the aim to develop the continuous intention to use e-learning system, which is used the same e-learning acceptance factors. Besides, additional factors such as the students' satisfaction, support assessment, interactivity, and academic performance (MacDonald et al., 2001). Another common factor is the effectiveness of the e-learning system which includes factors such as teacher-subject knowledge, course content, and technology integration (Junglas, Abraham, & Watson, 2008). Finally, the university outcomes of the e-learning system related to factors such as perceived ease of use and perceived usefulness which are concerned with behavioural intention towards continuous intention to use the e-learning system. Recommendations made by Lin, Chen, & Liu, (2017) and Liu, (2005) were focusing on how to improve the quality of e-learning are listed as follows:

i. Enhance the e-learning system to support the development and following each student's course material, teacher's subject knowledge to improve the continuous intention to access and use the e-learning

ii. Use technology-enhanced learning in the university by an increased adoption on e-learning system to enhance the student satisfaction on their academic performance as significant factors to enhance the continuous intention of e-learning.

These recommendations are important to be addressed in each stage of the e-learning system. The first stage is based on motivating students to the continuous intention to use e-learning system. The second stage entails the teachers' teaching tools used in the material of courses offered and the experience of teachers in using the technology integration for teaching and assessment toward continuous intention to use e-learning system. Besides, it is aligned to validate the level of satisfaction derived from students regarding the continuous intention to use e-learning system. Moreover, the factors of interactivity, support assessment, effectiveness and academic performance are

linked to the usability of e-learning and its development for continuous intention to use e-learning systems (MacDonald et al., 2001). The e-learning system enables teachers to enhance student understanding, peer discussion, enrich the sharing of knowledge and skills development (Redecker et al., 2010; Tan, 2013). The main difficulties are how to enhance technology results of acceptance and use to be emphasized in the continuous intention to use e-learning system.

Therefore, in order for universities to improve their e-learning systems, there is a need to assess the learning and teaching processes and to find the criteria that affect the success of their e-learning systems and increase student satisfaction (Neila & Latifa, 2011). Likewise, Liu and Chen (2012) studied on how to improve the shared experience of "Faculty Course Assessment Report (FCAR)" towards assessing the courses used by e-learning system. This study determines the significance of teacher-subject-knowledge, support assessment and the required time generated to improve the assessment results through the continuous intention to use e-learning system. The method approach is based on assessment goals for e-learning outcomes, which examines the course content difficulty to be assessed by the teacher and accepted within the factor of student satisfaction. Even though this study was not focused on the continuous intention to use e-learning, it shows the significance of support assessment of course contents.

No matter how many factors are used for constructing a truly effective e-learning system, there are still factors that suffer from inconsistent intention to use the e-learning system. Table 2.1 shows a description of the earliest studies related to the different types of e-learning systems. Table 2.1, summarized the authors, each model problem, what's the method applied, the number of sample size, Data collection material, limitation, and the derived factors from each study.

The summarised table discussed 18 different studies a variety of times from 2011 to 2017. All of them used a survey distribution between students among many universities or institutions to evaluate the acceptance of the suggested e-learning system. The main objective of these studies was based on the needs to develop e-learning systems used in HEIs that consists of contributing factors for different purposes such as enhancing the student learning outcomes (Posey & Pintz, 2016; Lin, et al, 2017; Liu, et al., 2016; Trocky & Buckley, 2016; Bookstaver, 2011; Ioannou et al., 2015), developing the assessment method for continuous intention to use e-learning system (Posey & Pintz, 2016; Beleche et al, 2012; Lin & Wu, 2016; Wilby, et al, 2017; Dargham et al, 2013; Graffigna et al, 2014), enhancing the student satisfaction and effectiveness of e-learning system (Schmid,

et al, 2014; Naidu And Derani, 2016; Chmiel, et al, 2017), or developing the teaching knowledge performance (Strang, 2013; O'Bannon and Britt, 2011; Adwan, 2016). The applied methods used were varied from using MOOC, Wiki chat program, Online learning system, or different technologies developed for the study special purpose of use.

As a result, there are inconsistencies in the findings from the literature review of studies at Table 2.1 regarding the continuous intention to use the e-learning system among students in terms of their perception on continuous intention to use e-learning system and for their purpose of learning. Meanwhile, a portion of the students avoided e-learning systems as they think it's no values to be added in their studies. In contrast, the benefits of using e-learning system with developing student independence and trust with the values of communication with all students using e-learning system are appreciated and recongized by some students, however, using the continuous intention to use e-learning system is not in their plan yet. This suggests that make an acceptance model for contributing factors to continuous intention to use e-learning system are affect ted by many factors that have effects on students' continuous intention to use e-learning system.

In conclusion, most of these studies suffered from missing the continuous intention to use the e-learning system, also, their limitations of determining the contributing factors used for the continuous intention purpose. Therefore, this study needs to highlight in the next section the selected acceptance models that can be used to test the acceptance of continuous intention to use the e-learning system.

Table 2.1 Summarised studies for assistance derived factors

Authors/ Years	Model Problem	Method Applied Mechanism	Sample Size	Material	Limitation	Derived Factors
Schmid, et al, (2014)	How to increase the effectiveness	Use of MOOC and multiple innovative technologies	1105	Survey, open end questionnaire	Continuance intention not considered	Effectiveness Student-Satisfaction Academic- Perform
Posey & Pintz, (2016)	How to evaluate lecturer's teaching method, student performance, and course material evaluation	comprises of (T3) of teaching, transforming, and technology project of Blended Learning	125	Survey on technology used	Continuance intention and effectiveness not evaluated	Teacher-Subject-Knowledge Student-Satisfaction Academic- Perform Interactivity Support-Assessment Effectiveness
Lin, et al, (2017)	How to assess the learning outcome of student academic performance	The web-based survey, online communication tools, wiki chat, and different Google services	116	Survey to learners in (4 subjects)	Factors of ease of use, interactivity, and effectiveness not considered	Academic- Perform
Liu (2016)	How TEL used to optimize SLO in universities	use of Web 2.0 application, video BLOG, and face to face interaction	-	Use of online automatic scoring marks	Only SLO considered without relating with another need	Academic- Perform Continue Intention
Beleche et al (2012)	How online assessment help in SLO	Use of post-test objective grade and use different faculty for assessment.	77 instructors 519 students	Survey for test evaluation	The study ignores the continuity intention and technology integration	Support-Assessment Student-Satisfaction
Strang (2013)	Missing to the model of instructor collaborative in study approach	Use of TEL and online exams	162	Survey to improve tool assessment	Only assessment and acceptance available	Teacher-Subject-Knowledge Student-Satisfaction

Table 2.1 Continued

Authors/ Years	Model Problem	Method Applied Mechanism	Sample Size	Material	Limitation	Derived Variables
Trocky & Buckley (2016)	How to reflect interactivity to improve SLO	Use of Wikis to improve student learning as collaborative or developed activities, by improving assignments electronically with high satisfaction feedback	-	Survey, Online open-ended questionnaire	The study not related between course, teacher and learners.	Academic- Perform Continue Intention Student-Satisfaction
Bookstaver (2011)	Using chat for improving independent student learning	Use groups of Wikis chatting for each assessment for easy understanding	15	Survey, Online open-ended questionnaire	Only developing student purpose	Effectiveness, Perceived ease of use, Student Satisfaction
Ioannou et al. (2015)	impact of Wiki chat on student learning	Use of online chat to support students in writing, developing, and formatting their reports	34	Survey	Only serving student purpose in learning	Interactivity, Technology Integration Effectiveness
O'Bannon and Britt (2011)	effect of using Wiki to create, design and increase the knowledge of lecturers	Use of technology TEL with keep read, write and edit of the material	103	survey	Only serving Lectures purpose	Course Content Perceived ease of use Perceived usefulness Effectiveness
Lytras et al. (2015)	Test influence of perceived usefulness and transformation with BL	Use of BL, Combine face-to-face with online learning	-	Online open-ended questionnaire	Not much satisfied by learners and not guarantee to improve SLO	Student Satisfaction Academic Performance Effectiveness
Naidu And Derani, (2016)	How to investigate the quality standards of each university in relation to the satisfaction students	usage of a survey evaluation (SERVQUAL) universal method tool	100	survey	Less acceptance than TAM with continuance intention and assessment	Student-Satisfaction Academic-Perform Support-Assessment

Table 2.1 Continued

Authors/ Years	Model Problem	Method Applied Mechanism	Sample Size	Material	Limitation	Derived Variables
Chmiel, et al (2017)	How to improve evaluation framework	TEL with the tools of student, faculty, and administrator	-	Survey	Not connected with the intention of the portal	Support-Assessment
Lin & Wu, (2016)	The problem of traditional marking and assessment method	Use of TEL based tools by automatic quiz assessment	186	Web based survey	The study not related to the interactivity of ease of use in the model assessment	Academic-Perform Support-Assessment
Wilby, et al (2017)	The needs to develop a full assessment system	Create a committee of students, faculty, and administrators to follow the assessment policy and approval checking.	-	Web based survey	The whole system has the manual procedure without relating to e-learning	Student-Satisfaction Academic-Perform Support-Assessment
Dargham et al (2013)	The needs to develop a full assessment system	Create direct assessment (online exams) and indirect assessment (projects, teamwork assignments)	68	Web based survey	The study missed the effect of teacher knowledge and course content with the usefulness	Student-Satisfaction Academic-Perform Support-Assessment
Graffigna et al (2014)	How to evaluate the right assessment	Use of Self-assessment for accreditation program and institute evaluation	-	Survey, Interview	Think on accreditation more than e-learning benefits	Support-Assessment
Adwan (2016)	How to improve learning and teaching quality outcomes.	develop on applying web-based Google forms for managing different assignments of students	2 Groups	Survey		Student-Satisfaction Academic-Perform Support-Assessment

2.3 Background of Acceptance Models

There are many acceptance models which researchers use in assessing e-learning acceptance that has been the focus of the e-learning systems (Burton-Jones and Hubona, 2005; Schumacher, & Ifenthaler, 2018). The goal of these models is to understand the factors that relationship the adoption of new models. Various studies described the significant relationship factors in the process of adoption, technology acceptance and lead to continuous intention to use e-learning system. E-learning findings from prior studies suggested that the integration of face-to-face (from 90% to 20%) and online learning (from 25% to 100%) can improve to be 100% online learning. For example, prior studies mentioned that in relation to the factors that have relationship students in achieving improved continuous intention to use e-learning system, it is not clear if the benefit of e-learning is not better than the traditional learning approach (Shih, Feng & Tsai, 2008).

Numerous models were used to justify the relations between factors to explore the acceptance and continuous use of the e-learning system, like models explained in Table 2.1. Table 2.1 list past research on different acceptance models, namely TAM, UTAUT, TTF, ECT, and TPB used for bot acceptance e-learning and continuous intention to use e-learning system mechanisms applied and sample size applied in each, as well as the country of study. It can be seen from Table 2.2 that studies mainly focused on the acceptance and use of e-learning system that are mainly done in developed countries as well as Asian countries but no studies have been known to be done in the Gulf Cooperation Council (GCC) particularly in the Sultanate of Oman.

Table 2.2 Relevent Theories for Continuous Intention to Use E-learning System in HEI

Authors/Year	Research Objective	Models Used	Mechanism Applied	Sample Size	Country of study
Ajzen, (1991)	Use belief and behavior concepts for model understanding	TPB	Internet connected, web of 2.0.	215	---
Chen (2010)	Examine factors that relationship e-learning adoption	TTF	Online Learning	220	Taiwan
Theng & Sin (2012)	Introduce support for online learning through building MOOC:	TAM+ E-learning	E-learning	451	---

Table 2.2 Continued

Authors/Year	Research Objective	Models Used	Mechanism Applied	Sample Size	Country of study
Barnard (2013)	Investigate the UTAUT factors relationship on education	UTAUT	Education	---	---
Lin (2013)	Investigate the relationship between TAM and usability	TAM + E-learning	Online learning	1525	Taiwan
Tan (2013)	Investigate the needs of Taiwanese universities to English e-learning websites	TAM	E-learning	---	Taiwan
Stone, Barker-Eveleth (2013)	Enhance e-textbooks through the adoption of continuous intention to use e-books	ECT	Electronic Textbooks	469	United State
Alraimi et al., (2015)	Integrate TAM and ECT in E-learning for discovering factors that affect education	TAM + ECT	E-learning	346	---
Baker-Eveleth and Stone (2015)	Examine factors that relationship e-learning continuous intention	TAM + ECT	Electronic-books	1434	USA
Parameswaran, Kishore, & Li, (2015)	Use of UTAUT toward engagement of technology continuous intention to use	UTAUT	Web 2.0 technology, Blog tool	250	---
Hone, El said, (2016)	Understand MOOC factors and its retention	---	MOOC	379	Cairo
Islam (2016)	Moderate student learning and teachers teaching skill	---	E-learning	165	Finland
Wu, Chen (2017)	Integrate TAM factors with MOOC features for continuous intention to use	TAM+ TTF+ E-learning	Web 2.0 technology	252	China
Joo, So, Kim (2018)	Examine the relationships among technology acceptance, satisfaction, self-assessment and continuous intention to use	TAM	MOOC	222	---

The TAM model has been used across various research domains with different methodologies of e-learning systems (Cabada, et al., 2018; Islam, 2016; Wu, Chen, 2017). The TTF model was used to examine the acceptance and intention to use e-learning systems like MOOC in terms of its usability and its features performance (Furneaux, 2012; Junglas, Abraham, & Watson, 2008). Bhattacherjee (2001), Mullen et al, (2018) and Lee (2010) used the ECT model to examine the continuous intention to use e-learning

of information system (IS) users, by comparing acceptance and success. Baker-Eveleth and Stone (2015), as well as Bhattacherjee and Premkumar (2004) on the other hand, the TAM, TTF and ECT models and extended factors to assess acceptance and task performance. The TAM, TTF and ECT were selected due to their simplicity and predicting intention of continuous use (Lee, 2010; Wu, Chen, 2017; Baker-Eveleth and Stone, 2015). Therefore, the purpose of this research is to implement the detailed models to indicate continuous intention to use e-learning system.

All in all, this research has been conducted to improve continuous intention to use e-learning systems. The following five subsections will explain the different existing acceptance models.

2.3.1 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) by Davis (1989) is the earliest model investigating the acceptance and intention of using technologies. TAM was built from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) which has four interrelated constructions, namely belief, attitude, intention and behaviour as this model's concern is to justify the behaviour of individuals that relationships the intention of system use.

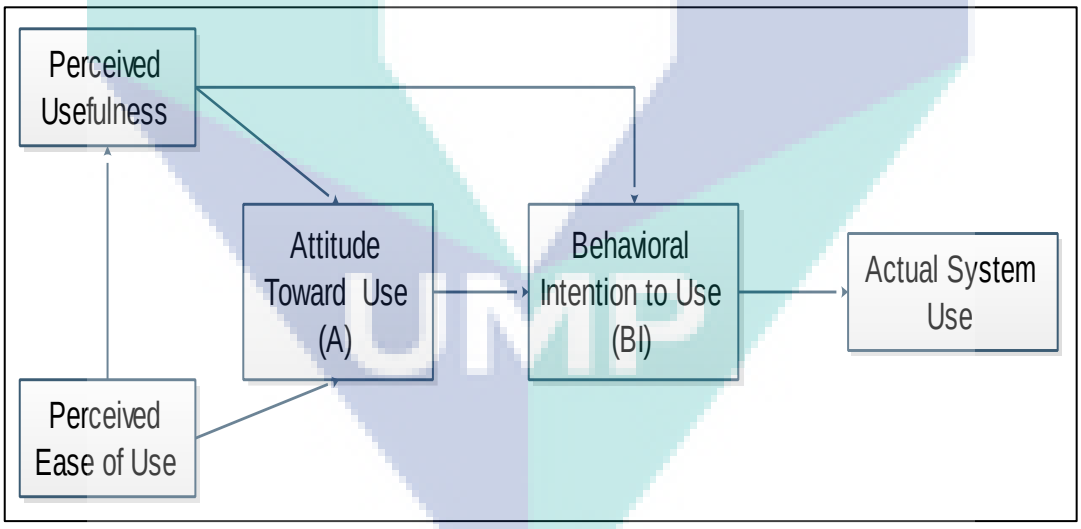

Figure 2.4 Technology Acceptance Model (TAM)
Source: Davis, et al. (1989)

Figure 2.4 shows that original TAM consists of four notable factors, namely 1) perceived usefulness (PU), 2) perceived ease of use (PEOU). 3) attitude towards behaviour, and 4) behavioural intention which are all pointing towards system use (Davis, 1989). Furthermore, TAM justifies the relationship of technology intention to use for

behavioural intention. These factors are highly accepted to validate the intention to use the e-learning system (Theng & Sin, 2012; Chen, 2010). PEOU refers to *"the degree to which a person believes that using a particular system would be a free effort"* Davis, (1989). In the e-learning context, PEOU refers to what users expect on the easiest to determine e-learning acceptance (Al-Hawari & Mouakket, 2010; Saadé & Kira,2009).

Referring to Davis et al., (1989), Perceived Usefulness (PU) can be defined as "*extent where a user perceives that a technology assists in improving capability and effectiveness to complete a task*". In the e-learning context, PU refers to users' beliefs that e-learning can enhance their performance and likewise their capacity to complete an activity (Al-Hawari & Mouakket, 2010; Saadé & Kira,2009). These previous studies revealed that technology acceptance using PU and PEOU can impact on student behaviour intention to accept or reject the system. Attitude factor is difficult to implement as it depends on the user's attitude towards using technology. Therefore, this factor was not considered with many other studies that used TAM as the main model to test its acceptance and validity (AL-Maroof, et al. 2018; Wu & Chen, 2017,). This indifferent attitude demotivates the students to adopt the e-learning to justify the students' needs where no beneficial functions serve the continuous intention to use e-learning system.

In further studies, TAM adopted to be added more factors and derives a new type called TAM2, then TAM3 by Lee, (2013). He used adopted TAM3 for confirming behavior intention of user acceptance to use YouTube in learning. These two adopted versions came out by combining TAM with other different models such as TPB, UTAUT and sometimes with ECT (García, et al., 2019; Sharifzadeh, et al.,2017; Harasis, Qureshi, & Rasli, 2018). The main objective of these adopted versions of the TAM model was to enhance the acceptance of e-learning in an organizational product and the engagement level of the students with the organization of each job or university. Besides, these types of combination to present an adopted TAM were mostly used to enhance the use of social media and serve the internet network or for company requirement of quality (Sharifzadeh, et al.,2017; Harasis, Qureshi, & Rasli, 2018).

For further information, Figure 2.5 shows the adopted TAM as TAM3, this model used to overcome some limitations of original TAM, by explaining the relationship system acceptance and behaviour intention (Cheung and Vogel, 2013). Consequently, some studies have identified there is a need to extend TAM and including external variables for organizational level and task characteristics for explaining the causal

relationships among factors (Davis, 1989, Taylor and Todd, 1995, Venkatesh and Davis 2000.

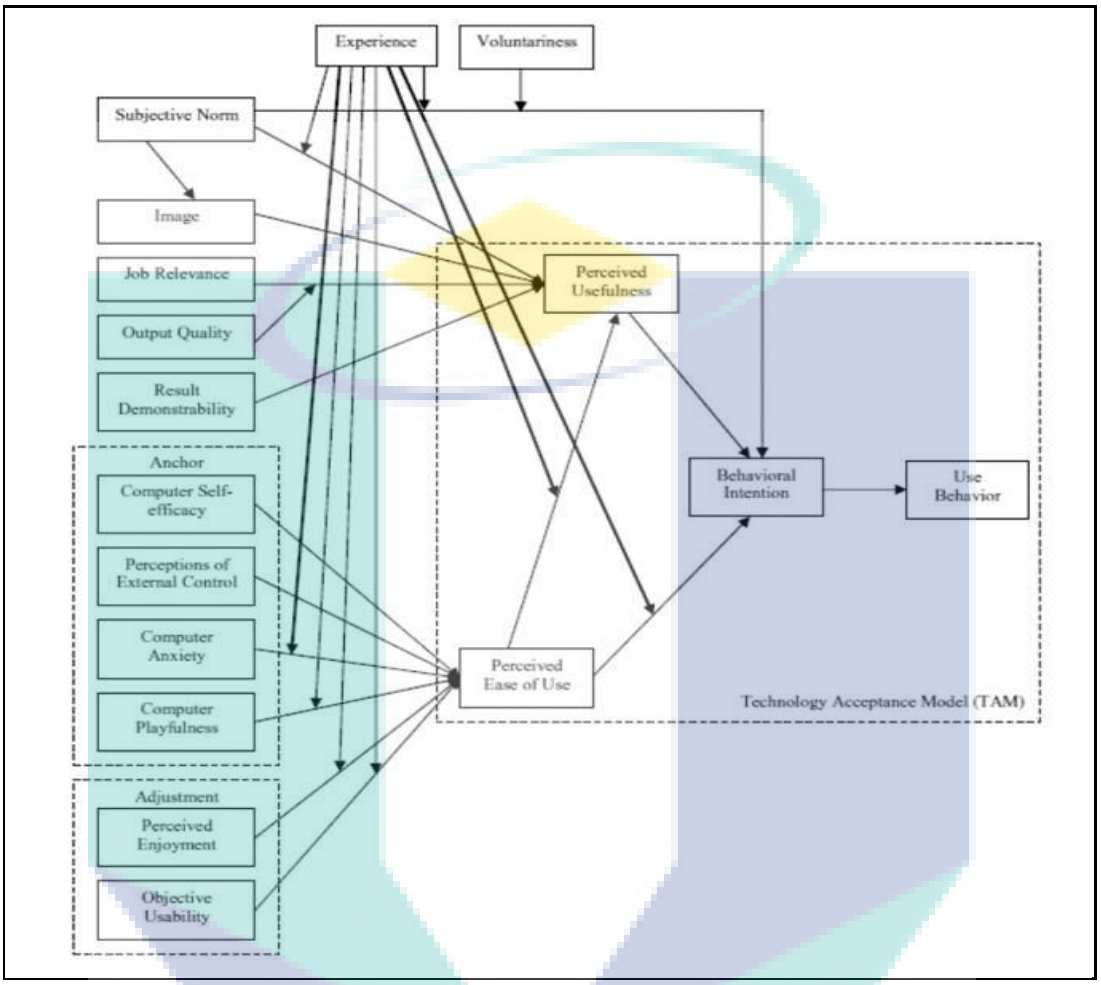

Figure 2.5 Adopted TAM2 and TAM3

Source: García, et al. (2019)

In 2000, Venkatesh and Davis introduced TAM 2 included many factors such as subjective norm, job relevance, image, output quality, result demonstrability that all have influence to perceived usefulness as external factors to validate the model impact on persons who work in an organization or any business performance. Moreover, TAM2 focusing on the" individuals' mental assessment of the match between important work goals and the consequences of performing job tasks using a system serves as a basis for forming perceptions regarding the usefulness of the system (Venkatesh & Davis, 2000). ". Even though, it can be validating the impact of these factors on students to validate the organization output and performance but not for student perception of acceptance the model and their need to continuous intention to use e-learning system. Furthermore, its

completely target the usage of a system of high-quality output as organization output, but not used for student perception or their acceptance to develop a feedback on keeping reality to continuous intention to use e-learning system.

In 2008, Venkatesh and Bala introduced TAM3, which combine TAM2 with PEOU (Venkatesh,2000). TAM 3, added more factors related to (Anchor) that all related on the computer used by the students and the functionality of it to give impact of student perception to use the model. Also factor of (adjustment) to have the enjoyment and the usage of computer as external factors influence to perceived ease of use (Lai, 2017).

The adopted TAM2 and TAM3 represented the contribution to IS community, they proved as solid and effective enough for mobile commerce, data mining, email, online financial or mobile payment technology (Al-Emran et al., 2016, Huang et al., 2017, Venkatesh et al., 2003).

This research tries to find the factors that effect on the students continuous intention to use e-learning system and their trust of the services given by the e-learning system that consider the technology integration, support assessment, and student satisfaction as the major factors to encourage the students to continuous intention to use e-learning, more than focusing on the students psychological perception or the computer features effects. For this reason, this research decides to use the original TAM with its basic factors to shade lights on the system services that impact directly on the continuous intention to use e-learning system.

Besides, this study focuses on student perception as individual use, while TAM2 and TAM3 work towards combine between individual use and organizational benefits of use. Furthermore, Wu, & Chen, (2017), Lee, & Lehto, (2013), kept nominating the original TAM as an easy and flexible model to be integrated easily with another model and adopted them to the acceptance model for continuous intention to use the e-learning system. As many researchers used TAM for their adaption models more than using the adopted models such as TAM2 and TAM3.

However there are many studies considering TAM2, and TAM3, but still, these studies focusing on the acceptance level of the e-learning system. This research tries to enhance the acceptance of e-learning to be continuous intention to use the e-learning system which can be achieved with minimum contributing factors from original TAM with the assistance of factors of TTF and ECT models. Besides, to enhance the continuous intention to use the e-learning system, the adoption of already adopted models like TAM2

and TAM3 will be a complex and complicated model, which not be helpful in the target of continuous intention to use. Also, the number of contributing factors will be high and difficult to evaluate the significant level of work. For this reason, this research decides to use the original TAM with its basic factors to shade lights on the system services that impact directly on the continuous intention to use e-learning system.Therefore, this research use TAM for the adoption model instead of using adopted model for adoptional target. Beside still TAM2 and TAM3 both are not used for continuous intention to use e-learning.

2.3.2 Expectation-Confirmation Theory (ECT)

ECT has been introduced for marketing domain since 1980. This model was developed originally by Oliver (1980) as seen in Figure 2.6. The ECT model by Oliver (1980) consists of five constructs, namely 1) perceived usefulness, 2) expectation, 3) confirmation, 4) satisfaction and 5) repurchase intention.

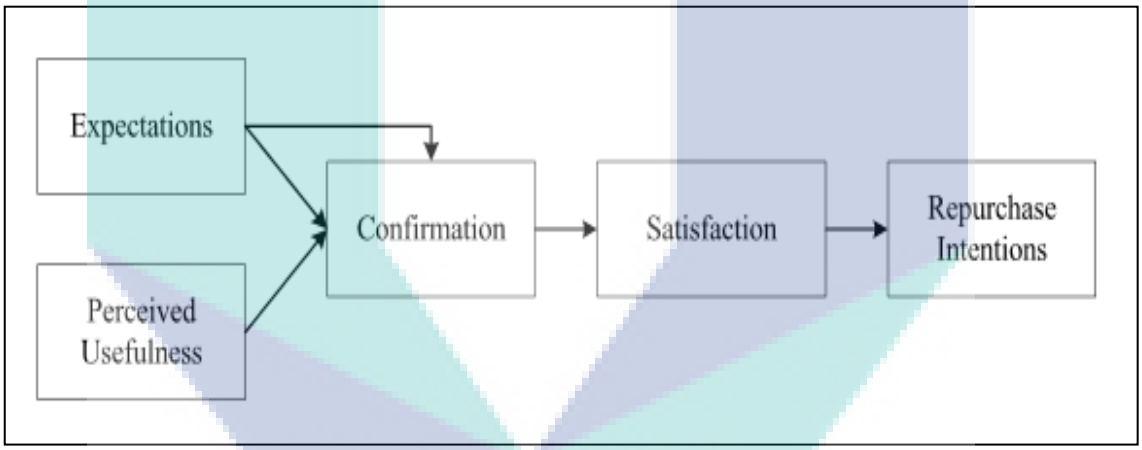

Figure 2.6 Expectation-Confirmation Theory (ECT)
Source: Oliver (1980)

These five constructs are related to the buyer's behaviour in regards to their purchasing process of any products or services. When a buyer buys a product, it may be due to the knowledge of perceived usefulness and if the purchase meets the users' expectations, it may seal the deal of loyalty upon confirmation and satisfaction which may relationship repurchase intention. In the education sector, satisfaction is related to the student's acceptance on the development of their academic performance to improve continuous intention to use (Bhattacherjee, 2001; MacDonald et al., 2001; Engelbrecht, 2003; Lee, 2010). Recently ECT theory came to be used in information system and with e-learning continuous intention to use by Bhattacherjee (2001).

The model is also used to justify the continuous intention and the satisfaction of students in using e-learning system and technology information by Venkatesh and Davis (2000). The perceived usefulness looks at the technology acceptance related to continuous intention to use with performance (Bhattacherjee, Premkumar, 2004; Venkatesh et al., 2011). However, because confirmation is used to indicate the level of usefulness of task for continuous intention to complete a task or project, confirmation is not applicable in this study. Project completion is more suitable for management level, rather than at the individual level, which is more applicable for student users (Oliver, 1980; Venkatesh et al., 2011).

In Venkatesh and Davis (2000), the expectation factor is referred to the student's targeted needs from the course. Their findings show the perceived usefulness which refers to user expectation advantages when utilizing a technology (Davis, 1989), which makes the expectation factor represent the same as perceived usefulness for this study of acceptance Model.

The repurchase intention is similar to 'continuous intention to use' factor to justify the satisfaction surrounding the services providers (Oliver, 1980). In e-learning context, satisfaction and perceived usefulness are the significant factors continuous intention of technology and e-learning use.

Another research by Joo, So, and Kim (2018) validated the relationship among perceived usefulness, perceived ease of use, satisfaction and continuous intention using ECT. Previous studies revealed that perceived usefulness and satisfaction are significant factors to show continuous intention to use e-learning system (Venkatesh, and Davis, 2000; Bhattacherjee, 2001; Bhattacherjee, Premkumar, 2004; Venkatesh et al., 2011). Based on these findings, ECT was recommended by Hone, El said (2016), Joo, So, and Kim (2018) Venkatesh and Davis (2000). as well as Bhattacherjee (2001) to enhance the continuous intention to use e-learning system.

2.3.3 Task-Technology Fit (TTF)

Task-Technology Fit (TTF) has been adopted and adapted by many studies to test the communication between tools for testing the continuous intention to use e-learning (Larsen, 2009; Junglas, Abraham, & Watson, 2008; Goodhue & Thompson, 1995; Cabada et al., 2018; Furneaux, 2012). The TTF model by Goodhue & Thompson (1995) is illustrated in Figure 2.7. TTF consists of three factors as 1) Individual characteristics, 2) Task characteristics, and 3) Technology characteristics of which each one also has

relationship over TTF. This model reveals the technology use and performance benefits as output from the model.

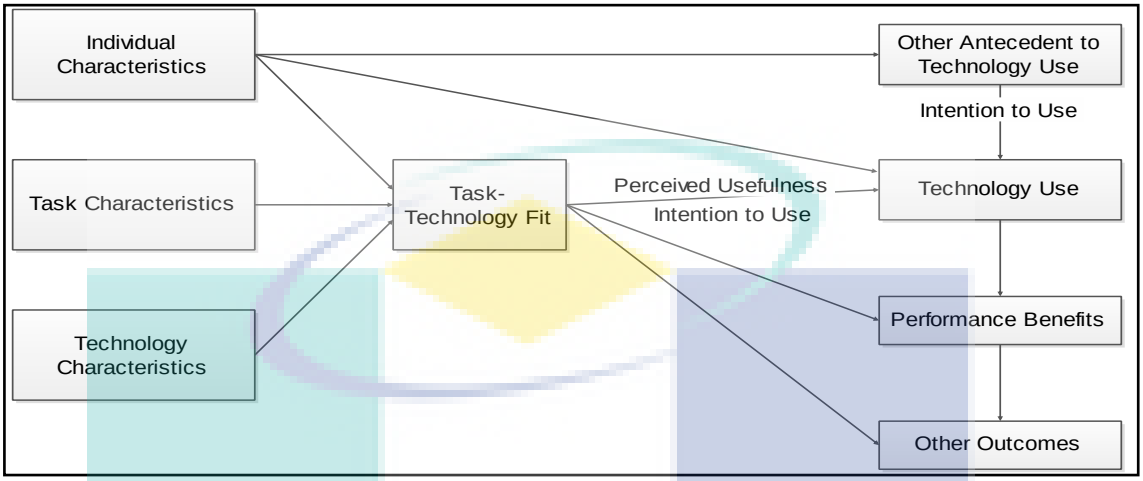

Figure 2.7 Task Technology Fit (TTF)
Source: Goodhue & Thompson (1995)

This model uses relationship between individual characteristic factors that justify the teacher task for the student in the e-learning system (Huang, Zhang & Liu 2017; Wu, & Chen, 2017; Lee & Lehto, 2013; Islam, 2016). Task characteristic factor refers to the course content when learning features of course material and teacher knowledge relationship the acceptance of the e-learning system (Huang, Zhang, & Liu, 2017; Islam, 2016). According to Karnouskos (2017), technology characteristic used as interactivity factor, refers student interactions between themselves, and between student-teacher to communicate about the course using technology tools that indirectly relationship the continuous intention to use e-learning system.

Thus, it is apparent that the different technologies and e-learning system used in the universities could directly or indirectly relationship the level of performance and continuous intention to use e-learning system (Cabada, et al., 2018). The potential of increasing the teaching and learning outcomes conducted by Islam (2016) suggested that e-learning system is created based on many types of constructs to moderate student learning and continuous intention to use e-learning for teaching outcomes. Therefore, this study recommends TTF to be included to enhance the continuous intention to use e-learning system.

Huang et al., (2017) adjusted the factors names with more specific factor names to meet the e-learning system needs that indirectly relationship the continuous intention

to use the system. In Huang's et al (2017) TTF model, Technology Integration was replaced with Technology Characteristic, Individual characteristic, was replaced with Course Content and Task characteristic to Teacher-Subject-Knowledge. These factors (course content, and teacher-subject-knowledge) are found to have a significant effect on the effectiveness factor, which is an output of the model that is cyclical. (Lee & Lehto, 2013). This TTF model, along with adjusted factors as applied by Huang et al. (2017) combined with the Davis' 1989 TAM model, as well as selected ECT factors (Goodhue & Thompson, 1995) should produce better adoption of Acceptance Model to indicate continuous intention to use e-learning system.

2.3.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

Another common acceptance technology model is known as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). This unified theory has been widely used for continuous intention to use e-learning system and in an online environment. This model is constructed on four factors as shown in Figure 2.8. namely performance expectancy (PE), effort expectancy (EE), and social influence (SI) and facilitating conditions (FC) which directly relationship Behavioural Intention (BI).

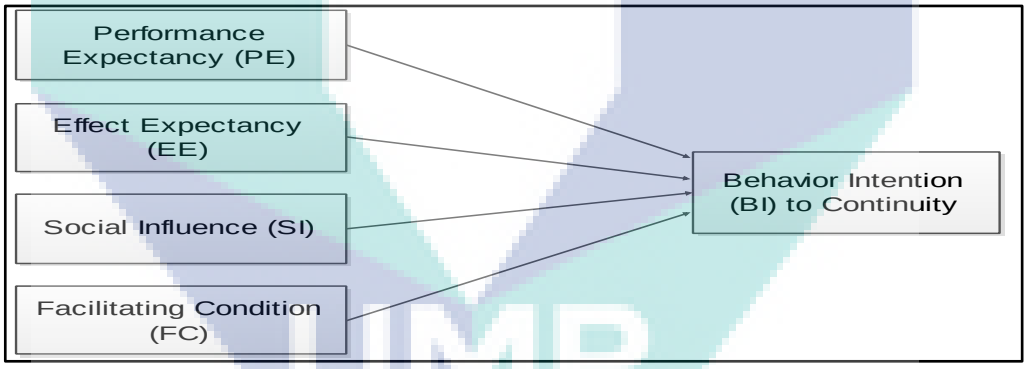

Figure 2.8 Unified Theory of Acceptance and Use of Technology (UTAUT)
Source: Venkatesh et al., (2003)

This model is appreciated by many types of learning tools when their target is related to behavioural intention (Rahman et al., 2017). Social influence factor refers to justify the type of interactivity between different types of communication. (Muller, et al., 2017; Hone, Elsaid, 2016). Their goal was to investigate the factors of Wiki system on behavioural intention to continuous use (Lin, et al, 2017; Bookstraver, 2011). This study came with the approval of using Wiki for continuous intention to use.

This model not recommended in this study, because UTAUT model factors are not related to the significant effects factors as effectiveness, support assessment, academic performance and student satisfaction that declared as reasonable factors to enhance continuous intention to use e-learning system. Besides, UTAUT model factors had not look at individual use of student's perception (Venkatesh et al., 2003), it is not included as part of the acceptance model developed in this study.

2.3.5 Theory of Planned Behaviour (TPB)

Another common model as seen in Figure 2.9 is used in testing the validity and improving the accuracy of proposed models is Theory of Planned Behaviour (TPB) (Ajzen, 1991). This model has different types of factors, namely Attitude towards behaviour (A), Subjective Norm (SN), Perceived Behaviour Control (PBC) each of which relationships the 'Intention to use' factor. The finding of Ajzen (1991) reveals the complexity of human social behaviour. All the factors of this model are related to human behaviour, which is one of the factors that has a significant indirect relationship on continuous intention to use e-learning as single factor called behavioural intention (Ajzen, 1991; Davis, 1989). Therefore, this type of technology acceptance is not highly recommended for testing technologies development or in submitting different application tools to improve the continuous intention (Rahman et al., 2017). Furthermore, this study looks at human behaviour with case of complexity in difficult task. This model reveals the attitude and personality are implicated in human behaviour (Ajzen & Fishbein, 1980). Therefore, TPB is also not included in the acceptance model that is going to develop.

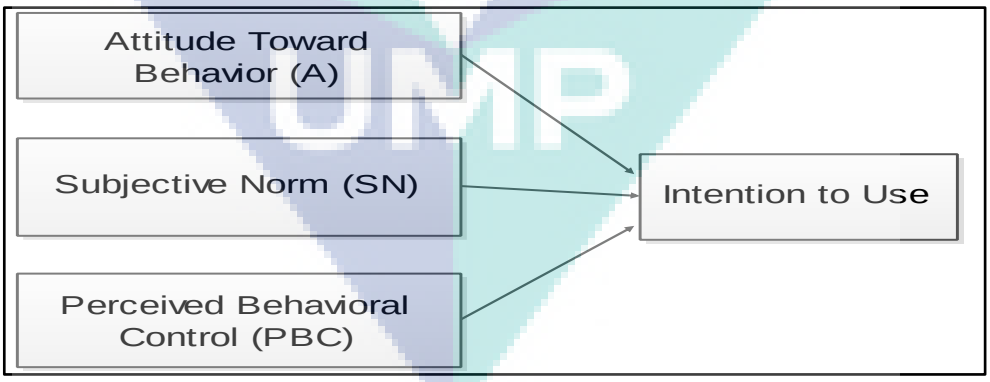

Figure 2.9 Theory of Planned Behaviour (TPB)
Source: Ajzen, (1991)

Furthermore, many studies proposed models of combined between different these common models as for more enhancement especially when they work towards the

continuous intention to use of e-learning system. For example, Larsen, et al., (2009) and Huang, Wu, & Chou, (2013), they used TTF with ECT for continuous intention to use information systems. Also, Wu & Chen (2017) and Dishaw, & Strong, (1999), they merged TTF and TAM for continuous intention to use MOOC and application systems. In additions, Harasis, Qureshi, & Rasli, (2018) and Al-maghrabi, Dennis, & Vaux Halliday, (2010) they used merging models between TAM and ECT to enhance the continuous intention to use. However, these studies used for organizational work beneficial outcomes and not proper for the individual level as students in this study.

Another studies, Peltier, et al, (2003) proposed a theoretical model to use factors of course content, interactivity, teacher-subject knowledge and satisfaction for the online learning quality. Besides, MacDonald, et al, (2001) used the common e-learning model called the DDML model for the important purpose of continuous intention to use and for improving a learning process. Furthermore, these studies not mentioned the importance of student perception towards continuous intention to use e-learning, which is major consideration in this study

Joo, So, Kim, (2018), used a theoretical model of ECT model and external factor self-determinant for continuous intention to use MOOC. As it seems self-determinant factor is not recommended as common factor to enhance the continuous intention to use e-learning. Chen (2010) used TAM with additional factors of quality information to link e-learning systems with continuous intention to use for job outcomes. As a conclusion, this study still used the TAM because the existence papers published in 2016 to 2019 still, they used TAM properly and merge it with additional models to achieve their target of enhancing the system acceptance of use.

To conclude, all these models are commonly used to test the acceptance of continuous intention to use e-learning system but some such as UTAUT and TPB are more suitable to be used at the organisational level (Venkatesh et al., 2003; Ajzen, 1991). Thus, this study favours integrating TAM, TTF and partial aspects of the ECT model because they enhancement continuous intention to use e-learning systems that indicate the student achievements by looking at factors such as Effectiveness, Support Assessment, Academic Performance and Student Satisfaction in the HEIs. The TRA, UTAUT and TPB are still not highly used from their factors for the purpose of continuous intention to use for individual students in the educational sector, while the TAM, TTF, and ECT models are highly recommended in this issue. Notably, ECT in some cases can

be used for organizational benefits more than individual benefits but still some factors are inter-related with individual use.

2.4 Related Theories and Models used in Prior Studies

In this section, there are 34 studies collected from the open database of journals and conference proceedings related to the acceptance models for using e-learning to enhance the continuous intention to use e-learning system. In this section, four different models represented by Figures 2.10 to 2.13 developed by Huang, Zhang and Liu (2017); Hone and El said (2016); Joo, So and Kim (2018) and Ifinedo, Pyke and Anwar (2018) respectively are used to explain the factors that have direct and indirect relationship and effect on the continuous intention to use e-learning systems. According to studies by Larusson and Alterman (2009) and Bookstaver (2011), the potential of using e-learning technologies continuously can enhance the collaboration and communication among the students as well as shared knowledge and ideas to enhance their academic performance. However, those studies lacked theoretical base (Le et al., 2018; US Department of Education. (2017).

Many studies highlighted the continuous intention to use e-learning system with technology acceptance models being used to test the validity of teaching and learning by students whose evaluations will improve this kind of environment for continuous intention to use e-learning system (Lytras et al., 2015; Lee, Yeung, & Ip, 2017; Pragman, Bowyer, & Flannery, 2010). There are intensive needs to do a research dealing with students' perceptions, their behavioural intentions, and support assessment for continuous intention to use e-learning for teaching and learning enhancement in HEIs.

As such, recent studies (Huang, Zhang & Liu, 2017; Hone & El Said, 2016) related to a Massive Open Online Course (MOOC) have been published to examine how MOOCs aim to extend the direct factors proposed in the TAM. Figures 2.8 and 2.9 show both published studies that focused on the continuous intention to use e-learning system.

In previous study of Huang, Zhang, Liu (2017), the model factors involved for course content to improve teacher-subject knowledge with the interactivity and effectiveness for intention to use technology. This study was adopted from original TTF model (Goodhue, & Thompson, 1995; Furneaux, 2012) In addition, another study by Hone, El said, (2016), in which the model justified the factors, course content, interactivity and effectiveness that significantly relationship the continuous intention to use e-learning system. These studies were mainly focused on exploring how teacher,

student, and technology contribute to improving learning activities in e-learning platforms such as MOOC. Therefore, their studies are targeted toward the regression of content, interactivity, and effectiveness to the benefit of teachers and students more than focusing on continuous intention to use. Furthermore, interactivity can be indicating to social influence where it pointed to the way of communication and information knowledge progress between students from UTAUT (Hone, El said, 2016; Huang, Zhang, Lin, 2017).

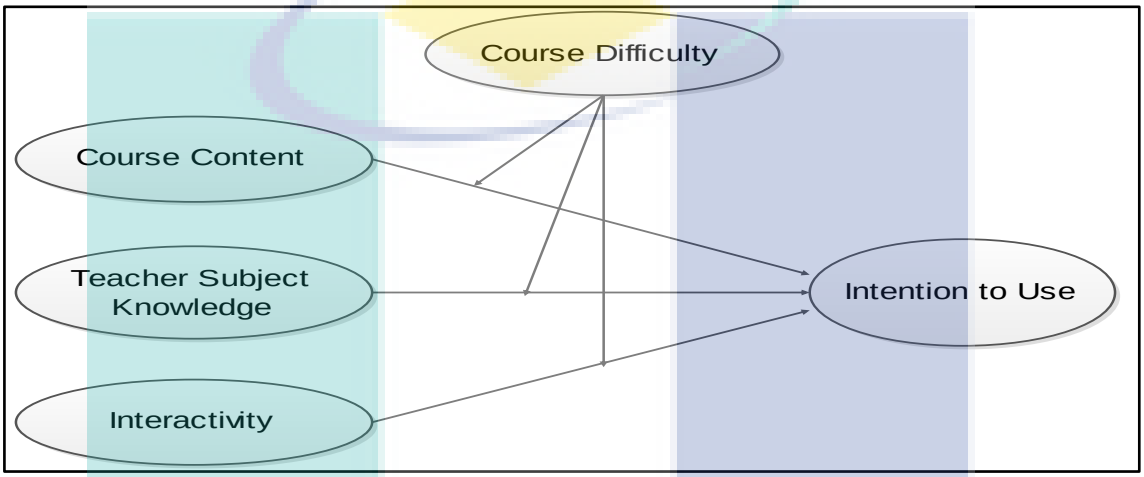

Figure 2.10 Research Intention to Use Composite Factors
Source: Huang, Zhang, Liu, (2017)

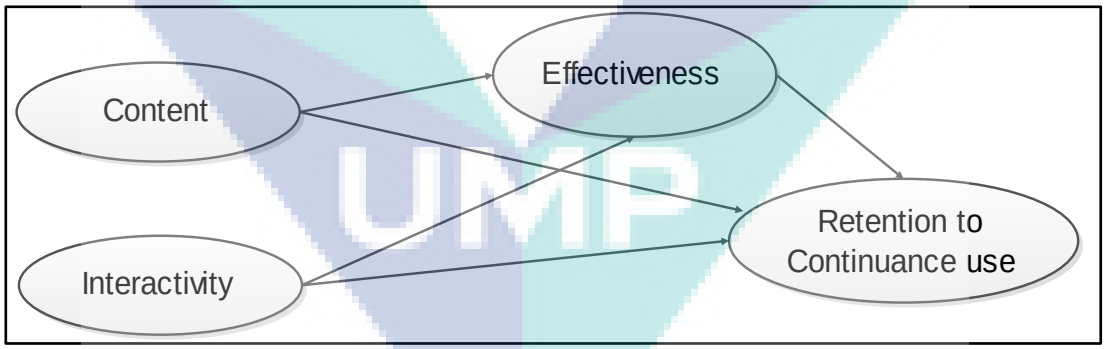

Figure 2.11 Research Model of Effectiveness Relationship to Continuous use
Source: Hone, El said, (2016)

Conversely, other studies such as Alraimi et al., (2015) investigated the impact of student learning progress in relation to internal and external factors like course content and teacher-subject knowledge that have an effect on teaching and e-learning system use. Although findings from the study offered valuable knowledge on teaching area and experience, the authors of this study did not consider the continuous intention to use the

system in their study as significant. Their main finding on the effectiveness of factors course content, interactivity, and teacher-subject-knowledge is to bring on new knowledge to improve further the educational practice. Still this study limitation with how to improve the model for continuous intention to use by students.

According to Chen (2010), there is a need to examine factors (perceived usefulness, and satisfaction) that relationship e-learning adoption and further explore how these factors can affect the continuous intention to use e-learning system. These factors are needed to assess the effect of perceived satisfaction on the model to improve continuous use intention of e-learning system. Likewise, more factors have appeared as Lee et al. (2017) researched the correlation between the three keys of interactivity, technology integration, and student perception factors with their need to improve the continuous intention to use e-learning.

Joo, So, and Kim (2018) in their article of adopting TAM, presented these two factors, namely PEOU and PU, which justify the significant relationship to behavioural intention that are recommended with a significant effect on satisfaction and continuous intention to use e-learning. This model adopted from TAM and ECT which comprises of initial acceptance and satisfaction as outcome factors. The model is shown in Figure 2.12, were they selected some factors to be implemented for continuous intention to use e-learning. This study model views satisfaction as a mediating factor between PU, PEOU and continued intention to use the model. Therefore, this study used as core study to re-select the needed factors to enhance the continuous of e-learning use.

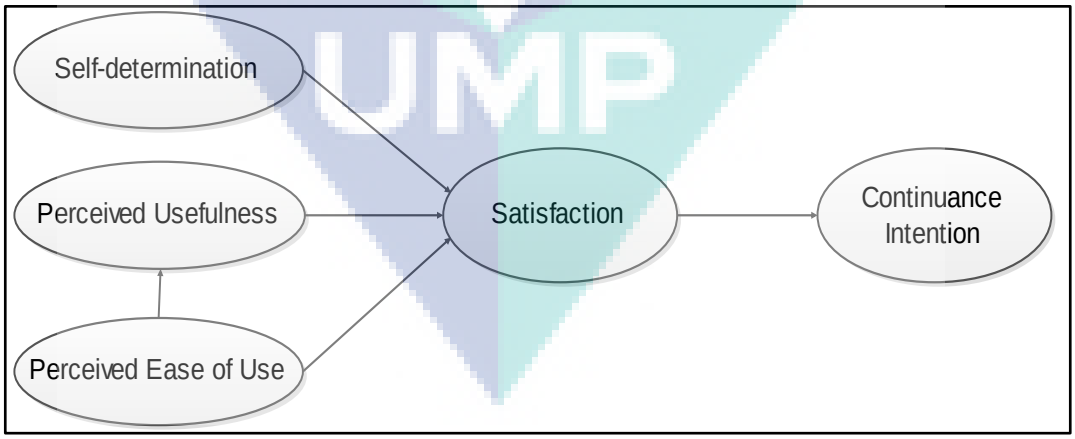

Figure 2.12 Research Model for Continuous Intention

Source: Joo, So, Kim (2018)

The findings reveal a significant result that has effect on continuous system use. In addition, PU has a significant effect on satisfaction and behavioural intention to keep using the system. However, both factors are not directly significant experiment with continuous intention to use in e-learning system. Bhattacherjee (2001) used ECT that uses acceptance factors to determine satisfaction as the initial acceptance. In this study, the author focuses on motivation as a relationship of the initial TAM factors such as PU and PEOU indirectly on the continuous intention to use without considering any additional regression and effectiveness of other factors related to educational process such as TTF factors of content, interactivity relationship satisfaction towards the continuous intention.

Ifinedo, Pyke, and Anwar (2018) proposed the application of the TAM which suggested that the relations between system use and benefit outcomes through academic performance can be achieved in e-learning. The model is shown in Figure 2.13. The relationship suggests that when the student participates in a continuous e-learning system, their academic performance is improved (Ifinedo, Pyke, and Anwar, 2018; Kleebbua & Siriparp, 2016). The ECT theory also combined in this study through the factors of perceived usefulness, satisfaction and continuous use (Oliver, 1980). Peer support factor refers to the type of confirmation could be predicted from both peer to peer discussion on the activities of the student (Ioannou et al., 2015; O'Bannon and Britt, 2011). In addition, TTF model also used, where peer support can be referring to the interactivity factor by sharing knowledge between students (Karnouskos, 2017). Teacher support refers to the teacher knowledge and experience to explain the material and discuss assessment feedback (Posey and Pintz, 2016). At the end of this model proposed by Ifinedo, Pyke, and Anwar (2018), the study combined TAM, TTF and part of ECT model towards the continuous intention to use e-learning system.

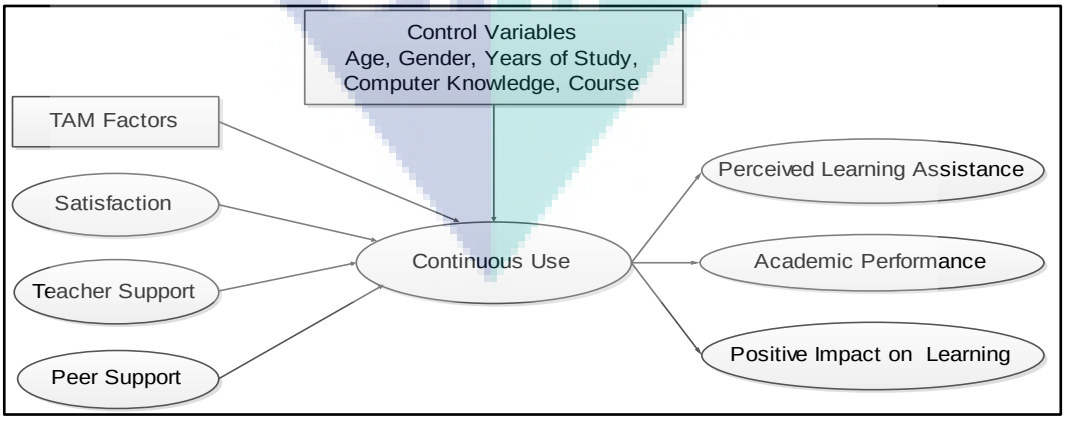

Figure 2.13 Research Model of Continuous Use Impacts

Source: Ifinedo, Pyke, Anwar (2018)

The review of the literature above indicated that TAM, TTF and ECT are widely accepted as an integrated model for continuous intention in the educational field (Schwartzbeck & Wolf, 2012). The review of the literatures revealed a high number of papers published in the educational field. Therefore, it is established there is a need for continuous intention to use e-learning system that could potentially improve the education quality. Due to this, teachers and students need to keep themselves updated with latest models proposed in education for enhancing continuous intention to use e-learning system.

In conclusion, from all the previous acceptance models mentioned in sections 2.3 as the most common acceptance model, besides the additional models explained in this section 2.4. These all models still not serve all the educational process needs by HEIs. Furthermore, these models in some how they limited in the factors used, limited in the target for some parts such as focusing on effectiveness, system use, and enhancing the academic performance, but they did not consider all these factors as contributing factors to keep success of continuous intention to use e-learning system.

2.5 Factors Used in This Study

There are 34 academic articles from journals and conference proceedings obtained from the open database related to this field that were used to assess and identify the most influential factors of continuous intention used by different e-learning systems for the benefit of continuous intention to use e-learning system. These different types of models work on the enhancement of the e-learning model (Kearsley, 1995; King & Doerfert, 1996) using the TAM, adopted TTF, and partial adoption of ECT to aid the continuous intention to use in universities. As illustrated in Table 2.3, the table shows the most frequent factors which are perceived usefulness (PU), perceived ease of use (PEOU), interactivity (INT), teacher-subject knowledge (TSK), course content (CC), behavioural intention (BI), technology integration (TI), student satisfaction (SS), academic performance (AP), support assessment (SA), effectiveness (EFF), and continuous intention to use (CI). The details of this table are explained in 2.6.1 to 2.6.12 with the most used e-learning systems description to conclude the model that is suitable for the next proposed model in Chapter 3.

Table 2.3 Summary of Most Frequently Referred Factors

Author	PU	PEOU	CC	TSK	INT	IT	BI	AP	SA	SS	EFF	CI
Sánchez, & Hueros, (2010)	Y	Y		X								
Wu, Zhang, (2014)	Y	Y					Y		X	Y		
Wu, & Chen, (2017)	Y	Y	X				Y			Y		
Huang, Zhang & Liu, (2017)			Y								Y	
Hone & El said, (2016)	Y	Y	Y		Y						Y	Y
Alraimi et al., (2015)	Y	Y	Y	X	X		Y		Y			
Vernadakis (2012)										Y		Y
Aldiab et al., (2017)										Y		Y
Joo, So, & Kim (2018)	Y	Y	X	X						Y		Y
Dargham et al (2013)	X		X	X		X			Y			Y
Ifinedo, Pyke, Anwar (2018)	Y	Y		Y			Y	Y	Y		X	Y
Lytras et al., (2015)	Y						Y					
Salajan & Mount (2012)				Y	X	X					Y	
Theng & Sin (2012)	Y	Y								Y	X	Y
Lin & Wu, (2016)						X			Y			Y
Ioannou et al. (2015)				X		Y	Y					
Barnard (2013)							Y	Y				
Trocky & Buckley (2016)				X			Y	Y				
Bookstaver (2011)			Y						Y			
Lin, Chen, Liu, (2017)		X			X			Y			X	Y
Liu (2016)	Y	Y								Y	X	Y
Strang (2013)					Y				Y		Y	Y
Lee (2010)	Y	Y								Y	X	Y
Baker-Evelth &Stone (2015)	Y	Y								Y		Y
Tan (2013)	Y	Y			Y	Y			Y	Y	X	Y
Lee, Yeung, & Ip (2017)	Y	Y					Y			Y		Y
Lin (2013)	Y	Y					Y			Y	X	
Conde et al., (2015)							Y	Y				
Leris et al., (2017)							Y	Y				
Al-Maroof, & Al-Emran, (2018)	Y	Y					Y			Y		Y
Lee, & Lehto, (2013)					Y				Y			
Karnouskos, (2017)					Y			X	Y			Y
Stone (2103)	Y	Y								Y		Y
Barak & Levenbergas, (2016)				Y	X						Y	Y

Figure 2.14 illustrates the population of these 34 studies has been displayed in Table 2.2. As can be seen, these twelve (12) factors were derived from previous studies and used different acceptance models as TAM, TTF, and selected factors of ECT models

which have significant direct or indirect relationship to continuous intention to use e-learning systems.

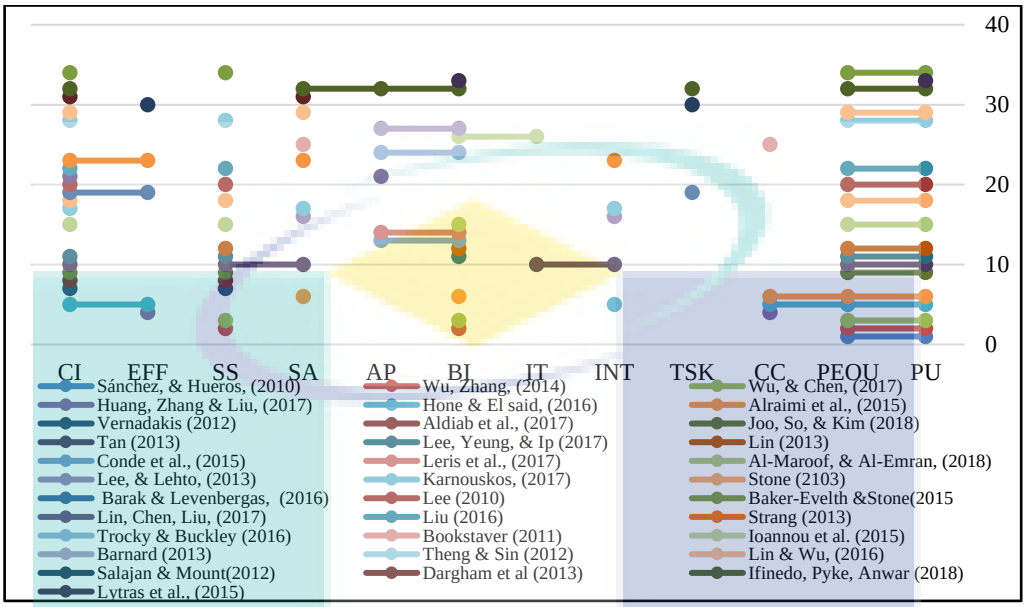

Figure 2.14 Population Chart of 34 Studies

These factors pose a challenge in supporting the student learning outcomes through the development of continuous intention of using e-learning systems. Experts in the field agree that there are inconsistencies in the existing technology acceptance models (Chen, 2010; Mullen et al., 2017). Table 2.2 shows the frequent factors indicated by (Y) and (X) indicates that the factors were not found to have such effects. For example, teacher-subject knowledge (TSK) has no relationship on effectiveness (EFF), nor does interactivity (INT) have relationship on effectiveness (EFF), and same goes with technology integration (TI) to behavioural intention (BI). But the above relationship between these determinant factors were still mentioned in some e-learning models factors by (Goodhue & Thompson, 1995; MacDonald, et al., 2001).

The following subsection reviews the important factors of using the e-learning system to assess the teaching impact of universities for teacher knowledge, support assessment and lastly the continuous intention to use e-learning system.

2.5.1 Perceived Usefulness (PU)

Davis (1989) defined PU as people's beliefs regarding how new technology will enhance their learning performance. Perceived usefulness (PU) represents the subjective mechanism of using the system to assess the level of job performance enhancement and

degree of student's progress in a course. The PU of TAM reveals it is the degree to which students believe that the application system can be a tool towards achieving learning goals with continuous intention to use. It represents the direct determinant of Information Systems (IS) behavioural intention, where continued use of the model is significantly relationship by PU (Alraimi et al., 2015).

Similarly, Lytras et al. (2015) studied the relationship of perceived usefulness and transformation between collaborative types of learning, whereas Lee, Yeung, and Ip (2017) researched on the satisfaction of students in relation to the use of computer devices as perceived ease of use to facilitate communication between teachers and students, and students to students. Findings from both studies indicated that the perceived usefulness is a significant factor that reveals the development of using the e-learning system for continuous intention for educational purposes. As a conclusion, the PU factor is an important factor and mostly used and tested by both the theoretical model and application system as one of the contributing factors for continuous intention to use the e-learning system.

2.5.2 Perceived Ease of Use (PEOU)

PEOU is defined as the degree where students feel that effort is not required to use the application of e-learning models. By considering student perceptions, the perceived ease of use (PEOU) tries to examine if the e-learning system is free of effort and that it is easy to acquire skills to use the e-learning 2.0 platforms, and indirectly move to develop a continuous intention to use (Sánchez & Hueros, 2010; Wu & Zhang, 2014; Wu & Chen, 2017). PEOU factor in the studies by Wu and Chen (2017) and Sánchez and Hueros (2010) referred to the student perception toward e-learning to increase their performance of completing a task. The PEOU factor in a study by Al-Maroof, et al., (2018) referred to the student usage of the system through perceived usefulness. Besides, Al-Maroof et al., (2018) referred to the significant relationship between PEOU and behaviour intention to motivate the students to use the system and indirectly support continuous intention to use e-learning system. The TAM developed in this study proposes PEOU as the users believe that the continued intention to use will be effortless (Wu and Chen, 2017). Furthermore, PEOU in studies by Wu & Zhang, (2014); Wu & Chen, (2017) indicated to the positive relationship between PEOU and student satisfaction to adopted the factors for continuous intention to use e-learning system. As a conclusion, the PEOU factor can be classified as an important factor to determine the acceptance and relationships between PEOU and behaviour intention by both theoretical model and

application system as the contributing factors for continuous intention to use the e-learning system.

2.5.3 Course Content (CC)

Course content is defined as the contents where students believe of e-learning model content can support their needs (Huang, Zhang, & Liu, 2017). The e-learning system allows online technology course content to be uploaded online and downloaded by students who can also access open access courses by using their email and password as well as submit their assignments and projects outcomes (Amrein-Beardsley, Foulger, & Toth, 2007). Huang, Zhang, & Liu (2017) adopted TTF factor individual characteristic to refer to factor course content from original sources (Goodhue & Thompson,1995; Junglas, Abraham, & Watson, 2008). Bookstaver (2011) utilized Wiki chat that used course content factor positively impacted on support assessment when they used as an e-learning tool to improve student learning outcomes. The paper combined both wiki chat and course content for positive effectiveness factor with the perception of student learning needs moving through the e-learning acceptance and continuity. Findings from the study revealed that the course content factor that is used in Wiki chat promotes student peer conversation within student groups in the significant result. These results of the study rely on the student intention to reuse the wiki for more effectiveness and supporting in their learning process. The indicator from Alraimi et al., (2015) shows that course content is used effectively as one of the factors to improve continuous intention to use e-learning. Therefore, e-learning systems such as Wiki chat can increase how fast learning materials can be transferred as well as simplify the transfer of knowledge from teacher to students in the continuous intention to use through the whole system activation.

As a conclusion, the importance of course content factor derived from the related theories that used in section 2.4 and can be added to the proposed model that mention the gap of less theoretical studies that explains the need for acceptance model for continuous intention to use e-learning system.

2.5.4 Teacher-Subject Knowledge (TSK)

Teacher-subject knowledge is determined by the experience of teachers in using applications. E-learning provides a virtual connection of students and teachers towards improving student confidence and also develops their knowledge skill and technology experience in a way to increase collaboration and results (Huang, Zhang, & Liu, 2017). Huang, Zhang, & Liu, 2017, adopted TTF factor task characteristic to referred to factor

teacher-subject-knowledge from original sources (Goodhue, & Thompson;1995; Junglas, Abraham, & Watson, 2008).

Currently, students are assessed based on different teaching strategies employed by the teacher to check the students' learning development process (Jonassen et al., 1997). Thus, using Wiki or another e-learning system is like an online conversation that gives the opportunity for students to learn from other studies for both effectiveness of learning and feedback for continuous intention to use (Robertson, 2008). Teachers can be connected with students via the Internet with open discussion and common groups under the high experience of teacher supervision to create different discussion areas and develop different techniques with the interest of users to improve their knowledge and performance scores when they discuss similar topics with other students (Salajan & Mount, 2012). Additionally, teacher-subject-knowledge and student satisfaction can be employed to measure the acceptance of a variety of e-learning systems used to improve the continuous intention to use (Barak & Levenberg, 2016). From these studies, the TSK factor reveals the positive relationship with the effectiveness that relies on the continuous intention to use e-learning system. As a conclusion, the teacher-subject knowledge factor classified to be an important factor in the proposed theoretical model to enhance the model with continuous intention to use e-learning system.

2.5.5 Interactivity (INT)

Interactivity is defined as the degree of student relationship on the sharing or high participation of connection between peer students and the vividness of each group in the communication level (Lee & Lehto, 2013). Additionally, the interactivity of e-learning systems improves students' communication for learning in gaining knowledge from the teacher (Huang, Zhang, & Liu, 2017). Huang, Zhang, & Liu, 2017, adopted TTF factor technology characteristic to referred to factor interactivity from original sources (Goodhue, & Thompson;1995; Junglas, Abraham, & Watson, 2008). Thus, interactivity encourages students to acquire skills with regard to developing ideas, attitudes, conversation, and trust with their teacher. At the moment, e-learning approaches such as MOOCs provide high interactivity for students and teachers that show the validity of continuous intention to use (Karnouskos, 2017). In addition, a collaboration between students and teachers in groups via web pages accessed on the Internet offers a space for students to add text, pictures, videos, online communications and links to other web pages. The use of technology creates an interactive medium that motivates students to study based on unlimited time, peer assistance, teacher guidance, and teamwork that are

provided by the e-learning system to achieve the learning goal of improving the continuous intention to use these tools. Besides that, data from the e-learning system provide the teacher with the learning habits and behaviour of students (García, et al., 2019).

Likewise, Strang (2013) proposed a model that aims to examine teachers in achieving a collaborative study approach. Strang's (2013) study aimed to reduce the gap between students' low achievement and high-quality requirements. Strang (2013) further studied how e-learning can be employed to evaluate teachers teaching and further improve how standardized exams are supported during e-learning and enhanced learning course runtime in keeping with the continuous intention to use e-learning system. This finding was also supported by researchers such as Laurillard (2008), who stated that the use of innovative computer technologies improves student learning outcomes, interactivity, academic performance, and also supports students in developing their knowledge in achieving their continuous use of learning goals (Laurillard, 2008). Hence, it is evident that the generalized use of e-learning can improve interactivity relationship to effectiveness especially since it supports the students to work without time limited (Strang, 2013; Hone & Elsaid, 2016). Besides, the studies (Lee & Lehto, 2013; Strang, 2013) reveal a significant impact of interactivity work between students and teachers to a positive relationship with support assessment, were all teachers available to support the students through advice, explain guidelines and interactive with them through email or tutorial sessions; however, it is not certain to be guaranteed to improve the continuous intention to use e-learning system.

2.5.6 Technology Integration (TI)

Technology integration is defined as the intention of students to use different technologies to support their understanding for the continuous intention to use. Ioannou et al. (2015) researched on the impact of Wiki chat on student learning and their results showed that the use of Wiki chat is more beneficial for students than when they used a traditional board forum. The results of the experiment revealed that technological usage provides more information that supports students in writing, developing, and formatting their reports in a much better way than using the board forum. Consequently, findings from their study suggested that the combination of different theoretical and practical formats, supported by continuous intention to use e-learning system in teaching helps to improve course material and students learning outcome. The study itself indicated a positive relationship between technology integration and the way students behaves when

they use the model. This reveals indirectly affected with the continuous intention to use the wiki chat as e-learning systems. Technology integration has brought a strange role of delivering knowledge between students and teachers. Previous researchers considered that technology integration can enhance the academic activities of students because of its ease to use, and its availability can be shared between students. Therefore, technology integration is a precious tool to develop the continuous intention to use e-learning system (Laurillard, 2008). Technology integration can also be referring to the facilitating condition that is justifying the way of integrating technologies to positive indirect relationship to continuous intention to use e-learning systems (Hone, El said, 2016; Sambamurthy, & Zmud, 1999; Tornatzky, & Fleischer, 1990; Yigit, et al, 2014).

There are several applications that can be used to support e-learning such as video-based programs and Wiki, which are the types of Web 2.0 technology. These applications aid students to interact with each other within a virtual learning environment rather than passively listening to a teacher. Researchers such as O'Bannon and Britt (2011) also examined the effects of using Wiki to create, design and increase the knowledge of teachers, their perceptions of technology integration used for teaching, the frequency of use including the reader, writer, and editor roles, and lastly their communication behaviour as a continuous routine of intention to use e-learning . Findings from O'Bannon and Britt's (2011) study revealed that there was a significant increase in the achievement of teachers after applying technology integration continuously. That means the technology integration factor reveals the significant relationship with the behaviour intention of the students after using the variety of applications. This type of results can inspire students in advance to continuous intention to use the e-learning system.

Researchers such as Posey and Pintz (2016) proposed that learning can be implemented with new technology that comprises of a teaching, transforming, and technology (T3) project. The blended method recommended by the authors was used to develop active learning of students through continuous e-learning system. Accordingly, findings from this study revealed that the best approach to improving the quality of teaching is based on the combination of face-to-face interaction and the technology integration factor. Moreover, the results have proven there was a positive indirect relationship between technology integration continuous intention to use because of the ease of using them. Therefore, this study is important in applying technology and improving the continuous intention to use e-learning system (Yigit, et al, 2014).

These studies have positive significant achievements in the factors of technology integration and give a clear intention on using it to create an indirect relationship to improve the continuous intention to use e-learning system. In addition, the real factors used in these studies are sufficient enough to cover all the factors used to test and validate the continuous intention to use e-learning system.

2.5.7 Behaviour Intention (BI)

The behavioural intention of students is determined by the perceived usefulness of direct access to online and full course content available with all types of connections between students and teacher of the course, which enhances the student academic performance. Thus, based on TAM and adopted TAM2 and TAM3 models that have been applied using MOOC, each reviewed study refers to the significant relationship and positive effect of PU and PEOU on a behavioural intention that is adopted within the context of e-learning to produce a system; however, the continuous intention to use it is determined (Al-Maroof & Al-Emran, 2018; Fidalgo-Blanco et al., 2015; Conde et al., 2015; Leris et al., 2017).

Venkatesh and Davis (2000) mentioned that behavioural intention is clarified as students' intention to either use continuously or adopt the e-learning system. TAM identified perceived usefulness and perceived ease of use as factors with significant relationship to e-learning system use. Besides that, these factors are influenced by behavioural intention factor toward the continuous intention to use system (Al-Maroof & Al-Emran, 2018). Moreover, findings from other studies (Kim, Suh, Lee, & Choi, 2010) suggested that any technology can be effectively deployed and is based on the behavioural intention values, such as the intention to use can be the reason why teachers and students utilize technology to get relationship of e- learning effectiveness (Wu & Chen, 2017). In this study, an e-learning system will be positive in interaction and strong in behavioural intention to continuous use of e-learning system.

Moreover, some studies by Macdonald, et al., (2001) and Fidalgo-Blanco et al., (2015) they came out in the theoretical model of each study to build a relationship between the system outcome from actual use with the academic performance of the student to be measured as outcomes. This improvement of academic performance extended when a continuous intention to use e-learning system were used. The results of these studies pointed to the positive relationships between behavioural intention and the impact on academic performance to keep the acceptance of the actual system.

As a conclusion, behavioural intention is a recommended factor to be extended use with all TAMs versions models. Moreover, this factor was already used in previous studies as a related work to enhance continuous intention to use e-learning models like Leris et al., (2017), Ifinedo, Pyke, Anwar, (2018) and Trocky and Buckley (2016). Therefore, the researcher recommended this factor to be in relationship with the academic performance of student outcomes to be an indicator for the continuous intention to use e-learning system.

2.5.8 Academic Performance (AP)

The academic performance (AP) is defined as student activities to improve their grades using the application model (Kirschner & Karpinski, 2010). Similarly, academic performance factor refers to the students' performance acceptance of e-learning system use and technology facilities (MacDonald et al., 2001; Engelbrecht, 2003; Huang, Zhang, & Liu, 2017, Goodhue & Thompson, 1995). Behavioural intention relationships the academic performance with the effectiveness of perceived usefulness and ease of use towards the system use (Ifinedo, Pyke, Anwar, 2018). Lin, Chen, and Liu (2017) argued that the terms: academic performance, learning outcome, and learning achievement are analogous phrases used to assess the learning outcome of students' academic performance; and that a learning outcome is an indicator used to measure students' learning and it supports the evaluation of teaching quality. Besides, academic performance factor was highly used as outcomes indicator from e-learning model. Therefore, this study argues that including of this factor can enhance the proposed model for continuous intention to use e-learning. The basic method used online is automatic scoring grades as e-learning system. This step of score grades need circular access by the teacher, and students to discuss and finalize the assessment results, which definitely means continuous intention to use the system. The improvement of academic performance is one factor that can relationship continuous intention to use the e-learning system. Technology in education involves several online communication tools: Wiki chat, and different Google services (Joseph, 2012) which aid in the management of online courses and try to evaluate the continuous use with limited factors of communication and interactivity.

Also, Trocky and Buckley (2016) presented a reflection of sharing common chatting locations to be convinced with student behaviour intention. Therefore, behaviour intention had positive influence to keep use the system for improving their academic performance. This study improved academic performance by the way of make student

engaged and interest to be continuous intention to use wiki system. Their approach offered a variety of academic settings by selecting reviewed papers depending on four criteria which encompass writing skill, adding knowledge, participation, and centralized dataset. These results showed a highly significant impact on the improvement of academic performance e-learning system.

At the end of all studies, academic performance factor is a recommended one to be included in the cycle of testing the continuous intention to use e-learning system (MacDonald et al., 2001; Engelbrecht, 2003). Furthermore, feedback of course or teaching method impression for any e-learning system can be measured sometimes through academic performance factor for some studies as (Trocky and Buckley 2016; Leris et al., 2017). This academic performance with feedback acceptance merged and used as an indicator to measure the continuous intention to use e-learning systems.

2.5.9 Support Assessment (SA)

Support assessment is defined as the external support given to the students to overcome learning difficulties (MacDonald et al., 2001; Engelbrecht, 2003). Similarly, Beleche et al. (2012) used post-test objective grade distribution to evaluate student learning objective (SLO); instead of the more common post-test that centrally checks and grades students as a measure for student support assessment. Support assessment is also meaning of gaining insight into how students can benefit from it, for example, the students' answers were marked by other students and teachers but not the teacher who taught the course itself. Moreover, Support Assessment can refer to types of assistance through internet guidelines, or by e-learning system that have relationships significant results toward continuous intention to use (Karnouskos, 2017; Strang, 2013; Dargham et al., 2013).

Adwan (2016) created an e-learning system environment to improve learning and teaching quality outcomes within the continuous use intention. The factors used in Adwan (2016) are perceived usefulness, perceived ease of use, support assessment and student satisfaction. The support assessment refers to the assessment results which are displayed to students based on a colour system that shows the results in real-time. The result reveals a positive relationship between support assessment and continuous intention to use e-learning system. That is support assessment factor is important to test and validate any e-learning system and inspire students for continuous intention to use or not.

Findings from Lin and Wu (2016) adopted a distribution that is related to the course objectives which are similar to types of support assessment. However, there are fewer studies that are aligned to the usage of e-learning based tools to facilitate the assessment method and support assessment by the teacher in the learning portal (Lin & Wu, 2016), which are part of the factors to keep continuous intention to use the system

Few studies like Ifinedo, Pyke, Anwar (2018), Adwan (2016) and Lin and Wu (2016) mentioned the importance of use support assessment to enhance the continuous intention to use e-learning system. This importance used for guiding students within their work of downloading material or solving assignments. Besides, the technique they learned to improve a successful model became the outcome of theoretical or practical use. Therefore, this study recommended support assessment to be used as dependent factor towards the continuous intention to use e-learning system.

2.5.10 Student Satisfaction (SS)

Student satisfaction is defined as the satisfaction on the course content to help students accomplish the objectives and the assessment transparency of e-learning outcomes (MacDonald et al., 2001; Engelbrecht, 2003; Amrein-Beardsley, Foulger, & Toth, 2007; Naidu and Derani, 2016). Moreover, satisfaction is referring to the feedback obtained from knowing the students' satisfaction, self-efficacy and performance from the existing system (De Wever et al., 2015). In other words, the high level of student satisfaction may be due to the fact that there was a good prediction between the academic performance, support assessment and teacher knowledge that fits the expectations and student needs especially with e-learning system (Vernadakis, 2012). Moreover, Lee, Yeung, and Ip (2017) explored the interactivity between students' yielded satisfaction aligned with the continuous intention to use of computer devices. The effectiveness of technology integration with supporting assessment and technologies can enhance the continuous intention to use e-learning system. It also can facilitate communication among the teachers, between the teachers and students, and among students in continuous step of using e-learning system. Its reveal a positive impact of student satisfaction of the continuous intention to use (Schmid et al., 2014). Besides, student satisfaction also provides feedback to groups or personal comments to help improve the students with a lower rating in the assessment to keep continuous intention to use e-learning system by many of students (Oakley et al., 2010; Adwan, 2016).

The student satisfaction factor is the important factor in the educational process that uses several technologies such as email, online videos, Wiki chats, and Google forms

which can be viewed from different e-learning system (Aldiab et al., 2017). Schmid et al. (2014) re-analysed the relationship of perceived usefulness and perceived ease of use impact on e-learning, and the findings from their study revealed that technology integration adoption improved the average satisfaction of student learning based on a university dataset that was used to measure effectiveness and self-evaluation through continuous acceptance of e-learning system use. These three outcomes are important in this study because these factors are used to create a relationship to improve the continuous intention to use e-learning system. Student satisfaction has been proposed as important in scholarly work by Venkatesh and Davis (1996) and Davis et al., (1989) through the relationship of perceived ease of use and perceived usefulness of TAM.

Similarly, since the experience of students in using e-learning varies according to the different education levels of the courses they enrol in for a particular semester and the services offered in their universities, it is required to consider the satisfaction factor as an important factor to measure the impact of e-learning system on the continuous intention to use e-learning environment. In this current study, student satisfaction is important to progress greater ease of use by the student to be accepted with e-learning system more than difficult system to use (Davis, et al., 1989).

End of all, the conclusion of the studies Naidu and Derani, (2016); Vernadakis, (2012); Lee, Yeung, and Ip (2017); Aldiab et al., (2017); Schmid et al. (2014); Liu (2016); Joo, et al, (2018); and Mullen et al. (2017) mentioned satisfaction factor as important to evaluate the continuous intention to use e-learning system. Therefore, the continuous intention to use e-learning system needs to test the acceptance and the satisfaction level for both individual use or on an organizational level to validate the continuity of the system.

2.5.11 Effectiveness (EFF)

Effectiveness is defined as the assessment scalability employed by the university to measure the effective assessment with continuous intention to use e-learning system for different students (Junglas, Abraham, & Watson, 2008; MacDonald et al., 2001; Engelbrecht, 2003; Goodhue & Thomson, 1995). Researchers such as Schmid (2014) mentioned that there was an increase in the effectiveness and student satisfaction when their learning is facilitated with technology. The results from a combined dataset revealed an increase in the self-evaluation, assessment on the effective measure of the students' learning for e-learning system (Schmid et al., 2014). Hence, it is evident that the use of multiple innovative technologies can improve the performance and effectiveness of

students with the continuous use of MOOC. MOOC continuous intention of use in science education which developed students' skills and knowledge and further assisted teachers in teaching (Wang & Hannafin, 2005).

Similarly, Cavanagh et al. (2014) investigated how to deploy an improved continuous use of Google-classroom teaching style that comprises of group work aimed at improving students' activities and participation effectiveness from their continuous access to the system. The study advocated the use of e-learning system to support the facility in attaining their benchmarked learning outcomes which comprise of all the factors required for effective continuous intention of e-learning system adoption. Although effectiveness is the main objective of these studies, effectiveness is needed to be combined with other factors to produce a new level of improvement that will raise continuous intention to use e-learning system to a new height of awareness and acceptance.

This study works on increasing effectiveness and satisfaction, at the same time extending their effects to include the relationship on the improvement to the continuous intention to use e-learning system. This study extends the effects of different factors such as the effects of course content on effectiveness and the effects of teacher-subject knowledge relationship on effectiveness towards continuous intention to use e-learning system. A conclusion of all above, this study is recommended effectiveness factor to have positive relationship to enhance the continuous intention to use e-learning system.

2.5.12 Continuous Intention to Use (CI)

Continuous intention to use e-learning system (CI) is defined as the intention of students to continuously use the e-learning system to improve their learning skills (MacDonald, et al., 2001). Continuous intention to use means to justify the satisfaction factor of ECT, and the behavioural intention of TAM. Liu (2016) explored the usage of video blogs to optimize the best intention to keep continuously use systems with student satisfaction in universities. Liu (2016) further attempted to investigate how video learning and face-to-face interaction could enhance university students' learning performance and to keep the continuous use intention a live and flourishing. The author's method depended on the application of Web 2.0 technology in supporting the process of enhancing the continuous intention to use the system (De Wever et al., 2015). The result presented by the author indicated that the use of video blog helped in improving the SLO determined through the TAM to get system use, then to adopt TAM2 for continuous intention to use.

In the conclusion of this study, Liu omitted the effectiveness of course content and teacher knowledge to give a high performance for the continuous intention to use.

The deployment of different e-learning systems currently used in universities could directly or indirectly relationship the continuous use intention of e-learning service through factors such as academic performance, effectiveness, support assessment, and student satisfaction factors. Furthermore, this study is anchored on the continuous intention to use e-learning system which is based the major factors used in TAM, TTF, and partial of ECT models. Therefore, this factor is recommended to be use for contributing factors of continuous intention to use e-learning system.

2.6 Extracting Causal Relationship between Factors

Accordingly, researchers such as Liu (2005), Chen (2005), MacDonald, et al., (2001), Engelbrecht, (2003) and Islam (2016) believed that the effects of e-learning on assessments and teaching with continuous intention to use vary based on different factors. For instance, some studies are more focused on student motivation, evaluation, social relationship, and learning interest through the model of continuous intention to use (Davis, 1989; Macdonald et al., 2001; Goodhue & Thompson, 1995). Other studies are more concerned about how to improve academic performance, assistance, and community effect as the basic factors for continuous use intention (Goodhue, & Thompson, 1995; Furneaux, 2012), while some researchers are more interested in exploring the perception, experience, facilitating conditions, and attitude, to measure the continuous intention to use e-learning system (Venkatesh et al., 2003; Huang, et al, 2017). Therefore, the relationship of e-learning on the continuous intention to use e-learning can be viewed from how students learn, inquire, and reflect upon past experiences to build, refine and conclude new practices of continuous intention. The use of e-learning helps the university management and moderator to be more professional with technological tools to easily carry out the continuous intention to use e-learning for different purposes (Miri and Ariella, 2016).

Based on the preceding discussion, it is required to examine the impact that e-learning system has on the continuous use intention and it is needed to investigate if e-learning system really takes place in the educational process. Table 2.4, illustrates the causal link between factors relationship based on the scholars of each one.

Table 2.4 Causal Relationships from Literature

Factors	Causal Link	Original Theory	Recent Studies
Perceived usefulness	PU→ BI	TAM	Davis, (1989); Alraimi et al., (2015); Lytras et al. (2015); Lee, Yeung, and Ip (2017); Lee, (2010); Stone (2013); Theng &Sin, (2012)
	PU→SS	ECT	Bhattacharjee (2001); Lee, Yeung, and Ip (2017); Liu (2016); Stone (2013); Theng &Sin, (2012); Lee (2010); Alraimi et al., (2015)
Perceived ease of use	PEOU→PU	TAM	Davis, (1989); Sánchez & Hueros, (2010); Wu & Zhang, (2014); Wu & Chen, (2017); Joo, et al, (2018); Ifinedo, Pyke, Anwar, (2018); Al-Maroof, & Al-Emran, (2018)
	PEOU→BI	TAM	Davis, (1989); Wu & Zhang, (2014); Wu & Chen, (2017); Al-Maroof, & Al-Emran, (2018)
	PEOU→SS	ECT	Wu & Zhang, (2014); Wu & Chen, (2017)
Technology Integration	TI→ BI	E-learning	Junglas, Abraham, & Watson, (2008); Goodhue & Thompson, (1995); Ioannou et al. (2015); O'Bannon and Britt (2011); Posey and Pintz (2016).
Course Content	CC→EFF	Adopted TTF	Huang, Zhang, & Liu, (2017); Hone & Elsaid (2016)
	CC→ SA	Adopted TTF	Bookstaver (2011); Alraimi et al., (2015)
Teacher-Subject-Knowledge	TSK→EFF	Adopted TTF	Salajan & Mount, (2012); Barak & Levenberg, (2016); Goodhue, & Thompson, (1995)
Interactivity	INT→ EFF	Adopted TTF	Strang (2013); Hone & Elsaid (2016)
	INT→ SA	Adopted TTF	Lee & Lehto, (2013); Strang (2013); Karnouskos, (2017); Lee (2010)
Behavioral Intention	BI→ AP	TTF, E-learning	Macdonald, et al., (2001); Fidalgo-Blanco et al., (2015); Conde et al., 2015; Leris et al., (2017); Ifinedo, Pyke, Anwar, (2018); Trocky and Buckley (2016)
Support Assessment	SA→ CI	Adopted TTF	Baker-Eveleth, & Stone, (2015); Beleche et al. (2012); Karnouskos, (2017); Strang, (2013); Dargham et al. (2013); Lin and Wu (2016); Lee (2010); Bhattacharjee (2001)
Effectiveness	EFF→ CI	E-learning	Barak & Levenberg, (2016); Schmid (2014); Cavanagh et al. (2014);
Academic Performance	AP→CI	Adopted TTF	Ifinedo, Pyke, Anwar (2018); Lin, Chen, and Liu (2017)
Student Satisfaction	SS→ CI	ECT, TTF	Naidu and Derani, (2016); Vernadakis, (2012); Lee, Yeung, and Ip (2017); Aldiab et al., (2017); Schmid et al. (2014); Liu (2016); Joo, et al, (2018); Mullen et al. (2017); Al-Maroof, & Al-Emran, (2018)

These technologies provide level by level explanations or add value to students' achievements and graduates' outcomes. Findings from the literature (Oakley et al., 2010; Schwartzbeck & Wolf, 2012; Trocky and Buckley, 2016) related to academic programme implementation confirmed that e-learning system for academic programme assessments have consolidated essential practices. Therefore, there is a need for more studies that focus on the use of e-learning system in assessments and the teaching process e to improve continuous intention to use.

Moreover, existing literature (Oakley et al., 2010; Schwartzbeck & Wolf, 2012; Trocky and Buckley, 2016) on e-learning further suggested that the use of technology to promote collaboration with traditional teaching positively improves the educational experience for the student, teacher, and the university. Thus, the use of technology ensures that students can work independently, notably with increased communication and collaboration, and greater access to information along with the continuous intention to use it. Currently the main problem relates to how universities can optimize the continuous intention to fit with the teaching techniques and student performance to add value to the e-learning system in universities. Therefore, there is a need to generate a common application system that is comprehensive to enhance all the suggested technologies with more tool collaborations to indirectly relationship the continuous intention to use e-learning system.

2.7 Factors Attributes

There are many factors that significantly affect continuous intention to use e-learning system. However, not all of them are tested on the same study or platform. Currently, the teachers rely heavily on communications among their students to redesign adopted courses and get consistency with the continuous intention to use e-learning system.

The previous models identified different types of factors. For each factor, there are many types of attributes that collaborate with another factor to move towards a positive continuous intention to use e-learning system. These factors were highly recommended by many previous studies to be effective in the continuous intention purpose as mentioned in Section 2.6. Table 2.4 shows the factors that have a significant positive effect on the e-learning system and can be significantly validated with continuous intention to use. Table 2.5 shows the independent factors derived from TAM, TTF, and ECT in addition to the e-learning factors (Kearsley, 1995; King & Doerfert, 1996) to be used in Chapter 3, Section 3.4.1 and in Chapter 4, section 4.2

Table 2.5 Independent Factor Attributes

Factor	Attributes
Perceived Usefulness (PU)	-People's belief regarding how new technology will enhance their learning performance -Subjective belief to assess the level of job performance enhancement -Subjective work to a degree of student progress in a course -Significant effect on satisfaction
Perceived Ease of Use (PEOU)	-Free of effort -Easy to acquire skills -User belief that continued intention to use will be effortless -Positive effect on perceived usefulness -Significant effect on satisfaction
Interactivity (INT)	-Enhance the learning process -Facilitate communication among the teacher, students, & peers -Help students to be more confident and trained in the use of e-learning platforms. -Encourage the peers learning from previous experienced students
Teacher-Subject-Knowledge (TSK)	-Optimizing teacher's continuous development -Acceptance of recommendations for continuous teacher's development programs. -Degree of knowledge and expertise -Degree of expertise of developed course and materials
Course-Content (CC)	-Determining the usefulness and quality of online learning -Determined by the teachers' knowledge -Determining the course difficulty and whole coverage of course contents
Technology Integration (IT)	-Use of communication tools integrity and application software as a type of interaction between students provide the mechanisms for determining the group members -Use of electronic materials such as PowerPoint slides, files, and videos - Be familiar on conversion between different technologies
Behavior-Intention (BI)	-Positive effect on knowledge development -Perceived usefulness that affects student behavior -Positive effect on the system portal use -Positive effect on improving academic performance
Academic Performance (AP)	-Direct access to online -Full course material available with all types of connections between students and teacher of the course -Improved based on higher grade scores of assignments, presentations, and online exams. -Competition between students to upgrade their grade score
Effectiveness (EFE)	- Encourages students in acquiring skills with regard to developing ideas, attitudes, conversation, and trust - Varieties of materials and assessments used throughout the semester work
Student-Satisfaction (SS)	-Degree of feelings and feedback from positive to negative -Provide feedback reports on the assessment process that can be used to achieve the course target and design process
Support-Assessment (SA)	-Varieties of materials and assessments used throughout the semester work -Support for more clarifications and knowledge development - Teacher and technical support for application problem solving
Continue-Intention-To-Use (CI)	-Learning acceptance refers to learning satisfaction, and preference - The continuous intention of the model access and beneficial use -Direct access to Online system

2.8 Summary

This chapter reviewed studies related to e-learning system usage in universities. This chapter reviewed the history of using e-learning systems in higher education institutions. Besides, the existence platforms used for continuous intention and e-learning use. This research compared among the e-learning acceptance models such as TAM, TTF, ECT, UTAUT, and TPB and their performance with continuous use. This research is focused on determining the important recommended factors such as information technology tools, teacher subject knowledge, course content and interactivity factors and how they can improve and support the e-learning process in a way that offers improved results in an effective continuous intention to use e-learning system. This chapter also reviewed and made a comparison of previous studies in models used for continuous intention to use e-learning system, some of them used for individual use while others are used for organizational use or for management level. Besides, this chapter reviewed models related to continuous intention to use e-learning, were they used different based factors as student satisfaction, support assessment, effectiveness, and academic performance respectively. Then, the study explained the factors used. Moreover, this chapter extracted the causal relationships between the factors. Lastly, this chapter discussed the factors and attributes that play an important role in identifying the contributing factors of continuous intention to use e-learning system. Chapter 3 will be the discussion of the research methodology.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the rationale of this study, its research paradigm as well as provides detailed description of the research flow through the four phases of this study's Research Operational Framework from the initial phase of identifying the research problem to discussing the outcomes of testing the developed Acceptance Model using PLS-SEM.

3.2 Rationale

The aim of this study to develop an acceptance model contributing factors for continuous intention to use the e-learning system for Oman higher education institutions. The framework mechanism comprises of addressing two issues. The first issue is the analysis of previous related works to identify the factors to be considered. The second issue is the deployment of a web-based survey which is an important tool for conducting research related to continuous intention to use e-learning system. For this research, students were considered as the key participants to evaluate the factors and the acceptance for continuous intention to use e-learning system.

This study needs to investigate the impact of different major contributing factors that have on student's perception on continuous intention to use e-learning. Besides, this research needs to establish the relationship between the contributing factors and the continuous intention to use e-learning. The main gap is the belief of limited acceptance of e-learning system from the students because of less continuous intention to use e-learning. This research presents further investigation to develop the acceptance model on factors contributing to the continuous intention to use e-learning systems in Oman higher education institutions. In this study, the proposed model is developed based on the partial

least squares-structural equation model (PLS-SEM) application which was utilized to draw out important constructs based on the structural relationship analysis between measured variables and latent constructs. These important constructs of e-learning were combined into the models of TAM, TTF, and selected parts of the ECT model to justify learning goals, learning activities, feedback and evaluation.

Further investigation is required to understand if researcher's assumptions are true and what can be done to improve the different aspects of pedagogy and quality perception in e-learning systems.

3.3 Research Paradigms

There are many types of paradigms to conduct a research. However, the most common types are positivist and interpretivist (Klein & Markers, 1999; Dash, 2005). Positivist paradigm is widely used in information system research because "positivism is based on the idea that science is the only way to learn about the truth". Positivist paradigm is primarily based on the quantitative test of the theories from features sampling of large numbers of random selection. Furthermore, the unit of analysis can be reduced in terms. The researchers in this paradigm view themselves as neutral observers where the outcomes are not in relationship by researcher's beliefs (Guba and Lincoln, 1994). Therefore, this type of paradigm is considered as quantitative research (Creswell, 2009). The instrument that is commonly used in quantitative research for data compilation is the survey questionnaire, designed based on the hypotheses and an associated body of acquaintance (Creswell, 2009). Likewise, in this study the survey questionnaire has been used as an instrument design based on hypothesis proposed in acceptance model. The subjects were derived from the representation and the analysis of the subject area, and the information gathered around them were used for the survey part.

The interpretivist paradigm is primarily used as qualitative test of theories used when researchers seek to deeply understand the relationship of people and their environment and the roles these people play in creating the social fabric in which they are a part of. Hence, the methods they prefer are those that seek experiences, understandings and perceptions of individuals for their data to uncover reality (Thanh & Thanh, 2015). As such, the research design of this study is positivist as the methods offer objective or precise information and rely on numbers of statistics.

3.4 Research Operational Framework

This research operational framework is divided into four phases to contribute to the outcome for this study. Phase 1 is the theoretical foundation. Phase 2 is the development of the research model and instrument. Research Validation is Phase 3, and lastly Phase 4 is the main research and hypotheses testing. Figure 3.1 depicts the research operational framework employed in this study in achieving the research objectives. Further details of the research framework are explained in the upcoming sections.

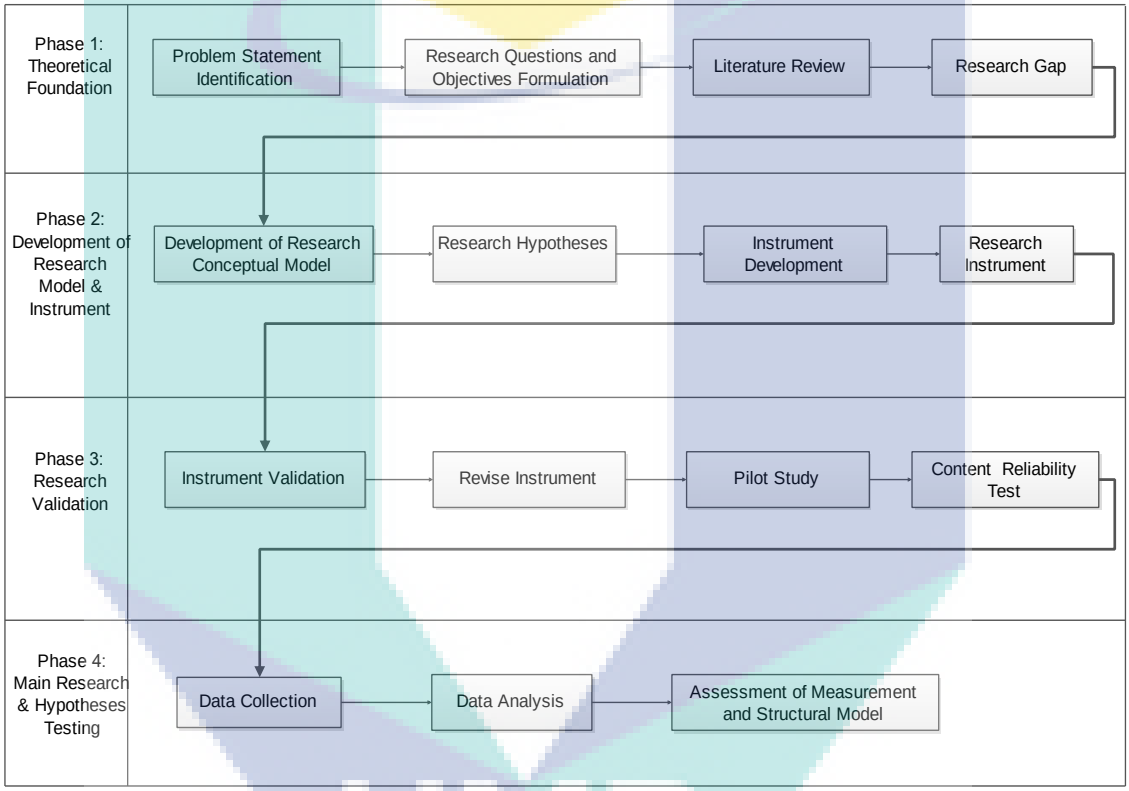

Figure 3.1 The Research Operational Framework

3.4.1 Phase 1: Theoretical Foundation

In the first phase, the research problem of the study was identified, followed with research questions, and research objectives. The literature review related to Chapter 2, the research applied theoretical perspectives, consisting of the literature review from previous studies to find the problem statement. Finally, the acceptance models were developed from the TAM, TTF models and part of the ECT model to finalize the research gap. In this phase, different articles in the literature were reviewed and analysed to form the conceptual background of the study. Thus, research journal articles and conference proceedings related to e-learning applications were analysed to identify the gap in

continuous intention to use e-learning system. The research operational framework is explained in terms of details of research activities, research objectives, and research deliverables in Table 3.1, which also represents the first phase results.

Table 3.1 Phase 1 Deliverables from Activities

Activities	Objective	Deliverables
Problem Statement Identification	To identify background of problem, research objectives, and research scope.	background of problem, research objectives, and research scope identified
Research questions and objectives formulation	To express research question and define its objectives.	Research questions and objectives formulated
Literature Review	To review existing e-learning systems in terms of relevant factors of continuous intention to use e-learning in higher education. This is followed by examining the models concerning adoption factors of TAM, TTF, and ECT as well as extra models' implementation and concerning on continuous intention to use e-learning system.	Research gaps by evaluating the model's factors by other researchers identified. research problem to be solved in this research also identified.
Research gap	To construct the framework and research design of this study.	Research framework and design are constructed

3.4.2 Phase 2: Development of Research Model and Instrument

In the second phase, there were namely 4activities: (1) development of research conceptual model, (2) research hypotheses, (3) instrument development and (4) construction of research instrument as illustrated in Table 3.2 below. The table also highlights the objectives and the deliverables of the activities.

Table 3.2 Phase 2 Deliverables from Activities

Activities	Objective	Deliverables
Development of Research Conceptual Model	To propose an acceptance model for continuous intention to use e-learning system work.	Initial model of the study.
Research Hypotheses	To generate the suitable relationships between factors	Hypothesis set constructed.
Instrument development	To design questionnaire item for instrument development.	Questionnaire set constructed.
Research instrument	To enhance the final questionnaire set of the research instrument.	Questionnaire set completed

3.4.2.1 Development of Research Conceptual Model

This section explains how this study has developed its research conceptual model which is named the Acceptance Model. The literature review had identified the gaps in relationship factors from various models of acceptance technology in continuous intention to use e-learning from various researchers. New complementary factors were generated for the model to enhance academic performance based on the continuous intention to use the e-learning system.

As mentioned in Chapter 2, Section 2.3, this model links the Technology Acceptance Model (TAM) of version produced by Venkatesh and Davis (1996), Task-Technology Fit (TTF), and part of Expectation- Confirmation Technology (ECT) model. Furthermore, the related work investigates four more adopted models with high factors matches with continuous intention to use e-learning that has been mentioned in Section 2.4. Moreover, the factors for this model were constructed based on factors that were explained in Section 2.5.

The relationships between these constructs are explained by the model design in Figure 3.2. The model developed to consist of six independent factors of perceived usefulness, perceived ease of use as used earlier in the TAM model. Also, the factor of technology integration determined by Huang, Zhang, Luh, (2017), and the three additional independent factors used in the TTF model such as teacher-subject knowledge, course content, and interactivity. The relationships constructed between contributing factors to produce significant relations and constructing more factors as dependent factors. The dependent factors are Student Satisfaction, Academic Performance, Support Assessment, and Effectiveness to enhance the continuous intention to use e-learning. Besides, factor Attitude removed from TAM because Venkatesh and Davis (1996) found direct influences from PU and PEOU to BI thus they eliminate Attitude construct. Also, confirmation exculuded from ECT because its meaused for business use not in education.

The whole model builds according to sixteen relationships to create a strong relationship that combines the factors from TAM, TTF, and partial of ECT models. For example, there are relationships from perceived ease of use to perceived usefulness, and perceived ease of use to behavior intention from the TAM model. Besides, another two relationships of perceived ease of use and perceived usefulness to student satisfaction from the ECT model. Also, a new relationship that mixed TAM with TTF such as technology integration to behavior intention, and behavior intention to academic

performance. Furthermore, the relationships between TTF factors from three factors of teacher-subject knowledge, course content, and interactivity to effectiveness factor. Another TTF contributing factors relationships such as two relationships from course content and interactivity to support assessment. Finally, the combined three models using four relationships among contributing factors of effectiveness, support assessment, student satisfaction and academic performance towards the continuous intention to use e-learning system factor. This is because there exist studies that have addressed the details of determining learning assessment and academic performance and its effects on the continuous intention to use e-learning system; however, these studies are not many.

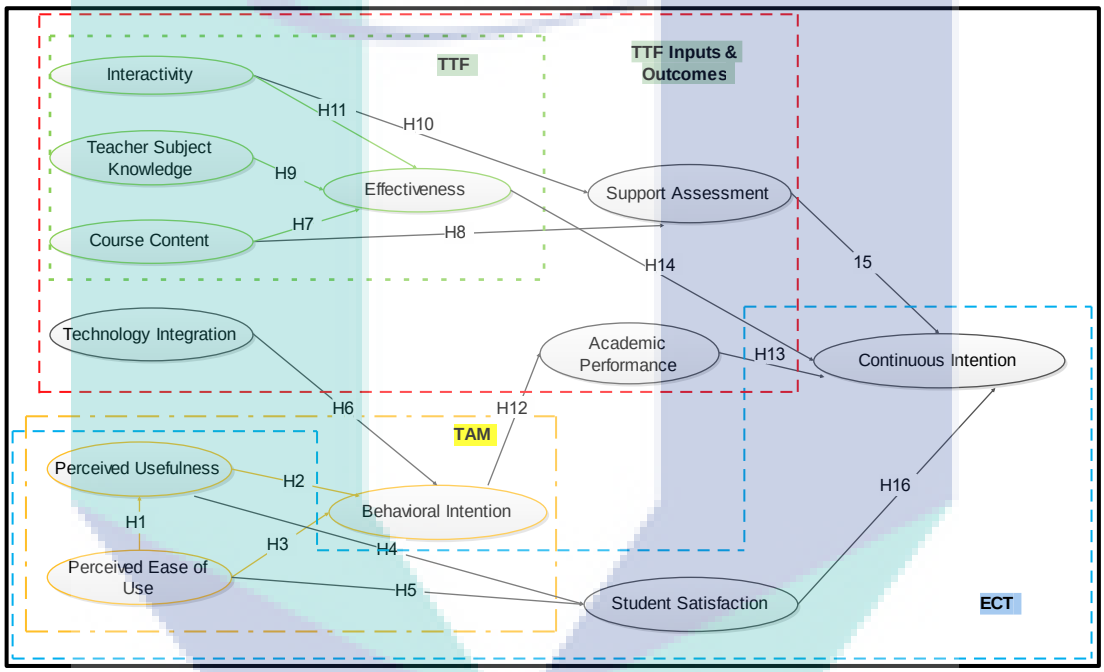

Figure 3.2 Research Conceptual of Acceptance Model

This study moves in the path of drawing the characteristics of the model to solve the complexity of course assessment depending on course content, teacher-subject knowledge level, and interactivity (Joo, So, & Kim, 2018; Ifinedo, Pyke, & Anwar, 2018). Besides, the student perception on perceived usefulness, perceived ease of use and behavioural intention (Davis, et al, 1989). Moreover, the impact of indirect using technology integration on the acceptance of continuous intention to use e-learning (Hone, El said, 2016; Yigit, et al, 2014). In addition, academic performance results of grade scores and student satisfaction feedback with student effectiveness and support assessment were also considered (Ifinedo, Pyke, Anwar, 2018; MacDonald, et al., 2001). The model factors are different from the traditional teaching model that is fixed on time

and real classroom, in which students and teachers can directly connect face-to face or outside of the course time (Lee & Lehto, 2013; Huang, Zhang, & Liu, 2017). The acceptance model can measure the impact of the continuous intention to use e-learning system based on the twelve dependent and independent factors as shown in Figure 3.2 that would be tested by the questionnaire survey.

This acceptance model is derived from the TAM factors of perceived ease of use, perceived usefulness relationship towards behavioural intention then moved towards continuous intention as presented by Davis (1986). Moreover, Task-Technology Fit (TTF) factors with adopted TTF in education and e-learning sector of course content, teacher-subject knowledge and interactivity which have a relationship on the effectiveness derived from Huang, Zhang, and Liu (2017), and MacDonald et al. (2001). In addition, part of the Expectation-Confirmation Technology (ECT) model factors such as perceived usefulness, satisfaction, and continuous intention are also adopted. Besides that, Effectiveness and Continuous Intention are derived from Hone and El Said (2016), and Student Satisfaction with Continuous Intention are derived from Joo, So, and Kim (2018). This model produces Support Assessment as a new factor added as it is found to increase continuous intention to use e-learning system and derived from teacher-support and peer-support from Ifinedo, Pyke, Anwar (2018). In addition, the structure of the model factors has built in more types of connections for better significant values using the PLS-SEM program.

In the context of research operational framework, the model attempted to test the independent factors that were applied to test the relationship between student perception perceived ease of use (PEOU) and perceived usefulness (PU) of behavioural intention (BI) as recommended by Davis, (1989), Alraimi, Zo & Ciganek, (2015), and Al-Maroof and Al-Emran (2018). These relationships among the factors of interactivity, teacher-subject knowledge (TSK) and course content (CC) on the effectiveness (Huang, Zhang, & Liu, 2017), Furneaux, (2012). Both relationships demonstrate an extra effect on support assessment, academic performance and student satisfaction on the continued intention (MacDonald, et al., (2001), Ifinedo, Pyke, & Anwar, (2018). In addition, technology integration (TI) with PEOU and PU affect the behavioural intention and student satisfaction which are derived from the main factors of TAM combined with the

additional factors from other adapted models from prior studies (Lee, Hsieh, & Chen, 2013; Hone & Elsaid, 2016; Joo, So, & Kim, 2018).

The TAM, TTF, and part of ECT models are adopted to measure the level of support assessment and evaluate the academic performance improvement using the acceptance model. Therefore, TAM, TTF, and part of ECT are used as the background for the effectiveness of the adopted technologies' enhancement of learning that uses many factors to relationship their decision of continuous intention to use e-learning system. Table 3.3 shows the factors, types and citation.

Table 3.3 Factors identified according to type and Citation

Factor	Type	Citation
Perceived Usefulness (PU)	Independent factors	Davis (1989); Wu & Chen, 92017); Al-Maroof, et al., (2018); Ifinedo et al., (2018); Joo et al., (2018)
Perceived Ease Of Use (PEOU)	Independent factors	Davis (1989); Al-Maroof, et al., (2018); Ifinedo et al., 92018); Goodhue & Thompson (1995)
Course Content (CC)	Independent factors	MacDonald, et al., (2001); Peltier et al., (2003); Hone, (2016); Goodhue & Thompson (1995)
Interactivity (Int)	Independent factors	Peltier et al., (2003); Hone, El Said, (2016); Mullen, et al., (2017); Goodhue & Thompson (1995)
Teacher Subject Knowledge (TSK)	Independent factors	Huang, Zhang, Liu (2017); Christensen, 92017); Ifinedo, et al., (2018); Goodhue & Thompson (1995)
Technology Integration (TI)	Independent factors	MacDonald, et al., (2001); Peltier et al., (2003), Hone, (2016); Goodhue & Thompson (1995)
Support Assessment (SA)	Dependent factors	Moloo, (2017); Ifinedo et al., (2018); Goodhue & Thompson (1995)
Academic Performance (AP)	Dependent factors	Moloo, (2017); Ifinedo et al., (2018); Goodhue & Thompson (1995)
Behavioral Intention (BI)	Dependent factors	Davis, (1989); Watson et al., (2017); Almaroof, et al., (2018); Hwang et al., (2018)
Effectiveness (EFF)	Dependent factors	Peltier et al., (2003); Goodhue & Thompson (1995); MacDonald, et al., (2001)
Student Satisfaction (SS)	Dependent factors	MacDonald, et al., (2001); Engelbrecht, (2003); Bhattacherjee, (2001); Spreng et al., (1996); Almaroof, et al., (2018); Ifinedo, et al, (2018); Joo et al., (2018)
Continued Intention to use (CI)	Dependent factors	MacDonald, et al., (2001); Engelbrecht, (2003); Bhattacherjee, (2001); Taylor & Todd, (1995); Joo et al., (2018); Mullen et al., (2017); Ifinedo et al., (2018); Goodhue & Thompson (1995)

The items measuring academic performance were derived from Ifinedo, Pyke, and Anwar (2018). Items measuring student satisfaction and behavioural intentions of the service, using technology- acceptance models were derived from Al-Maroof and Al-Emran (2018), and the continuous intention is based on utilizing technology integration to relationship online learning effectiveness (Wu & Chen, 2017). However, the behavioural intention factor has a positive effect on support assessment as suggested by prior studies (Moloo et al., 2018). The developed models of TAM2 show that Attitude factor is not used anymore, that why it's removed in this study. Furthermore, Confirmation factor with TAM2 and TAM3 was removed to be in fact of these two factors were excluded from the proposed model.

3.4.2.2 Research Hypotheses

The hypotheses for this research are developed according to the factors identified from the literature as has been explained in the previous subsection. TAM, TTF, and part of ECT model are adopted as an appropriate theoretical model to investigate student continuous intention to use e-learning systems. Findings from prior studies (Abushanab et al., 2010) suggested that performance expectancy has a positive association with behavioural intention.

According to Davis (1989), PEOU has a positive effect on perceived usefulness (PU) by using the model system directly or indirectly through TAM factors (Hong et al., 2009; Alraimi et al., 2015; Lee, Yeung, and Ip, 2017; Lee, 2010; Stone 2013; Theng &Sin, 2012), where PEOU correlates with PU towards the usage of e-learning. These factors can directly affect behavioural intention and thus, indirectly affect the continuous intention to use the e-learning systems.

Hence, students' initial adoption of e-learning is mostly relationship by their peers' suggestions and teacher's support, but their behavioural intention to use e-learning as well as the continued use of e-learning are determined by their own experiences and evaluations of the usefulness of the e-learning systems (Lee & Choi, 2013).

Therefore, these three factors, namely PU, PEOU, and BI are the main factors to evaluate the acceptance of any e-learning system. But still, these factors are not enough to prove the significance of the continuous intention to use e-learning unless they are connected to other hybrid factors from another tested technology model to identify the positive effects of different factors on the improvement of continuous intention. Previous

studies show that the students' perceptions have a positive effect on the knowledge development of using systems (Mortensen & Bloch, 2005). Also, it reflects that users' support assessment enhances the job performance which means the satisfaction level has indirect effect to the continuous intention to use e-learning (Davis, 1989). ECT also reflects the significant relationship between perceived ease of use and satisfaction (Bhattacherjee, 2001; MacDonald, et al.,2001; Engelbrecht, 2003). In summary, it is evident that there are few studies that examined the perceived ease of use and perceived usefulness relationship on student satisfaction and behavioural intention in e-learning. Therefore, the hypotheses are developed as below:

H1: There is a significant positive relationship between perceived ease of use and perceived usefulness.

H2: There is a significant positive relationship between perceived usefulness and behavioural intention.

H3: There is a significant relationship between perceived ease of use and behavioural intention.

H4: There is a significant positive relationship between perceived usefulness and student satisfaction.

H5: There is a significant relationship between perceived ease of use and student satisfaction.

Technologies and types of technology integration can be mastered after understanding the operations and limitations of technology. However, the course can be presented in different categories where one is a student, and the other is a teacher and the third is materials only. In the new generation of MOOC with adopted TTF, all electronic material makes technology integration more sufficient and easier to access and share (Alraimi, Zo & Ciganek, 2015; Aljukhadar, Senecal, & Nantel, 2014; Bhattacherjee, 2001; Engelbrecht, 2003). Thus, the researcher proposes these hypotheses:

H6: There is a significant relationship between technology integration and behavioural intention.

H7: There is a significant relationship between course content and effectiveness.

However, previous studies did not consider how the student satisfaction factor and teacher-subject knowledge factor can enhance the continuous intention to use e-learning. ECT model satisfaction factor has a positive impact to continuous intention through the students' evaluation of the course that fit the requirements of the university needs (Bhattacherjee, 2001; MacDonald et al.,2001; Engelbrecht, 2003). Moreover, the TTF model factor of teacher-subject knowledge relationships the impact of using TTF on the academic performance and assistance of use as type of continuous intention to use e-learning system (Junglas, Abraham, & Watson, 2008; Goodhue & Thompson, 1995).

In addition, there is a need to include the technology integration factor or to enhance e-learning as recommended by prior studies (Hutchinson & Wells, 2013; Greene, Oswald, & Pomerantz, 2015). Therefore, this factor attempts to measure the effectiveness of combining the factors application of tools used to improve the continuous intention to use e-learning. The teacher-subject knowledge refers to the degree of knowledge and expertise possessed by the teachers in relation to his/her teaching styles which are carried out in accomplishing the complete course content and support assessment in a proper manner that is perceived as useful to the students and for teachers to find the relationship between evaluations and learning (Junglas, Abraham, & Watson, 2008). The finding can provide positive feedback towards the continuous intention to use e-learning system. The teacher knowledge moderates the effects of teaching duration and development related to e-learning system that moderates students' perception in sharing knowledge and assessment performance in relation to provide continuous intention to use e-learning system (Al Rubaish et al., 2011). These parts are converted to the following hypotheses:

H8: There is a significant relationship between course content and support assessment.

H9: There is a significant relationship between teacher-subject knowledge and effectiveness.

E-learning also provides students with the opportunity to learn more and get more benefits by interacting with other students without the need to meet face-to-face based on a fixed time or schedule in order to learn (Almaroof, et al., 2018).

Another factor describes how the interactivity of e-learning systems in providing educational electronic materials such as PowerPoint slides, files, and videos can affect

the continuous intention to use e-learning system. Thus, the use of communication tools and application software among students provides the mechanism of interactivity of which the group members can coordinate, chat, and relationship knowledge achievements (Huang, Zhang, & Liu, 2017). These interactive tools help students to be more confident and trained in the use of e-learning system (Lee & Lehto, 2013). Accordingly, in the era of evolution, the use of the technology integration factor as email, Wiki, and video conversations has enhanced distance learning, improved coursework teaching, and also enhance the continuous intention to use e-learning systems (Laurillard, 2008).

Marks, Sibley, and Arbaugh (2005) presented three aspects of interactivity which include teacher-student, student-student, and student-content interactions. Findings from a study conducted by Marks et al. (2005) confirmed that the interactivity of an e-learning system has a significant effect on learning effectiveness with teacher-student and student-student interactions that affect the use of e-learning systems. This is shown in the following hypotheses:

H10: There is a significant relationship between interactivity and support assessment.

H11: There is a significant relationship between interactivity and effectiveness.

The present innovative platforms such as MOOC are based on e-learning concepts which employ evolutionary, tightly coupled technologies of chat, files, and automatic exams to meet the learning and teaching needs of the increasing huge numbers of continuous intention to use a system (Dabbagh & Kitsantas, 2012). The authors' evaluation was based on the interactivity and effectiveness of the comprehensive factors for academic performance that have been adopted for continuous intention to facilitate e-learning. This study thus attempts to establish that such factors have relationship the continuous intention of e-learning by using academic performance as a mediator factor. This study strives to find a significant relationship between the academic performances that indirectly indicates the power and enhancement of continuous intention.

Furthermore, previous studies have shown that student perception has a positive effect on knowledge development of the use of the systems (Mortensen & Bloch, 2005). Researchers such as Chmiel et al. (2017) employed the mediator factor of TAM like behavioural intention (BI) factor as the main character, on the basis of computational web-based survey models, as an appropriate and widely accepted approach to carry out

continuous intention to use e-learning systems. Additionally, it reflects the enhancement of academic performance, which means that it will indirectly affect the continued use of the systems (Davis, 1989). Also, Alraimi, Zo, and Ciganek (2015) conducted a survey with different users on MOOC platforms to get the continuous intention of using the model. Findings from their study revealed that perceived usefulness, perceived ease of use, and user satisfaction are significantly relationship by academic performance but the study did not account for the positive impact on the continuous intention. Thus, the impact of behavioural intention effects academic performance as the mediator factor to enhance continuous intention to use e-learning as the target factor (Huang, Zhang, & Liu, 2017). The hypotheses are:

H12: There is a significant relationship between behavioural intention and academic performance.

H13: There is a significant relationship between academic performance and continuous intention to use e-learning system.

H14: There is a significant relationship between effectiveness and continuous intention to use e-learning system.

H15: There is a significant relationship between support assessment and continuous intention to use e-learning system.

H16: There is a significant relationship between student satisfaction and continuous intention to use e-learning system.

This study proposes 16 hypotheses, which will be explored throughout the investigation on continuous intention to use e-learning system. The study utilized TAM, TTF, and part of ECT models in postulating the hypotheses.

3.4.2.3 Instrument Development

After the development of initial model, the instrument to be employed in this study was constructed from selecting the suitable questions derived from the related work and scholars. These are listed in Table 3.4.

Table 3.4 List of Measures for Acceptance Model

Factors	Code	Measures	References
Student Perception	SP1	E-learning systems enhance my effectiveness	Ifinedo, et al,2018, Wu & Chen, 2017
	SP2	E-learning systems improve my academic learning performance	Alraimi & Ciganel, 2015; Theng and Sin, 2012; Lee, 2010; Davis 1989; Al-Maroof, 2018, Joo, et al, 2018
	SP3	E-learning systems are easy to use	
	SP4	It is easy to get materials from E-learning systems	
	SP5	E-learning systems are clear and understandable	
	SP6	E-learning systems allow me to submit my assignments	
Course Content	CC1	E-learning systems effectively challenge me to think	Peltier et al., 2003, Hone, 2016
	CC2	Course assignments are interesting and stimulating	
	CC3	This course is up-to-date with developments in the field	
	CC4	Student evaluation techniques such as projects, assignments, and exams are related to the E-learning objectives of this course	
	CC5	Course content applies E-learning and problem solving	
Interactivity	IN1	I feel free to express and explain my own views throughout E-learning systems	Peltier et al., 2003, Hone, 2016
	IN2	I have sufficient opportunity to interact with other students using E-learning systems	
Teacher Subject Knowledge	TSK1	E-learning systems are trusted by teacher to enhance learning	Christensen, 2017
	TSK2	E-learning systems can be used to improve 21st-century skills.	
	TSK3	E-learning systems allow the student to enjoy privacy with the instructor	
	TSK4	E-learning systems guide curriculum updating courses	
	TSK5	E-learning systems increase the effectiveness of moderation	
Technology Integration	IT1	The interactive content of E-learning systems effectively communicates from the same course	Peltier et al., 2003, Hone, 2016
	IT2	The interactive content of E-learning systems includes information not covered in printed material of the same course	
	IT3	The interactive content of this course contributes to E-learning	
Support Assessment	SA1	E-learning systems guarantee trust in assessment Timely and quality feedback	Moloo, 2017, Ifinedo, et al, 2018
	SA2	Projects/assignments are clearly explained using E-learning systems	Ifinedo, et al, 2018
	SA3	E-learning systems guarantee to support my learning motivation	Ifinedo, et al, 2018
	SA4	E-learning systems make technology more convenient	Moloo, 2017

Table 3.4 Continued

Factors	Code	Measures	References
	AP2	I anticipate better grades in classes where e-learning systems are used heavily compared to where they are not used	Ifinedo, et al, 2018
Behavioral Intention	BI1	I am considering the new information I have learned with e-learning systems when taking action related to the topic.	Watson, et al, 2017; Parameswaran, et al., 2015
	BI2	It is worth to recommend the e-learning systems to other students.	Hwang, et al, 2018, Almaroof, 2018
	BI3	I'm interested to use the e-learning systems more frequently in the future	Hwang, et al, 2018, Almaroof, 2018
Continuous Intention to use	CI1	I intend to use e-learning systems in the future continuously	Taylor, Todd, 1995, Joo, et al, 2018 Parameswaran, et al., 2015
	CI2	If e-learning systems become diverse in the future, I intend to use it frequently even after graduation.	
Student Satisfaction	SS1	E-learning systems are user-friendly	Almaroof,2018
	SS2	I am really happy with e-learning systems after using them	Ifinedo et al, 2018
	SS3	E-learning systems are a very delightful experience.	Joo, et al, 2018, Spreng, et al, 1996; Alraimi & Ciganel, 2015; Theng and Sin, 2012;
Effectiveness	EF1	I would recommend e-learning systems to friends/colleagues	Peltier et al., 2003
	EF2	I have learned a lot in this e-learning system	

The instrument that is commonly used in quantitative research for data compilation is the questionnaire survey, which is designed based on the hypotheses and an associated body of acquaintance (Creswell, 2009). Likewise, in this study the survey questionnaire has been used as an instrument design based on hypothesis proposed in acceptance model.

The questionnaire was titled "An Acceptance Model For Contributing Factors Of Continuous Intention To Use E-Learning Systems In Oman Higher Education Institutions ". It was divided into two sections. The first section comprised questions related to students' demographic information whereas the second section was divided into twelve parts, in which there were 37 items based on the 11 factors. The factors were intended to evaluate students' perceptions on their continuous intention to use e-learning systems to their academic performance, teacher-subject knowledge, course content, behavioral intention, satisfaction, support assessment, effectiveness, and familiarity with technology, perceived usefulness and perceived ease of use. The survey used a Likert scale of three levels to measure the extent of their agreement to the measures based on the following: 1 = Disagree, 2 = Neutral, 3 = Agree.

3.4.2.4 Research Instrument

At this stage, the questionnaire was completed and submitted to several panels of experts for review and feedback to ensure that the objectives of the study were met and to reduce any confusing aspects of the questionnaire. Their feedback was to verify the factors in the first version of the questionnaire and balance the distribution of items. As a result, apart from grammatical corrections, revisions were made to the title, and items were increased from 37 to 44. Evaluator 2 recommended that the Likert Scale be increased from 3 scores to 5 scores. Table 3.5 shows the updated items. Appendix A shows the 44 items of measures.

Table 3.5 shows Version 2 of factors that comprise updated measures with citation.

Table 3.5 List of Version 2 Measures for Acceptance Model

Factors	Code	Measures	References
Perceived Usefulness	PU1	E-learning systems enhance my effectiveness	Ifinedo, et al,2018, Wu & Chen, 2017
	PU2	E-learning systems improve s my academic learning performance	Alraimi & Ciganel, 2015; Theng and Sin, 2012; Lee, 2010; Davis 1989; Al-Maroof, 2018, Joo, et al, 2018
	PU3	E-learning systems easily translate s the learning material into specific Knowledge.	
	PU4	Using E-learning systems would enable me to accomplish tasks more effectively	
Perceived Ease of Use	PEOU1	E-learning systems are easy to use	Davis, 1989; Alraimi, et al, 2015; Al-Maroof, 2018; Ifinedo, et al, 2018; Theng and Sin, 2012;
	PEOU2	It's easy to get materials from E-learning systems	
	PEOU3	E-learning systems are clear and understandable	
	PEOU4	E-learning systems allow me to submit my assignments	
Course Content	CC1	E-learning systems effectively challenge me to think	Peltier et al., 2003, Hone, 2016
	CC2	Course assignments are interesting and stimulating	
	CC3	This course is up-to-date with developments in the field	
	CC4	Student evaluation techniques such as projects, assignments, and exams are related to the E-learning objectives of this course	
	CC5	Course content applies E-learning and problem solving	

Table 3.5 Continued

Factors	Code	Measures	References
Interactivity	IN1	I feel free to express and explain my own views throughout E-learning systems	Peltier et al., 2003, Hone, 2016
	IN2	I have sufficient opportunity to interact with other students using E-learning systems	
	IN3	The instructor provides timely feedback on assignments, exams or projects	
	IN4	E-learning systems facilitate the collaboration among the students	
Teacher Subject Knowledge	TSK1	E-learning systems are trusted by teacher to enhance learning	Christensen, 2017
	TSK2	E-learning systems can be used to improve 21st-century skills.	
	TSK3	E-learning systems allow the student to enjoy privacy with the instructor	
	TSK4	E-learning systems guide curriculum updating courses	
	TSK5	E-learning systems increase the effectiveness of moderation	
Technology Integration	IT1	The interactive content of E-learning systems effectively communicates from the same course	Peltier et al., 2003, Hone, 2016
	IT2	The interactive content of E-learning systems includes information not covered in printed material of the same course	
	IT3	The interactive content of this course contributes to E-learning	
Support Assessment	SA1	E-learning systems guarantee trust in assessment Timely and quality feedback	Moloo, 2017, Ifinedo, et al, 2018
	SA2	Projects/assignments are clearly explained using E-learning systems	
	SA3	E-learning systems guarantee to support my learning motivation	
	SA4	E-learning systems make technology more convenient	
Academic Performance	AP1	I anticipate good grades in courses where e-learning systems are used heavily	Parameswaran,et al., 2015
	AP2	I anticipate better grades in classes where e-learning systems are used heavily compared to where they are not used	Ifinedo, et al, 2018
	AP3	E-learning systems efficiently allow teacher-student interaction	Moloo, 2017
Behavioral Intention	BI1	I am considering the new information I have learned with e-learning systems when taking action related to the topic.	Watson, et al, 2017; Parameswaran, et al., 2015
	BI2	It is worth to recommend the e-learning systems to other students.	Hwang, et al, 2018, Almaroof, 2018
	BI3	I'm interested to use the e-learning systems more frequently in the future	Hwang, et al, 2018, Almaroof, 2018

Table 3.5 Continued

Factors	Code	Measures	References
Continuous Intention to use	CI1	I intend to use e-learning systems in the future continuously	Taylor, Todd, 1995, Joo, et al, 2018 Parameswaran, et al., 2015
	CI2	I intend to utilize e-learning systems for various purposes such as self-development as well as earning credit hours.	
	CI3	If e-learning systems become diverse in the future, I intend to use it frequently even after graduation.	
Student Satisfaction	SS1	E-learning systems are user-friendly	Almaroof,2018 Ifinedo et al, 2018 Joo, et al, 2018, Spreng, et al, 1996; Alraimi & Ciganel, 2015; Theng and Sin, 2012;
	SS2	I am really happy with e-learning systems after using them	
	SS3	E-learning systems are a very delightful experience.	
Effectiveness	EF1	I would recommend e-learning systems to friends/colleagues	Peltier et al., 2003
	EF2	I have learned a lot in this e-learning system	
	EF3	I have enjoyed e-learning systems	

Table 3.6 shows the expert evaluator profiles and the recommendations made.

Table 3.6 Expert Evaluator Profiles of Initial Questionnaire

Expert	Degree/ Department	Profile Description	Remarks
Evaluator 1	Assistant Professor at AlBuraimi College, Oman IT Department	The evaluator has extensive research publications in different areas of interest. His research interests are in Programming, Teaching and Learning in education, E-Learning. He holds the position of Head of Department since 2010.	-It is better to use E-learning system in general instead of using (UCOM) new specific name. - This questionnaire needs a lot of corrections to overcome all the grammatical errors - What do you mean with Item INT 1? The question is not clear? - use the term 'worth' in question BI 2, " It is good to recommend the e-learning systems to other students." -The whole other factors mentioned is applicable for the research study.
Evaluator 2	Associated Professor at Al-Enbar University, Iraq IT Department	The evaluator has extensive research publications in different areas of interest. His research interests are in data mining, Teaching and Learning in education, E-Learning.	-It is better to extend Likert scale score from 3 points to 5. -Improve the language of writing questions to be more easy, understandable and targeting one point at a time in each factor. -My advice is to rewrite the questionnaire by splitting student perception factor into two important factors with TAM perceived usefulness (PU) and perceived ease of use (PEOU).

Table 3.6 Continued

Expert	Degree/ Department	Profile Description	Remarks
Evaluator 3	Assistant Professor at AlBuraimi College, Oman IT Department	The evaluator has extensive research publications in different areas of interest. His research interests are in information systems in education, E-Learning.	-Determine the thesis title in the introduction of your questionnaire to be clear for all respondents what are you want to achieve? -I propose you to separate technology integration items from interactivity items factors to be one value achieved in each question. - Rewrite the questionnaire after review by an expert in language terms to determine the easiest and suitable words to be delivered from each item of your questionnaire

3.4.3 Phase 3: Research Validation

At the end of Phase 2, the second version of the questionnaire draft was reviewed and revised. This section describes the activities of Phase 3 which are (1) Instrument Validation, (2) Revise Instrument (3) Pilot Study and (4) Content Reliability Test. Table 3.7 illustrates the activities, objectives and deliverables of this phase.

Table 3.7 Phase 3 Deliverables from Activities

Activities	Objective	Deliverables
Instrument validation	To assess the questionnaire correctness through experts.	A validated questionnaire content from the experts received
Revise instrument	To adjust the instrument with extra items and rephrase the instrument items.	A final validated questionnaire formed
Pilot study	To select a small group of respondents from the preliminary questionnaire set.	Analysis of questionnaire
Content Reliability test	To validate the study by sending to experts and confirm instrument by testing the reliability of questionnaire.	Confirmed instrument

3.4.3.1 Instrument Validity

In this phase, the revised draft was again submitted for evaluation to another panel of experts to validate the questions in terms of correctness, suitability and validity. The experts' comments are given in Table 3.8.

Table 3.8 Expert Evaluator Profiles of Version 2 Questionnaire

Expert	Degree/ Department	Profile Description	Remarks
Evaluator 1	Assistant Professor at AlBuraimi College, Oman IT Department	The evaluator has extensive research publications in different areas of interest. His research interests are in data mining, Teaching and Learning in education, E-Learning.	Sufficient Questionnaire
Evaluator 2	Assistant Professor at Tikrit University, Iraq IT Department	The evaluator has extensive research publications in different areas of interest. His research interests are in E-Learning, Networking, and Computer Security.	Fitted smoothly with the title of the study
Evaluator 3	Lecturer at AlBuraimi College, Oman IT Department	The evaluator has extensive research publications in different areas of interest. His research interests are in cloud computers, information systems in education, E-Learning.	Fully accepted and applicable

3.4.3.2 Revision of Instrument

Based on the feedback received from the second panel, the draft was finalised. The Likert Scale was increased from a 3-point scale to a 5-point scale, which are (1) =Strongly Disagree, (2) =Disagree, (3) =Neutral, (4) =Agree, and (5) =Strongly Agree. (Refer to Appendix B on pages 148 to 151 for the finalised draft).

3.4.3.3 Pilot Study

Once the questionnaire was finalised, the next step would be to test the reliability of the questionnaire using the Cronbach Alpha test. If the reliability passed Cronbach's Alpha >0.7, the questionnaire would be distributed to the main population of the study. However, it is always advantageous to pilot the questionnaire first. This is in line with Sekaran and Bougie's (2016) recommendation. They (2016) suggested that prior to collecting data, applicable statistics from the original study should be calculated to ascertain reliability. This section discusses how the Acceptance Model was piloted in this study.

The pilot test was conducted by the researcher on her section's students at BUC. They were 58 undergraduate students from two sections in the Information Technology Department. The hard copy of the questionnaire was distributed during class time. The aim was to check if students could answer the questionnaire without any difficulty. The participants that were selected for the pilot study received a preliminary declaration

stating that their participation was voluntary and that their anonymity would be guaranteed if they chose to complete the questionnaire survey.

3.4.3.4 Content Reliability Test

Data from pilot test were then tested for reliability. Table 3.9 shows the results of the pilot study based on Cronbach's Alpha test.

Table 3.9 Pilot Study Statistical Package for the Social Sciences (SPSS) Evaluation

Acronym	Latent Factors	No. of Items	Cronbach's Alpha
PU	Perceived Usefulness	4	0.916
PEOU	Perceived Ease of Use	4	0.729
CC	Course Content	5	0.862
INT	Interactivity	4	0.802
TSK	Teacher-Subject Knowledge	5	0.858
TI	Technology Integration	3	0.873
SA	Support Assessment	4	0.759
AP	Academic Performance	3	0.845
BI	Behavior Intention	3	0.889
SS	Student Satisfaction	3	0.831
EFF	Effectiveness	3	0.725
CI	Continuous Intention to Use	3	0.874

As shown in Table 3.9, the internal consistency of the items was measured using Cronbach's alpha analysis on Statistical Package for the Social Sciences (SPSS). Since the Cronbach's Alpha fell within the acceptable range (0.83 to 0.88) > 0.7, the reliability of the scale was confirmed (George et al., 2003).

This shows that the current model is applicable for Acceptance Model and the measures reflect the continuous intention to use e-learning systems. The questionnaire was then created as an online form using Google Form, a free online survey service that can be used to collect responses.

3.4.4 Phase 4: Main Research and Hypotheses Testing

In Phase 4, the main activities are (1) Data Collection, (2) Data Analysis, (3) Assessment of Measurement and Structural Model, as illustrated in Table 3.10. The table also presents the objectives and deliverables of this phase.

Table 3.10 Phase 4 Deliverables from Activities

Activities	Objective	Deliverables
Data Collection	To distribute Google.doc questionnaire survey link.	Questionnaire data filled.
Data Analysis	To evaluate the data from the survey	Quantitative analysis completed.
Assessment of Measurement and Structural Model	To determine the evaluation feedback hypothesis testing.	Model with supported hypothesis.

3.4.4.1 Data Collection

Once the Acceptance Model passed the reliability test, data could be collected. This section describes the sampling selection and size, the ethical considerations, data collection procedures, data analysis and findings.

a) Sampling Selection and Size

It is important to collect information from every single individual in the population. Hence, sampling means collecting sufficient information from a particular participant in the population in order to popularise the findings of the entire population (Hair et al., 2013). The data to validate the model were collected from four different HEIs from different regions of Oman. All these four HEIs apply an e-learning system.

As the primary objective of the Acceptance Model is to enhance continuous intention to use e-learning systems based on the contributing factors from TAM, TTF and part of ECT, the main selection criterion was that the respondents were students of HEIs. It was also important that the students chosen were using e-learning platforms at their respective HEIs.

The next main criterion therefore was that the research sites must be using e-learning systems. According to Cone and Foster (1993), a few departments in universities were already using e-learning or had participated in earlier research as the teachers were allowed to use e-learning in combination with their subject knowledge at that point in time. Others were still in the early stages of the innovation-decision process or were transferring from a period of investigation into a phase where e-learning was considered as part of the institutional agenda (Collis & Van der Wende, 2002). In the Omani context, the HEIs that implement e-learning systems are Buraimi University College (BUC), Sohar University (SohU), Sultan Qaboos University (SQU) and University of Buraimi

(UoB). The reason behind selecting these four universities was, these universities had a variety of requirements as all have different departments and more than one major in each department. Secondly, these universities had mixed students' gender. Third, the important common factor where all of these universities were used Moodle as a type of e-learning system. Thus, the sample in this study is purposive, which according to Crossman (2017), is a non-probability sample that is chosen based on the characteristics of the population and the objective of the study.

The author employed G-power software to calculate the sample size. The software used a construct rule of relationship between the number of constructed factors and number of hypotheses in the model, which shows that the minimum number of sampling should be 193. In this study, the total number of respondents is 295. This will be explained more in Section 4.3.

b) Ethical Considerations

To gain access to the four HEIs in Oman that implement e-learning systems in the teaching and learning process, permission was gained through the Directors of Research Units. The author had to fill in a Research Ethics Checklist to get access to conduct her research. This is appended in Appendix D, which also includes the letter of agreement to distribute the questionnaires to different universities as well as the hardcopy of the approval given by Al-Buraimi College as sample.

c) Data Collection Procedures

Data were collected during the first academic semester of 2017-18 in January 2018 and it took one month to complete. After obtaining clearance from the Director of research unit of BUC, a brief letter that explained the details of the study and a copy of the designed questionnaire were sent to the management office of the four selected HEIs to facilitate the process of obtaining data with permission to conduct this survey at their institutions. Upon getting approval, the questionnaire link of the online form of the questionnaire created using Google Form was shared by email through the Director of Research Unit of the author's university (BUC) to the Directors of the Research Units of the other HEIs. They, in turn, forwarded the questionnaire link to relevant lecturers who would get their students to fill in the questionnaire.

Kayam and Hirsch (2012) stated that online data collection tools are extremely convenient as they lower the costs associated with data collection, save time, enable more participants to be reached to achieve a greater yield, collect the data in form of a database, and some even provide statistical analyses on the data collected. The participation is voluntary as participants experience less pressure when allowed to answer in their own time (Kayam & Hirsch, 2012).

However, despite this convenience, the author had no control over the respondents' participation. Due to poor response, the author had to resort to contacting lecturers from the three HEIs, and giving the lecturers of each institution about approximately 110 hard copies of the questionnaire survey to be distributed to their students for them to fill in the questionnaires. As a result, 307 questionnaires from undergraduate students of different majors were returned.

In total, from Al-Buraimi College (BUC), 96% filled out the survey forms (100 out of 104); some online and some hard copy. In addition, from Sohar University (SohU), 99% of students answered the questionnaires (83 out of 84). In Sultan Qaboos University (SQU), the participants returned 92% of the total samples (54 out of 59). Lastly, in the University of Buraimi (UoB), the questionnaires were distributed to 60 students, and only 58 responded and filled them out, which means that 97% participated in the survey. Of 307 questionnaire feedback received, only 295 respondents fully answered all the items. Unfortunately, 12 of these samples had missing values; therefore, these were removed from consideration, making the total number of respondents 295.

Data were entered in Excel file, and saved as csv extension (comma delimited) to be tested by PLS-SEM programme. Results were examined and evaluated to determine the accuracy of the Acceptance Model. Then finally, the documentation and description were reported. All these are reported in the following sections and subsections. To conclude, Table 3.10 summarises the research procedures within the duration of the research.

d) Summary of Research Operational Framework

Lastly, Table 3.11 summarises the steps and procedures that applied in the four phases of research operational framework.

Table 3.11 Summary of Research Operational Framework

Phase 1: Theoretical Foundation (outcome: Research Gap)			
Activities	Objectives	Method/Tool	Deliverables
Problem Statement Identification **Research Questions and Objectives formulation** **Literature Review** **Research Gap**	- To Identify research question -To identify research objectives -To identify research constructs -To develop research initial model -To identify literature review gap	-Literature Review -Mind Map -Systematic literature review -Thematic literature review -Discussion	-Problem statement -Research questions -Research objectives -Research constructs -Research operational framework
Phase 2: Development of Research Model and Instrument			
Develop of Research Conceptual Model **Research Hypotheses** **Instrument development Research Instrument**	-To develop initial items and instrument -To develop items and instrument -To test construct content validity	-Content selected from related studies -Content expert -Content and face validity	-Refine instrument -Design items and instrument -Final questionnaire
Phase 3: Research Validation			
Instrument validity **Revised instrument** **Pilot study** **Content Validity & Reliability test**	-To distribute questionnaire to the expert -To validate the questionnaire validity by experts -To conduct pilot study from respondents -To perform statistical analysis -To test instrument reliability and validity	-Questionnaire verification and usefulness -Factor analysis -Pilot study validity -Pilot study analysis reliability -Model estimation -Model evaluation	-Receive survey from reviewers -Return survey and test reliable measurement model -Validated model re-specified model
Phase 4: Main Research and Hypothesis Testing			
Data Collection **Data Analysis** **Assessment of Measurement and Structural Model**	-To conduct survey on main sample -To test research hypothesis -To determine the highest sufficient results from the positive hypothesis -To test final model -To develop final model	-Data gathering -Data screening -Validity and reliability analysis - Model assessment measures -PLS-SEM test	-Influential factors on continuous intention to use e-learning system -Final model

3.4.4.2 Data Analysis

The data that were entered in Excel file, and saved as vs. extension were tested using the PLS-SEM software that is based on a set of data collection used to evaluate all the questions with different factors. However, before embarking on the data analysis, missing data, outlier, normality and multi-collinearity issues were addressed in order to clean the data before further data analysis was employed.

3.4.4.3 Using PLS To Assess the Measurement and Structural Models

A two-step approach was adopted to assess the Acceptance Model which are 1) assessment of measurement model and 2) assessment of structural model. This two-step approach is based on the assessment of the measurement and structural models. The guidelines used to assess both measurement and structural models of this study will be deliberated in the next subsections.

1. Assessment of Measurement Model

The measurement model determines the link between the independent and dependent factors, and assesses the factors' indicator values based on the confirmatory factor analysis (CFA) technique. Next, the measurement model's validity can be evaluated by testing the convergent validity and discriminant validity.

Based on the output from the developed Acceptance Model, an adjusted PLS model is created to identify how the acceptance model can be improved based on the initial model of continuous intention to use e-learning.

Convergent Validity

The convergent validity assesses to what extent the construct measures are different from the other constructs in the model. The value of the convergent validity measure is based on a merge or percentage of variance. Several techniques are employed to measure the relative quantum of convergent validity among measured. - items. Accordingly, Hair et al. (2006) suggested the use of factor loadings, composite reliability, and Average Variance Extracted (AVE) in measuring the convergent validity, where factor loadings ≥ 0.5, and preferably ≥ 0.70, show a high convergent validity. On the other hand, a composite reliability with estimates ≥ 0.70 shows enough convergence or internal consistency. The AVE exhibits the indicators total variance accounted for by the latent construct and the value for the AVEs should be ≥ 0.5. Thus, when the values are higher

than the minimum recommended score for factor loading, composite reliability, and AVE, it signifies the instrument items are valid and reliable.

Discriminant Validity

A discriminant validity measure is another test carried out to measure the extent to which a construct is truly different from other constructs. A high discriminating validity shows that a concept is specific and highlights some effects overlooked by other measures. To assess discriminating validity, latent constructs correlations matrices are applied where the square roots of the AVEs along the diagonals are indicated. Correlational statistics between constructs are shown in the lower left off-diagonal elements in the matrix. Thus, discriminant validity is realized when the diagonal elements (square roots of AVEs) exceed the off-diagonal elements (correlations between constructs) in the same row and column as suggested by Fornell and Larcker (1981).

2. Assessment of Structural Model

The structural model's characteristics are measured by studying R^2 determination coefficients, regression estimates, and statistical significance. The R^2 value assesses the amount of prognostic power and shows the extent of divergence, justified by its antecedent factors in the model. The model's R^2 values should be high enough to reach a minimum level of explanatory power (Urbach Ahlemann, 2010). Accordingly, Chin (1998) considered R^2 values of 0.67 as significant, 0.33 as reasonable, and 0.19 as poor. Another measure that is carried out in the assessment of the structural model is the path coefficient value which measures how strong the link is between the independent factors and dependent factors. To assess if the path coefficients are significant, the value should be higher than 0.100 within the model and be substantive at the 0.05 level of significance at least.

Descriptive Analysis

Descriptive analysis of the data was carried out to analyse the demographics of the respondents and the frequency, mean, and standard deviations of the factors. The descriptive analysis was performed to examine the relationship of independent factors on the dependent values in the Acceptance Model as seen in Figure 3.2. This is presented in Chapter 4 in Section 4.4.

3. Findings

This section highlights the common findings from the Acceptance model that has been tested in PLS-SEM. These findings are distinguished in 1) communication skills and 2) e-learning system integration to enhance continuous intention to use e-learning systems. In communication skills, the findings show the powerful constructs with effectiveness, interactivity, perceived usefulness, perceived ease of use, teacher-subject knowledge, technology integration, student satisfaction, behavioural intention and support assessment factors.

i. Communication Skills

In terms of communication skills, interactivity, teacher-subject knowledge and support assessment have been identified as some of the most important factors for communication skills. For example, teacher-subject knowledge refers to teachers' experience in developing programmes as well as the support assessment, interactivity is important as it promotes positive interactive functions. All these require good communication skills which indirectly increase continuous intention to use e-learning systems.

ii. E-Learning System Integration

E-learning system comprise a collection of different teaching tools and assessment methods that are based on a different acceptance technology models used. Similar to the findings from previous researchers (Islam, 2016; Chmiel et al., 2017), it is evident that there are many factors such as course content, teacher-subject knowledge, interactivity, perceived ease of use, perceived usefulness and technology integration that could be integrated in this study to improve result accuracy in the continuous intention to use.

The four dependent factors (effectiveness, support assessment, academic performance, and student satisfaction) of continuous intention to use e-learning system relationship are the need of interactivity, technology integration, the importance of teacher-subject knowledge, and PU and PEOU with course content. This study strives to establish the relationship of dependent factors to improve the continuous intention to use e-learning system for technology acceptance. In addition, this study assessed the method of students' evaluation as well as their satisfaction with the support assessment factor as a result of student grades to continuous intention to use e-learning system.

Therefore, the effectiveness and support assessment lie continuous intention to use e-learning system, where Acceptance Model could be deployed as an assistant learning and teaching technology.

3.5 Summary

In this chapter the research method for this study was discussed, specifically the rationale, research paradigm, and research phases. Using the Acceptance Model that combined TAM, TTF and part of ECT models not only measure the continuous intention to use e-learning systems more comprehensively by looking at 12 factors that had been identified in the literature for the students to improve their academic performance, it also enables the HEIs to improve the application of e-learning systems, as well as enable teachers to improve their delivery of subject knowledge, integration of technology and interactivity, among other things. The next chapter will discuss the research findings of this project.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the statistical analysis of the survey questionnaire that comprised of forty-four questions. Besides that, the findings related to the research questions are also presented in this chapter. Thus, this chapter is divided into three sections; first is the description of how the data were prepared for analysis which is presented in Section 4.2. Next, the characteristics of the respondents which included their particulars, namely major, degree, age, university name, gender, scholar, and also how often they use e-learning system, as well as their level of knowledge are described in Section 4.3. In addition, the reliability and exploratory factor analysis are then outlined in Section 4.4.1, followed by the findings of the measurement assessments model in Section 4.4.2. Next, the results of the structural model assessment using PLS-SEM and findings regarding the research hypotheses are outlined in Section 4.4.3. Next, the full discussion of the model outputs which is presented in Section 4.5. Next, the practical effect of the model test among factors, which is presented in Section 4.6. Lastly, a summary of the chapter is presented in Section 4.7.

4.2 Data Analysis

This section presents the findings regarding the sample size, missing data, outlier, multi-variant normality, and multicollinearity test carried out on the collected data.

4.2.1 Sample Size

The survey questionnaires were distributed to students from four HEIs. From that, 307 respondents' questionnaire feedback were received but only 295 responses were deemed valid to proceed with this study.

4.2.2 Missing Data

In this study, the percentage benchmark of missing data should not exceed 5% per questionnaire item to be sure that the survey data are trusted, valuable and acceptable to be used in this study (Ilieva et al., 2002). Otherwise, the impact of the data based on random sampling and non-formal size between participant fields in validating the model constructs. However, the final data collected from the survey contain 12 missing data since the respondents were not mandatorily required to provide answers to all the survey questions.

4.2.3 Outlier

An outlier in a survey data signifies the numbers that exceed the majority of answers, where there are two types of outliers which include univariate and multivariate (Kwak & Kim, 2017). The univariate is assumed if the SPSS regression produces a result of unusual value in a single factor that exceeds the number of case acceptance, which is usually less than -3.29 or greater than +3.29. In this case, these records should be removed from the data set and considered as a univariate element. An initial investigation of the survey data in SPSS suggested that there were no cases that exceeded ±3.29 based on their z score records (Hair et al., 2013). Similarly, in another SPSS regression, there were no records that were classified as multivariate, identified by checking the Mahalanobis distance at $p<0.001$. Therefore, after the check for outliers, a final 307 were used for this study.

4.2.4 Test of Multi-variant Normality

When using PLS-SEM as a statistical tool, the data can either be normal or not normal distribution (Hair et al., 2013). However, the assessment of Kurtosis value requires that the value should be lesser than +1 or lesser than -1 for the data to be at normal distribution (not peak or flat). Likewise, for the skewness, the value should not exceed +1 or be less than -1 to be normal (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Based on the Multivariate Normality, data were found to be in normal distribution.

4.2.5 Test of Multi-collinearity

A multicollinearity test is aimed to assess if there is a high correlation between the predictor factors in a multiple regression model. Thus, high levels of multicollinearity can result in incorrect statistical results (Fritz, Morris, & Richler, 2012). Multicollinearity

can be assessed by considering the Variance Inflation Factor (VIF), where all factors in the Acceptance Model revealed that the VIF values ranged from 1.15–3.02 and as such were below 3.3, thus the VIF values were accepted as shown in Table C.1, on page 136 and C.3 on page 138 in Appendix C.

4.3 Participant Demographics

This section presents the demographic characteristics of the respondents which are provided in Table 4.1. Table 4.1 shows the characteristics among four universities that all had common features as all were using Moodle as the e-learning system. Furthermore, they have different aspects of majors, degrees of each program. These universities were mixed in characteristics of gender, included different financial /scholarships. Lastly, these universities include different student's ages and different computer skills of using the e-learning system.

Table 4.1 Demographic characteristics of participants

Field	Description	Number	Percent
Participant	Total	307	100%
	Valid	295	96%
	Missing data	12	04%
Major	IT	147	47.9%
	Engineering	71	23.1%
	LAW	77	25.1%
	Other	12	0.04%
Degree	Diploma	99	32.2%
	High diploma	44	14.3%
	Bachelor	164	53.4%
Gender	Male	134	43.6%
	Female	173	56.4%
Financial Assistance/Scholarship	Government	191	66.1%
	Private	98	33.9%
Computer skill competency	Very High	144	47.4%
	High	132	43.4%
	Low	28	9.2%
How often do you use application of e-learning	Often	131	43%
	Sometimes	151	49.5%
	Never used	23	7.5%
Age	18-21	131	42.7%
	22-26	125	40.7%
	Above 26	51	16.6%

Table 4.1 shows the respondents' major or field of study, where the results depicted that 147 (47.9%) participants are from the IT domain, whereas 77 (25.1%) respondents are from Law discipline. This is followed by Engineering with 71 respondents (23.1%), next is English with 7 respondents (2%) and lastly business with only 5 respondents (1.6%).

In relation to the respondents' level of study, Table 4.1 depicts that 164 respondents (53.4%) are pursuing their Bachelor's degree, 99 respondents (32.2%) are taking Diploma, and 44 respondents (14.3%) are doing Higher Diploma. In terms of gender, Table 4.1 shows that majority of the respondents 173 (56.4%) are females while the remaining 134 (43.6%) are males.

Table 4.1 also depicts the age distribution in which 131 or 42.7% of the respondents are in the age range of 18-21 years and another 125 or 40.7% of the respondents are aged 22-26 and lastly, 51 or 16.6% of the respondents are above 26 years of age. In terms of scholarship type Table 4.1 depicts that 191 or 66.1% of the respondents are from governmental financial assistance whereas 98 or 33.9% of the respondents are from private financial assistance.

In relation to knowledge of computer, Table 4.1 shows that 144 or 47.4% of the respondents have very high knowledge of computer use, whereas 132 or 43.4% of the respondents have high knowledge of computer and 28 or 9.2% of the respondents have low knowledge of computer. Participants with low knowledge of computer can handle the hardware of the computer but software can pose a challenge to them. The problem these students are facing is their lack of understanding of the applications on the e-learning systems which hinder their acceptance of e-learning. With substantial knowledge of the root cause of the problems, it will pave the way for more students to accept e-learning.

In relation to how often e-learning system is used, Table 4.1 mentions that 151 or 49.5% of the respondents sometimes use e-learning systems, while 131 or 43%of the respondents often use e-learning system and lastly 23 or 7.5% of the respondents never use e-learning system in their courses.

The second phase of analysis included i) evaluating the identified factors specified in the survey questionnaire to measure the level of support assessment, ii) perceived

effectiveness, iii) academic performance, iv) student satisfaction, and v) the impact on the continued intention to use e-learning system. The findings of these factors will help to improve student learning outcomes (SLO) which comprise student perception (*i.e.*, perceived ease of use and perceived usefulness), interactivity, technology integration, teacher-subject knowledge, and course content to conclude the level of student satisfaction. Thus, the second phase of analysis is shown in Chapter 3, Section 3.4.4. The questionnaire survey was measured based on a 5-point Likert scale method which measured from 1 to 5 where 1 was strongly disagree and 5 was strongly agree. Then, PLS-SEM was employed to analyze the survey data by deploying the Smart PLS software. Figure 4.1 shows, 6 independent factors name 1) Perceived Usefulness, 2) Perceived Ease of Use, 3) Technology Integration, 4) Course Content, 5) Teacher-Subject Knowledge include items 4, 4, 3, 5, 5 and 4 respectively. Furthermore, Figure 4.1 shows, 6 dependent factors namely 1) Support Assessment, 2) Effectiveness, 3) Behavioral Intention, 4) Academic Performance, 5) Student Satisfaction and 6) Continuous Intention to Use each one has, 4, 3, 3, 3, 3 and 3 respectively.

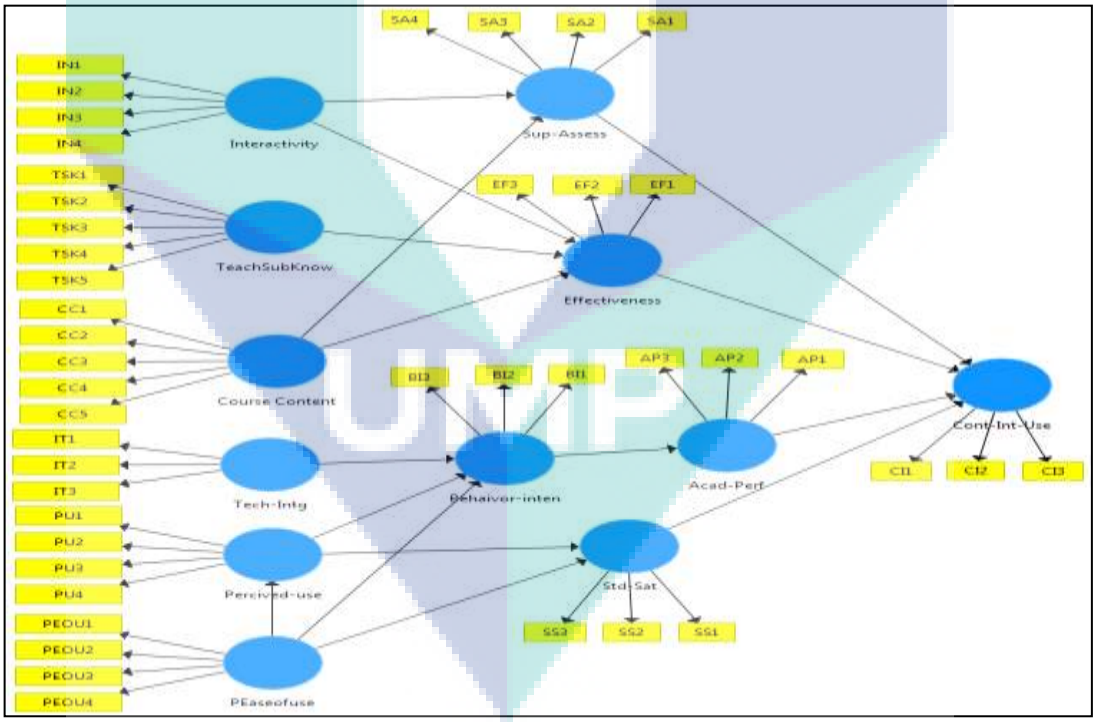

Figure 4.1 Acceptance Model distribution of items

4.4 Construct Validity

The function of construct validity is to validate the assessment that ensures the factors measure to what it intends to measure (Mohajan, 2017). This study includes sub-sections of construct validity such as evaluation of reliability and convergent validity as well as data screening and measurement model. Moreover, the validation of structural model and hypothesis testing are also described. The questionnaire survey which comprised 44 questions, distributed twelve factors, as shown in Figure 4.1.

4.4.1 Evaluation of Reliability and Convergent Validity

Reliability was assessed using Cronbach's alpha value, where the Cronbach's alpha value for all construct items should be greater than 0.70. Next, the convergent validity was assessed based on the criterion that the indicators estimated coefficient was significantly based on its posited underlying construct factor. The author evaluated the measurement scales using three criteria where all the item factor loadings (k) should be significant and exceeded 0.7 benchmark. Moreover, the Composite Reliabilities (CR) for each construct should exceed 0.7 and the Average Variance Extracted (AVE) for each construct should be greater than 0.50 as suggested by Fornell and Larcker (1981).

Accordingly, Table 4.2 presents the data analysis of questionnaire items, including item, number, missing values, mean, median, minimum, maximum, standard deviation, kurtosis and skewness. In relation to the mean, the value should be above 2.5, the median score should be 2.5, and the standard deviation value should be more than 0.5 to be sure that all item results were truly accepted.

Table 4.2 Data analysis indicator of participants

Item	No	Miss	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
PU1	1	0	4.208	4	2	5	0.788	-0.857	-0.508
PU2	2	0	4.117	4	2	5	0.880	-1.024	-0.462
PU3	3	0	4.28	4	2	5	0.731	0.519	-0.843
PU4	4	0	4.367	4	2	5	0.694	-0.147	-0.758
CC1	5	0	4.238	4	2	5	0.689	0.159	-0.591
CC2	6	0	4.303	4	2	5	0.663	0.234	-0.631
CC3	7	0	4.211	4	1	5	0.737	0.416	-0.303
CC4	8	0	4.251	4	1	5	0.701	0.745	-1.086
CC5	9	0	4.306	4	2	5	0.618	-0.208	-0.395
PEOU1	10	0	4.023	4	1	5	0.606	2.473	-0.628

Table 4.2 Continued

Item	No	Miss	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
PEOU3	12	0	4.316	4	1	5	0.783	0.365	-0.807
PEOU4	13	0	4.550	5	2	5	0.547	0.286	-0.800
IN1	14	0	4.195	4	3	5	0.492	0.221	0.390
IN2	15	0	4.176	4	2	5	0.611	1.089	-0.461
IN3	16	0	4.199	4	2	5	0.494	1.114	0.216
IN4	17	0	4.257	4	3	5	0.537	-0.372	0.112
TSK1	18	0	4.280	4	1	5	0.774	1.319	-1.082
TSK2	19	0	4.072	4	1	5	0.572	0.591	-0.940
TSK3	20	0	4.160	4	2	5	0.585	1.979	-0.532
TSK4	21	0	3.717	4	1	5	0.749	-0.263	0.051
TSK5	22	0	4.046	4	2	5	0.618	0.509	-0.278
IT1	23	0	4.362	5	2	5	0.776	-0.784	-0.771
IT2	24	0	4.182	4	2	5	0.794	-0.255	-0.652
IT3	25	0	4.190	4	2	5	0.731	-0.700	-0.414
SA1	26	0	4.081	4	1	5	0.742	0.460	-0.565
SA2	27	0	4.313	4	2	5	0.615	0.712	-0.567
SA3	28	0	4.081	4	2	5	0.579	0.175	-0.309
SA4	29	0	4.326	4	2	5	0.674	0.186	-0.694
EF1	30	0	4.101	4	2	5	0.680	0.726	-0.566
EF2	31	0	4.443	5	1	5	0.717	0.896	-0.425
EF3	32	0	4.257	4	2	5	0.763	-0.080	-0.738
CI1	33	0	3.987	4	1	5	0.803	-0.424	-0.318
CI2	34	0	4.414	4	2	5	0.589	-0.082	-0.527
CI3	35	0	4.316	4	1	5	0.736	0.957	-1.168
BI1	36	0	4.257	4	2	5	0.686	1.032	-0.809
BI2	37	0	4.094	4	2	5	0.566	0.820	-0.635
BI3	38	0	4.147	4	2	5	0.486	0.607	0.177
AP1	39	0	4.104	4	2	5	0.573	4.433	-1.043
AP2	40	0	4.098	4	1	5	0.596	3.783	-0.87
AP3	41	0	4.14	4	2	5	0.628	0.458	-0.353
SS1	42	0	4.238	4	2	5	0.587	0.543	-0.3
SS2	43	0	4.358	4	2	5	0.627	1.108	-0.768
SS3	44	0	4.283	4	2	5	0.572	0.384	-0.618

Next, results from Table 4.3 depicted the item loading, the AVE, CR and Cronbach' s alpha values for all constructs/factors in the measurement model which exceeded the recommended threshold values. In summary, the adequacy of the measurement model indicated that all items were reliable indicators of the hypothesized constructs.

Table 4.3 Item loading and reliability

Construct	Item	Loading	Alpha	CR	(AVE)
Interactivity	IN1	0.635			
	IN2	0.791	0.772	0.727	0.571
	IN3	0.719			
Support Assessment	SA1	0.685			
	SA2	0.740	0.733	0.803	0.673
	SA3	0.876			
	SA4	0.894			
Teacher Subject Knowledge	TSK1	1.000	0.845	1.000	1.000
Academic Performance	AP1	1.000			
	AP2	0.580	1.000	1.000	1.000
	AP3	0.702			
Behavior Intention	BI1	0.937			
	BI2	0.707	0.814	0.813	0.689
	BI3	0.673			
Effectiveness	EF1	0.630			
	EF2	0.725	0.754	0.807	0.680
	EF3	0.913			
Perceived Ease of Use	PEOU3	0.832			
	PEOU4	0.846	0.709	0.826	0.704
Student Satisfaction	SS2	0.849			
	SS3	0.828	0.813	0.826	0.704
Perceived Usefulness	PU1	0.765			
	PU2	0.908			
	PU3	0.823	0.943	0.904	0.703
	PU4	0.851			
Technology Integration	IT1	0.930			
	IT2	0.891	0.946	0.925	0.804
	IT3	0.868			
Course Content	CC1	1.000			
	CC2	0.592			
	CC3	0.627	0.884	1.000	1.000
	CC4	0.638			
Continuous Intention to Use	CI1	0.873			
	CI2	0.868	0.883	0.875	0.700
	CI3	0.765			

4.4.2 Data Screening and Measurement Model

The initial data screening identified that the academic performance factor scale was problematic, with a low Cronbach's alpha value that is lesser than 0.7 for most items for academic performance factor. Thus, for this construct, only one item was accepted to be used for further analysis. Additionally, in teacher-subject knowledge, the author excluded some items that were below the required value. Next, the exploratory factor

analysis was employed on the data to confirm high cross-loadings between the constructs. After the removal of cross-loading items, a clean two-factor model was obtained, consisting of course content (retaining three out of five items from the original scale) and knowledge (retaining only one item out of five initial items). In addition, the academic performance was redesigned to one item out of three in the original scale. In the final stage, all constructs used in this model showed a high degree of validity and reliability as presented in Table 4.3 and Figures 4.2, 4.3 and 4.4.

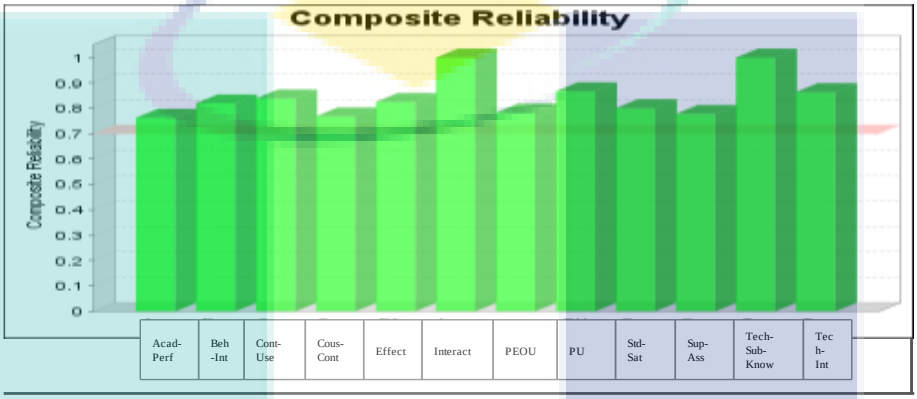

Figure 4.2 Composite Reliability Diagram

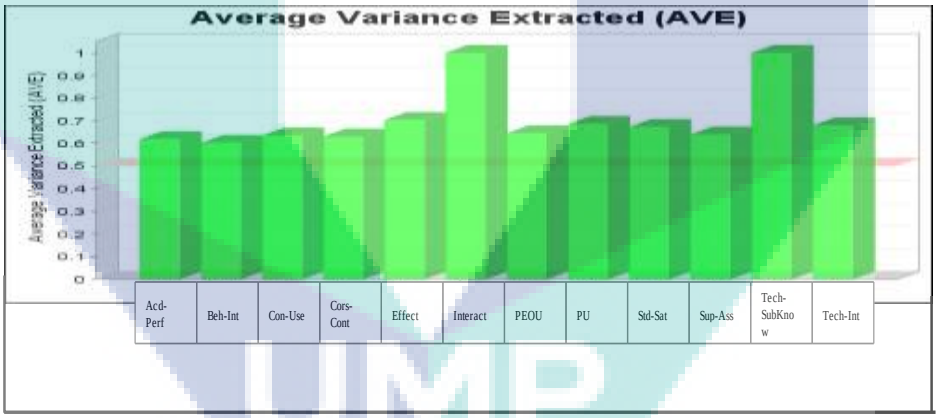

Figure 4.3 Average Variance Extracted (AVE) Diagram

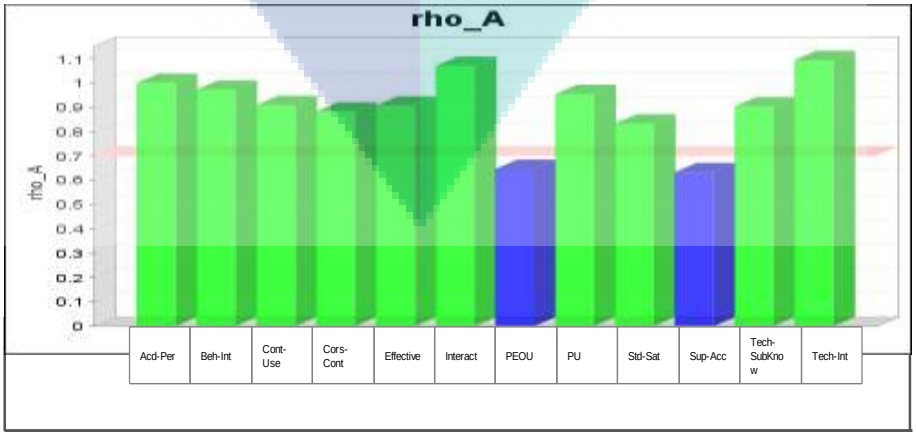

Figure 4.4 rho_A Diagram

Next, exploratory factor analysis was performed based on a rotated factor solution and the results suggested negative Cronbach's alpha values for the initial model factors. Therefore, the model was adjusted one more time by excluding low-value loading from the items of factors measured (see Table 4.3); after which the data were analysed based on exploratory factor analysis, where the new results suggested that there was no single factor that emerged from the factor analysis and three factors with different values adjusted to 1 were extracted, which indicated that the data were free of common method bias. Thus, the reliability of the constructs was assessed by Cronbach's alpha and the resultant values were larger than 0.70 indicating good reliability. The Cronbach's alpha values of the constructs of the adjusted model included course content (0.884), perceived usefulness (0.943), teacher-subject knowledge (0.845), interactivity (0.772), academic performance (1.00), technology integration (0.946), behavioural intention (0.814), continuous intention to use e-learning (0.883), effectiveness (0.754), perceived ease of use (0.709), and support assessment (0.733); thus, all constructs have adequate reliability.

Furthermore, in testing the validity of the model constructs, two measures were considered which are convergent validity and discriminant validity, where the convergent validity was employed to assess whether items within the same construct were highly correlated with each other. On the other hand, discriminant validity was used to assess if the items loaded more on their intended construct than on other constructs (Lai & Chen, 2011). Therefore, construct validity was tested using factor analysis with principal component analysis and varimax rotation. The diagonal line of loading between 0.45 and 0.54 is generally considered fair, loading between 0.55–0.62 is good, loading between 0.63–0.70 is very good, and loading is considered excellent if it is higher than 0.71 (Comrey & Lee, 2013). The modified factor loading analysis indicated that all the constructs in the model have both good convergent and discriminant validity with each AVE value greater than the threshold value, as presented in Table 4.4.

Table 4.4 Fornell Larcher Criterion

Factor	AP	BI	CI	CC	EF	IN	PEOU	PU	SS	SA	TSK	TI
Academic Performance	1											
Behavioral Intention	0.36	0.83										
Continuous Intention to Use	0.202	0.553	0.837									
Course Content	0.193	0.246	0.435	1								
Effectiveness	0.205	0.373	0.591	0.34	0.824							
Interactivity	0.1	-0.019	-0.111	-0.075	-0.305	0.756						
Perceived Ease Of Use	0.148	0.32	0.419	0.482	0.314	-0.085	0.839					
Perceived Usefulness	0.152	0.348	0.669	0.435	0.475	-0.169	0.393	0.838				
Student Satisfaction	-0.15	0.107	0.343	0.327	0.293	-0.186	0.326	0.502	0.839			
Support Assessment	-0.053	0.302	0.455	0.289	0.605	-0.396	0.261	0.473	0.367	0.82		
Teacher Subject Knowledge	0.037	0.188	0.362	0.309	0.171	0.012	0.331	0.491	0.413	0.239	1	
Technology Integration	0.173	0.252	0.384	0.084	0.369	-0.032	0.353	0.535	0.205	0.339	0.143	0.897

Additionally, the Fornell -Larcker criterion and correlations (HTMT) performed among all the factors (including the control factors) to make a robustness examination of discriminant validity (Fornell & Larcker, 1981). As shown in the results of Table 4.4, we found that the square root of AVE was greater than the correlations for all constructs, indicating sound discriminant validity. Thus, Table C.2 in Appendix C, shows the cross loading between the items where all values were above 0.7, as shown in bold in Table C.2. In addition, Table 4.5 shows the Heterotrait-Monotrail (HTMT) results for each factor and Figure 4.5 shows the actual ratio of each factor and its cross effect with all the others.

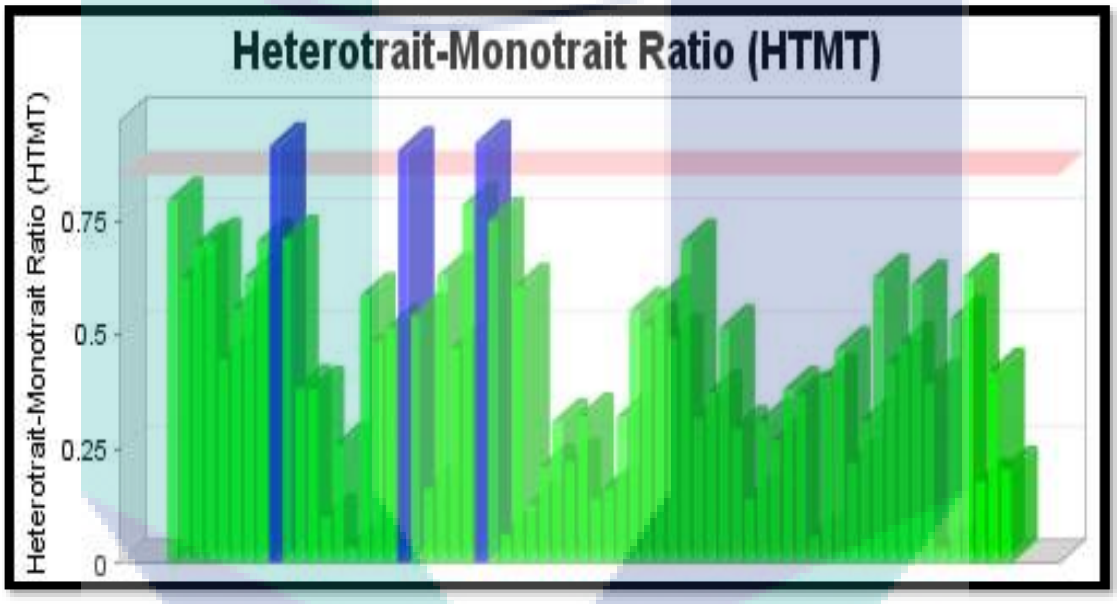

Figure 4.5 Heterotrait-Monotrail Ratio (HTMT)

Table 4.5 HTMT Heterotrait-Monotrail

	AP	BI	CI	CC	Eff	Int	PEOU	PU	SS	SA	TSK	TI
Academic Performance												
Behavioral Intention	0.794											
Continuous Intention to Use	0.625	0.695										
Course Content	0.706	0.448	0.557									
Effectiveness	0.627	0.705	0.914	0.711								
Interactivity	0.385	0.381	0.103	0.26	0.336							
Perceived Ease Of Use	0.586	0.486	0.516	0.905	0.542	0.164						
Perceived Usefulness	0.630	0.471	0.785	0.921	0.750	0.064	0.606					
Student Satisfaction	0.129	0.212	0.311	0.224	0.322	0.144	0.163	0.722				
Support Assessment	0.553	0.521	0.579	0.496	0.703	0.320	0.373	0.516	0.395			
Teacher-Subject Knowledge	0.143	0.310	0.269	0.381	0.370	0.061	0.409	0.467	0.223	0.613		
Technology Integration	0.626	0.438	0.480	0.613	0.397	0.035	0.536	0.628	0.180	0.421	0.706	

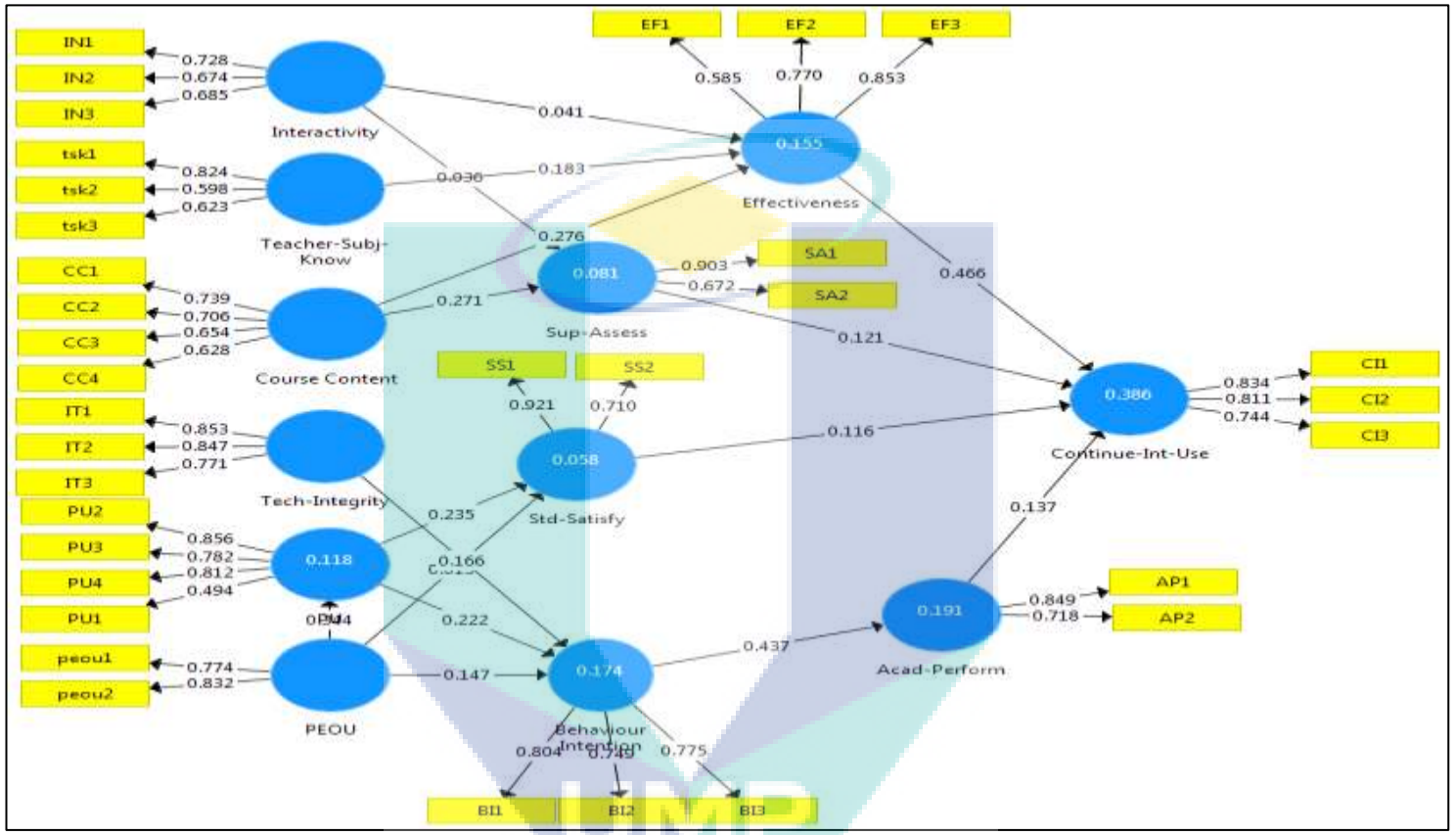

Figure 4.6 Original Model Loading Factors

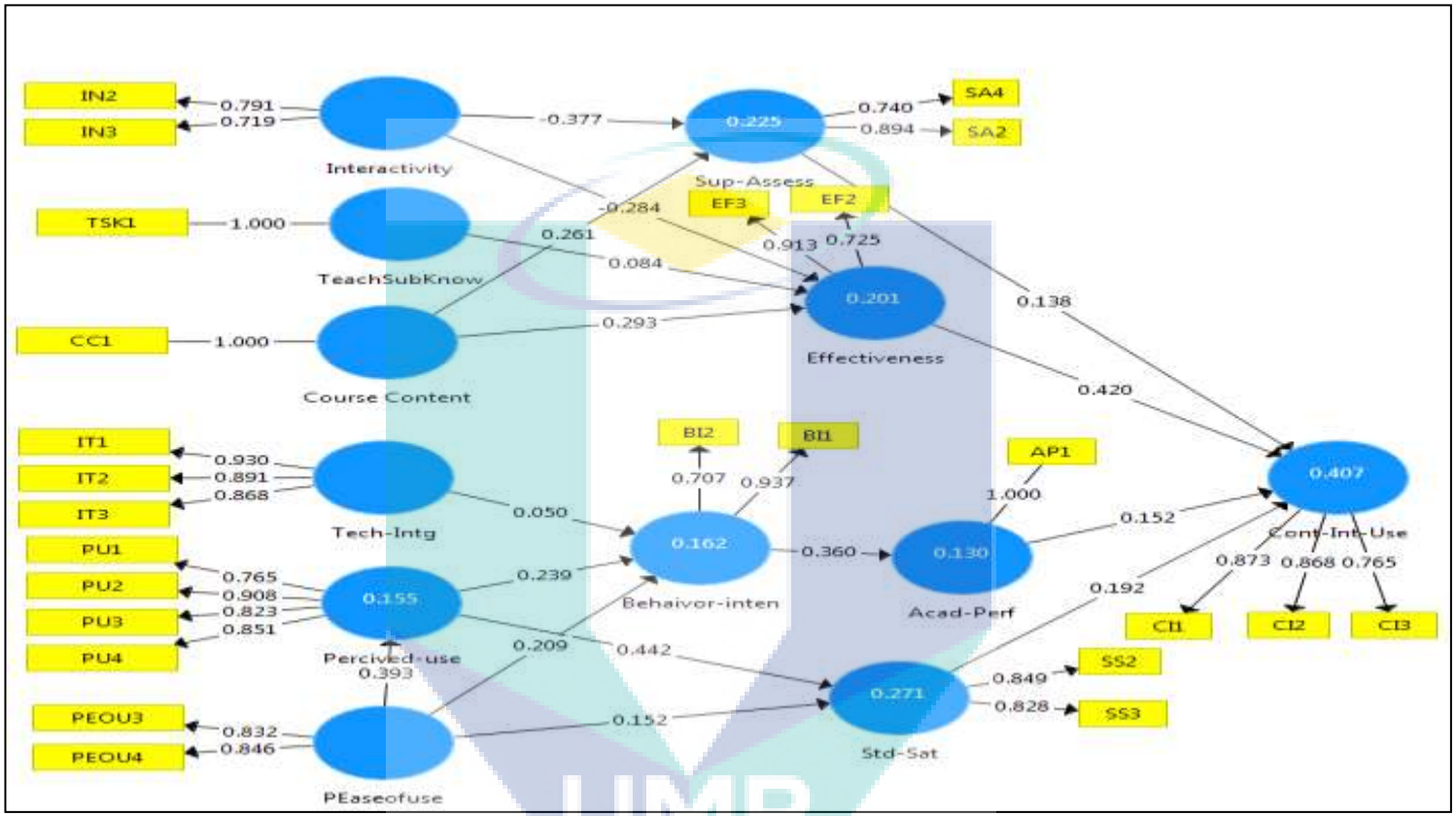

Figure 4.7 Adopted Model Item Loading Results

In addition, based on the results from the HTMT analysis (see Table 4.5), Figure 4.6 depicts the original Acceptance Model with all types of items constructed with their original loading where some of them were not fitted with the normal loading. Figure 4.7 depicts the adapted model loading respectively as constructed by PLS-SEM program and using the right selected item with their load as mentioned above in Table 4.3. Next, Figure 4.8 shows the results of the path coefficient for histogram after bootstrapping based on the Fornell -Larcker criterion results. Also, Table B.4 shows the Indicator Data Correlation Imperial values, where the diagonal crossing should be 1.000 for all items.

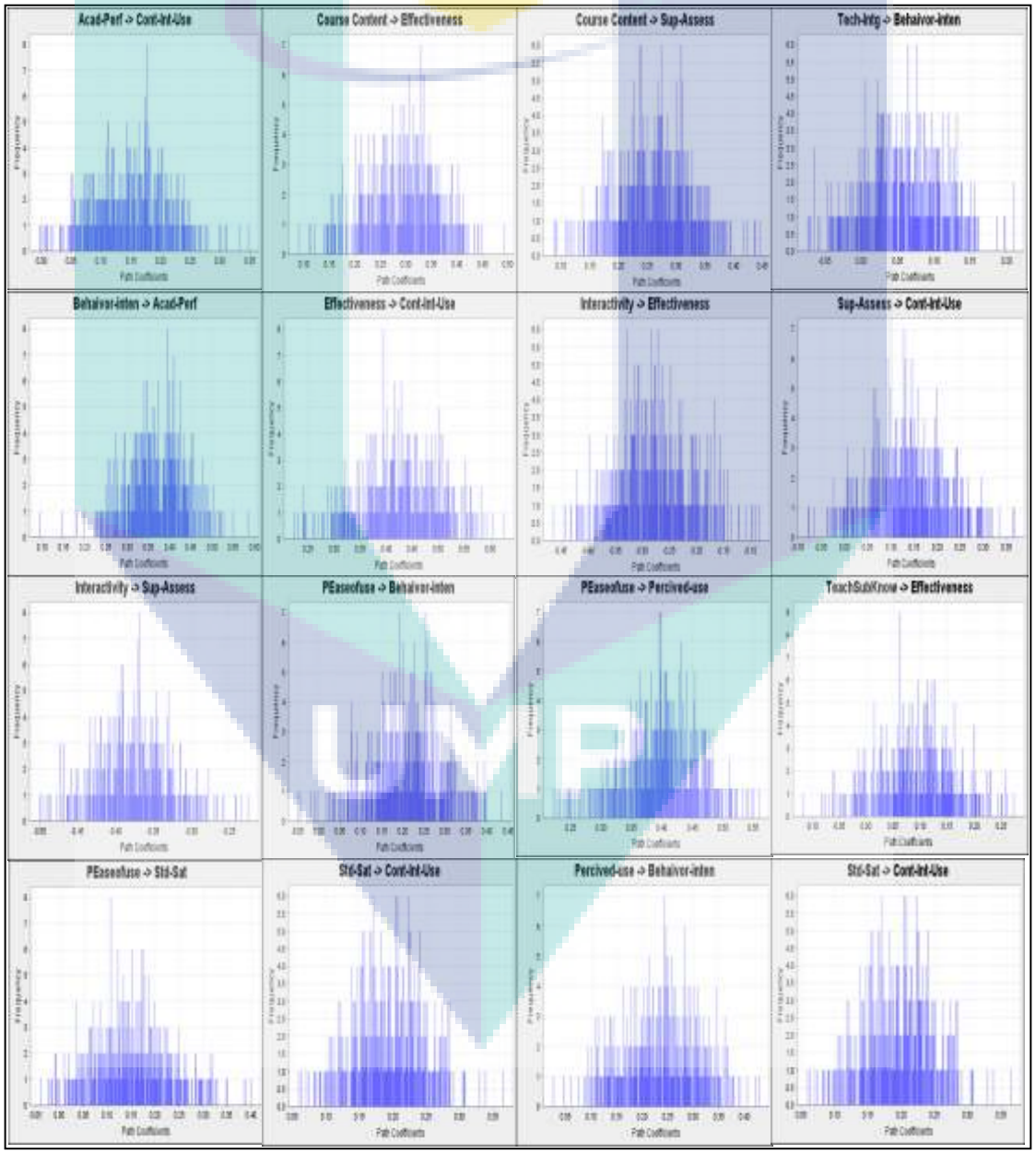

Figure 4.8 Path Coefficient Histogram

4.4.3 Validation of Structural Model and Hypotheses Testing

In this study, 16 hypotheses were proposed based on the review of the literature as described in Section 2.5 of related work, 2.7 of extracting causal relationships between factors, and in chapter 3, section 3.4.4.2. Thus, this sub-section aims to validate each individual hypothesis based on the survey data employed using PLS-SEM which supports the analysis of the relationships between the constructs (independent factors and dependent factors). The test of the structural model included measuring the R^2 values, which represented the amount of variance explained by the independent factors, and estimates of the path coefficients, which indicate the strengths of the relationships between the dependent and independent factors. Thus, the R^2 and the path coefficients values were examined to indicate how well the data supported the hypothesized of integrated model, as shown in Figure 3.2 in Chapter 3.

Accordingly, Table 4.6 depicts the R^2 and the resulting path coefficients values of the integrated research model followed by Figure 4.9 for the same results diagram. The results suggested that perceived usefulness was found to be significantly determined by the direct effect of perceived ease of use, resulting in an R^2 of 0.155. Thus, perceived ease of use explained 15.5% of the variance in the perceived usefulness. Likewise, support assessment was found to be significantly determined by two exogenous factors which included interactivity and course content, resulting in an R^2 of 0.225. Thus, interactivity and course content factors explained 22.5% of the variance in the support assessment. Effectiveness was significantly determined by three factors that comprised of interactivity, teacher-subject knowledge, and course content, resulting in an R^2 of 0.201, hence interactivity, teacher-subject knowledge, and course content factors explained 20.1% of the variance in effectiveness.

Furthermore, behavioural intention was significantly determined by three factors that comprised of technology integration, perceived usefulness, and perceived ease of use with an R^2 of (0.162) that equalled to 16.2% of variance on behavioural intention. Besides that, the relationship of academic performance on behavioural intention resulted in an R^2 of (0.130) that was interpreted as 13%. Student satisfaction was relationship by perceived usefulness and perceived ease of use, with an R^2 of (0.271), that explained (27.1%) of variance on student satisfaction. The dependent factor of continuous intention was significantly determined by four factors which comprised support assessment,

effectiveness, academic performance, and student satisfaction, which resulted in an R^2 of 0.407. In other words, the combined effects of the four dependent factors explained 40.7% of the variance in continuous intention.

The Critical Ratio (CR) was calculated as depicted in Table 4.3, where a CR higher than 1.96 (or lower than 1.96) indicates a two-sided significance at the customary 5% (Hox & Bechger, 1998). The CR criterion held true for all model hypotheses except for the perceived ease of use factor to student satisfaction, support assessment to continuous intention to use e-learning system, teacher-subject knowledge to effectiveness and technology integration to behavioural-intention, hence these hypotheses were not supported by the survey data. There are more results explained in Table 4.7 about F^2 values where all the results were above the minimum value of 0.13, and Figure 4.10 on the same details. This is followed by Table 4.8 that shows the Bootstrapping mean, Std, T-test, P-values, bias, and supporting values.

Table 4.6 R^2 value of model constructs

Factor	**R^2**
Academic Performance	0.13
Behavioral Intention	0.162
Continuous Intention to Use	0.407
Effectiveness	0.201
Perceived Usefulness	0.155
Student Satisfaction	0.271
Support Assessment	0.225

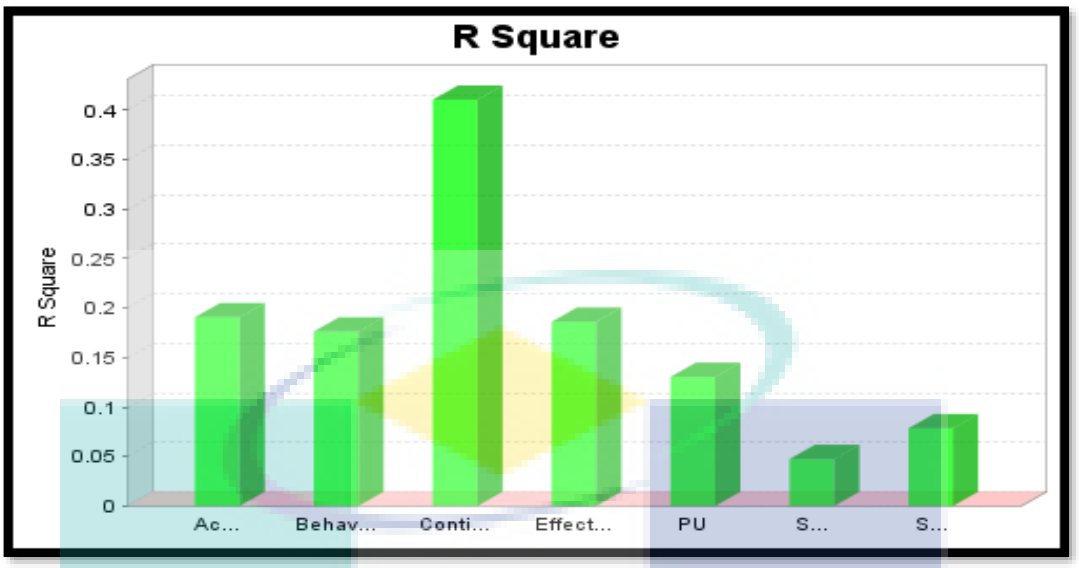

Figure 4.9 R^2 Test

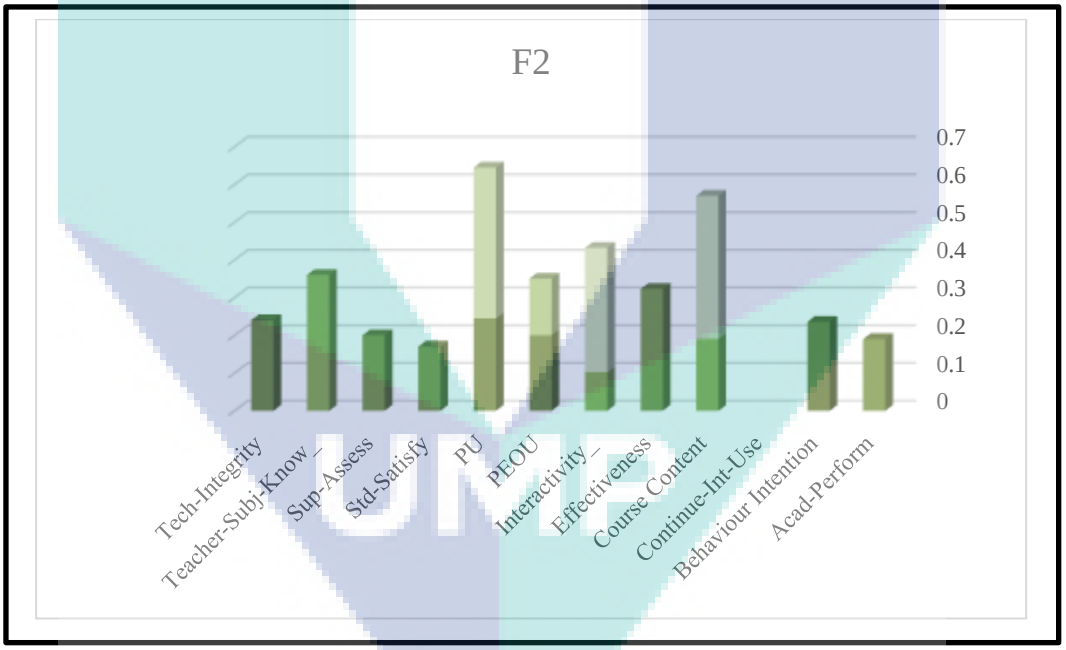

Figure 4.10 F^2 Test

Table 4.7 F^2 statistical test

	Academic Performance	Behavioral Intention	Continuous Intention to Use	Course Content	Effectiveness	Inter-activity	PEOU	PU	Student Satisfy	Support Asses	Teach-Subject Know_	Tech-Integ
Academic Performance			0.190									
Behavioral Intention	0.236											
Continuous Intention to Use												
Course Content					0.190					0.380		
Effectiveness			0.323									
Interactivity					0.102					0.330		
Perceived Ease Of Use		0.200						0.150	0.240			
Perceived Usefulness		0.245							0.400			
Student Satisfaction			0.170									
Support Assessment			0.200									
Teacher-Subject Knowledge					0.360							
Technology Integration		0.240										

Table 4.8 Bootstrapping mean, Stdev, T-test, P-values, bias, supporting

Hypotheses	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Value	Bias	Support
H1	Perceived Ease of use -> Perceived usefulness	0.393	0.402	0.055	7.108	0.000	0.009	Supported
H2	Perceived-use -> Behavioural-intention	0.239	0.234	0.073	3.268	0.001	-0.004	Supported
H3	Perceived Ease of use -> Behavioural-intention	0.302	0.201	0.084	2.484	0.013	-0.007	Supported
H4	Perceived-usefulness -> Student-Satisfaction	0.326	0.441	0.064	6.929	0.000	-0.002	Supported
H5	Perceived Ease of use -> Student-Satisfaction	0.152	0.151	0.079	1.910	0.057	0.000	Supported
H6	Tech-Integration -> Behavioural-intention	0.05	0.062	0.053	0.957	0.339	0.012	Not Support
H7	Course Content -> Effectiveness	0.293	0.288	0.066	4.443	0.000	-0.004	Supported
H8	Course Content -> Sup-Assess	0.261	0.260	0.057	4.575	0.000	0.000	Supported
H9	Teacher Subject Knowledge -> Effectiveness	0.084	0.083	0.065	1.296	0.195	-0.001	Not Support
H10	Interactivity -> Support-Assessment	-0.377	-0.377	0.048	7.815	0.000	0.000	Not Support
H11	Interactivity -> Effectiveness	-0.284	-0.293	0.066	4.287	0.000	-0.008	Not Support
H12	Behavioural-intention -> Academic – Performance	0.36	0.361	0.065	5.575	0.000	0.000	Supported
H13	Academic- Performance -> Continuous - Intention	0.152	0.152	0.066	2.310	0.021	0.000	Supported
H14	Effectiveness -> Continuous -Intention	0.42	0.42	0.074	5.699	0.000	0.001	Supported
H15	Sup-Assess -> Continuous -Intention	0.138	0.139	0.072	1.910	0.057	0.000	Supported
H16	Std-Sat -> Continuous -Intention	0.192	0.196	0.051	3.761	0.000	0.005	Supported

4.5 Discussion

This section discusses the outcomes from Acceptance Model and its significant support between hypothesis relationships. This subsequent subsection will explain in detail path value results, predictive relevance Q^2 and F^2, theoretical effect of the acceptance model, the effect of TAM, the effect of Independent factors and effectiveness, the effect of interactivity and behavioural intention, and continuous intention to use e-learning system.

4.5.1 Path Value Results

In terms of path analysis, Table 4.9 depicts the path coefficients and p-values for each hypothesis. Thus, results from the model validation reveal that 12 out of 16 hypotheses were supported by the survey data. This suggests that 12 relationships between the independent and dependent factors are significant. Both tested p-value and B results should be accepted as B>=0.1 and p<0.01 or p<0.001. It explains the hypotheses results has been tested through a survey of 12 factors used in the model with 16 hypotheses. Therefore, each of the hypothesized relationships is briefly described below:

H1 result there is a significant relationship between perceived ease of use and perceived usefulness, where ($\beta = 0.393$, $p < 0.000$) describes the path between perceived ease of use and perceived usefulness, indicating that the perceived ease of use enhances the perceived usefulness of the acceptance model.

H2 result a significant relationship between perceived usefulness and behaviour intention, this is supported by the result where ($\beta = 0.293$, $p < 0.001$) shows that the hypothesis is significant, suggesting that the perceived usefulness positively relationships the behavioural intention to use the acceptance model.

H3 result a significant relationship between perceived ease of use and behavioural intention, where ($\beta = 0.302$, $p < 0.013$) highlights a positive association, revealing that perceived ease of use positively relationships the behavioural intention to use acceptance model.

H4 result a significant positive relationship between perceived usefulness and student satisfaction, where ($\beta = 0.326$, $p < 0.000$) describes a positive relationship,

indicating that perceived usefulness significantly affects the student satisfaction of the acceptance model.

H5 result a significant relationship between perceived ease of use and student satisfaction, with values ($\beta = 0.15$, $p < 0.057$) suggesting that perceived ease of use significantly determines the student satisfaction of the acceptance model.

H6 result a significant positive relationship between technology integration and behavioural intention, where ($\beta = 0.05$, $p < 0.339$) describes a negative relationship (not supported), indicating that technology integration does not significantly affect the behavioural intention of the acceptance model.

H7 result a significant positive relationship between course content and effectiveness, where ($\beta = 0.293$, $p<0.000$) shows the positive relationship, indicating that course content significantly affects the effectiveness of acceptance model.

H8 result a significant positive relationship between course content and support assessment with a value of ($\beta = 0.261$, $p<0.000$) indicating course content significantly relationships support assessment of the acceptance model.

H9 result a significant relationship between teacher-subject knowledge and effectiveness, where ($\beta = 0.084$, $p<0.195$) suggests a negative relationship, indicating that teacher-subject knowledge does not significantly affect the effectiveness (not supported).

H10 result there is a significant relationship between interactivity and support assessment with a value of ($\beta = -0.377$, $P< 0.000$) showing that the relationship between interactivity and support assessment is negative (not supported).

H11 result there is a significant relationship between interactivity and effectiveness with ($\beta = -0.284$, $p<0.000$), indicating there is a negative association between interactivity and effectiveness, thus interactivity does not significantly relationship effectiveness (not supported).

H12 result there is a significant relationship between behavioural intention and academic performance with ($\beta = 0.360$, $p<0.000$) indicating that there is a positive

relationship between behavioural intention and academic performance, where behavioural intention significantly relationships academic performance.

H13 result there is a significant relationship between academic performance and continuous intention with values (β =0.152, p<0.021) indicating a positive relationship between academic performance and continuous intention, where that academic performance significantly affects the continuous intention to use e-learning system.

H14 result there is a significant relationship between effectiveness and continuous intention with the values (β =0.420, P<0.000) revealing that there is a significant association between effectiveness and continuous intention, indicating that effectiveness significantly affects the continuous intention to use e-learning system.

H15 result there is a significant relationship between support assessment and continuous intention with values (β =0.138, p<0.057) showing a positive relationship between support assessment and continuous intention, indicating that support assessment significantly determines continuous intention to use e-learning system.

H16 result there is a significant relationship between student satisfaction and continuous intention to use e-learning system with values (β =0.192, p<0.000) indicating there is a positive relationship between student satisfaction and continuous intention, confirming that student satisfaction significantly affects the continuous intention to use e-learning system.

Accordingly, the results of this study suggest that both PEOU and PU positively affect the behavioural intention of HEI degree and diploma students, and course content positively affects the effectiveness of students who perceive the use of the acceptance model as easy and useful. Thus, these students are highly motivated toward the incorporation of such pedagogical tools in their learning process. At the same time, the adoption of the Acceptance Model can positively increase student satisfaction and support assessment with development in academic performance. Thus, it can be concluded that the aforementioned factors enhance the continuous intention to use e-learning system. Thus, decision-makers in higher educational institutions should take these results into their consideration in their future attempts to construct or improve an e-learning infrastructure.

Table 4.9 Path coefficient and β results

	Relationship	β	P value	Remarks
H1	Perceived Ease Of Use → Perceived Usefulness	0.393	0.000	Supported
H2	Perceived Usefulness → Behavioral Intention	0.293	0.001	Supported
H3	Perceived Ease Of Use → Behavioral Intention	0.302	0.013*	Supported
H4	Perceived Usefulness → Student Satisfaction	0.326	0.000	Supported
H5	Perceived Ease Of Use → Student Satisfaction	0.150	0.057*	Supported
H6	Technology Integration → Behavioral Intention	0.050	0.339	Not supported
H7	Course Content → Effectiveness	0.293	0.000	Supported
H8	Course Content → Support Assessment	0.261	0.000	Supported
H9	Teacher Subject Knowledge → Effectiveness	0.084	0.195	Not supported
H10	Interactivity → Support Assessment	-0.377	0.000	Not supported
H11	Interactivity → Effectiveness	-0.284	0.000	Not supported
H12	Behavioral Intention → Academic Performance	0.360	0.000	Supported
H13	Academic Performance → Continuous Intention to Use	0.152	0.021*	Supported
H14	Effectiveness → Continuous Intention to Use	0.420	0.000	Supported
H15	Support Assessment → Continuous Intention to Use	0.138	0.057*	Supported
H16	Student Satisfaction → Continuous Intention to Use	0.192	0.000	Supported

Note: P<0.01, * P<0.001, β >=0.1

After discussion of the path value results of all the 16 hypotheses. Now, the model will be re-drawn with the positive relationships between the supported contributing factors and removing all hypotheses of " not supported" remarks. These hypotheses determined in the above Table 4.9. For hypotheses H6, H9, H10, and H11, which proposed that results analysed by testing the path coefficient and beta value show negative results as not supported for the relationships between factors. These unsupported factors are achieved only in this case study of Oman universities. However, it cannot be used as general case, because maybe there is some difference in the feedback of students on factors that gave negative remarks. These factors were used in TTF as "Teacher-subject-knowledge", "Technology Integration", and "Interactivity". The new modified model concludes that TTF factors are not highly recommended with an acceptance model of continuous intention to use e-learning. Figure 4.11 shows the modified model with removed unnecessary factors with the not supported hypotheses.

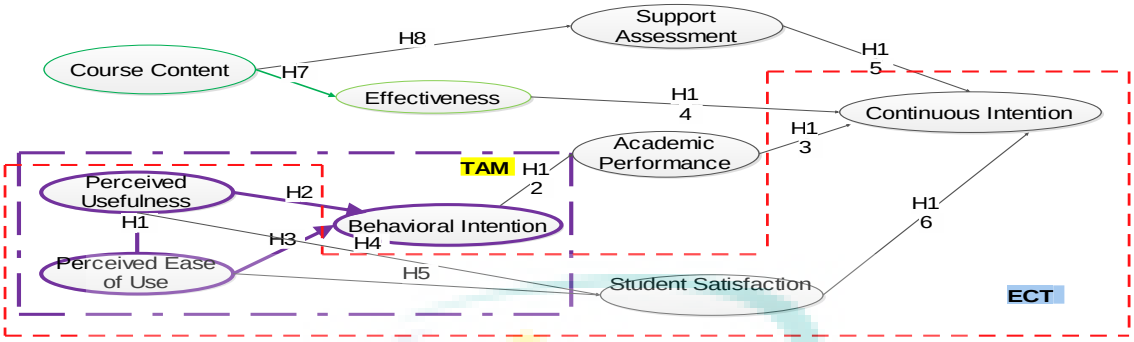

Figure 4.11 The Modified Model after deleted not supported hypotheses

Form the previous Figure 3.2, with the research model proposed, the model came out with 4 not supported hypotheses. H6 was the negative relationship between technology integration and behavior intention, as mentioned in that performance relationships as indirectly connected to continuous intention to use the e-learning system. A study of a systematic review of MOOC by Liyanagunawardena, et al. (2013) reported that technology integration factor used as case studies but not for continuous intention to use MOOC. Besides, the study lack of MOOC experiences with technology effects. In the same way of Oman context of universities, still, the use of the e-learning system used recently. The students' and teachers' experiences were still limited in developing the Moodle continuous of use. Ebben and Murphy (2014) highlighted the need to connect from the technology integration of MOOC to the students' behavior intention. Still, these studies work with a specific focus on technology integration on the retention more than their effects on behavior intention factor.

For H9, the not supported relationship between Teacher-subject-knowledge and Effectiveness. For H10, Interactivity has not supported a relationship with Support Assessment. For H11, Interactivity is not supported the relationship with the Effectiveness factor. Peltier, et al, (2003) found that the course content was the main factor affects significantly the Effectiveness rather than the Teacher-subject-knowledge. Similar to Marks et al. (2005), determined that interactivity cannot be enough for effectiveness without course content. Besides, marks et al. (2005) explained the Teacher-subject-knowledge has less efficiency while it's not connected to student's usefulness and their behavioural intention to get good performance using e-learning model experts and experienced for continuous intention to use. Therefore, Omani students considered that Teacher-subject-knowledge and Interactivity factors of individual students were related to high interaction with the main factor of course content (Goodhue & Thompson,1995; Junglas, Abraham, & Watson, 2008).

At the end of this model, this research came out with the fact that most TTF model factors can be used but not highly recommended for the acceptance model to use e-learning systems. Unless the importance of course content factor, this factor was recommended by all developed models produced by (Hone, El said, 2016; Huang, Zhang, Lin, 2017; Ifinedo, Pyke, and Anwar, 2018; Amrein-Beardsley, Foulger, & Toth, 2007)

4.5.2 Predictive Relevance $Q^2$and F^2

To evaluate the predictive relevance of the path model, the blind folding technique was conducted using Smart PLS to generate Q^2 and F^2 values for all independent factors. Thus, all Q^2 values should be above zero suggesting there is a predictive relevance as recommended by Hair et al. (2013). Therefore, the current path model is inferred to have predictive relevance for the independent factors as presented in Table 4.10. Likewise, F^2 values of independent factors above 0.018 indicate that there is a small effect, 0.15 indicates medium effects, and 0.815 indicates there is a large effect on the independent factors and the dependent factors (Hair et al., 2013). The results of the F^2 and Q^2 values for the model are presented in Table 4.10.

Table 4.10 Path coefficient, f^2 *and* Q^2 results

	Relationship	Path coefficient	F^2	Q^2	Remarks
H1	Perceived Ease Of Use→ Perceived Usefulness	0.393	0.150	0.582	Supported
H2	Perceived Usefulness→ Behavioral Intention	0.293	0.245	0.636	Supported
H3	Perceived Ease Of Use→ Behavioral Intention	0.302	0.200	0.544	Supported
H4	Perceived Usefulness→ student Satisfaction	0.326	0.400	0.145	Supported
H5	Perceived Ease Of Use→ Student Satisfaction	0.150	0.240	0.372	Supported
H6	Technology Integration→ Behaivoral Intention	0.050	0.240	0.181	Not supported
H7	Course Content→ Effectiveness	0.293	0.190	0.815	Supported
H8	Course content→ Support Assessment	0.261	0.380	0.119	Supported
H9	Teacher-Subject Knowledge→ Effectiveness	0.084	0.360	0.202	Not supported
H10	Interactivity→ Support Assessment	-0.377	0.330	0.152	Not supported
H11	Interactivity→ Effectiveness	-0.284	0.102	0.430	Not supported
H12	Behavioral Intention→ Academic Performance	0.360	0.236	0.545	Supported
H13	Academic Performance→ Continuous Intention to Use	0.152	0.190	0.160	Supported
H14	Effectiveness→ Continuous Intention to Use	0.420	0.323	0.303	Supported
H15	Support Assessment→ Continuous Intention to Use	0.138	0.200	0.018	Supported
H16	Student Satisfaction→ Continuous Intention to Use	0.192	0.170	0.118	Supported

4.5.3 Theoretical Effect of the Acceptance Model

The model developed in this study not only contributes to extend the current body of knowledge in existing literature related to e-learning but also helps researchers and practitioners gain a better understanding of user behaviours in the continued use of e-learning and the acceptance model. This research provides implication for universities and reveals multiple statistically significant relationships that explain why students choose acceptance model and why they have continuous intention to use e-learning system. Findings from this study extend prior work on the Acceptance Model by highlighting the importance of achieving course content, teacher-subject knowledge, interactivity, and technology integration. Besides that, findings from this study suggest that the continuous intention to use e-learning system of model is indirectly determined by the perceived ease of use, perceived usefulness, technology integration, teacher-subject knowledge, interactivity, and course content. The acceptance model provides an improved explanation and in-depth insights for students regarding their intention to use e-learning systems. Therefore, it is evident that the results from this study can enhance the understanding of factors that relationships students' continuous intention to use e-learning system.

4.5.4 The Effect of TAM

The hypotheses regarding perceived ease of use to perceived usefulness, perceived usefulness to behavioural intention, perceived ease of use, and perceived usefulness to student satisfaction (H1-H5) were supported, as shown in Table 4.10. The TAM was extended and integrated into the model to examine behavioral intention and student satisfaction and the results suggest that behavioral intention and student satisfaction factors are important factors that should be considered for exploring behavior in integrated research contexts.

Likewise, H5, which is the effect of perceived ease of use to student satisfaction, was also supported. Thus, results from the data analysis suggest that the perceived ease of use does relationship the dependent factors and student satisfaction. This result is similar with the findings from prior studies (Breslow et al., 2013; Hew & Cheung, 2014) which suggest that students' dissatisfaction with e-learning experiences is due to reasons such as low-quality discussion, misunderstanding contents, missing feedback, ambiguity in guidance, and technical. It can be inferred that in this context, students may be facing the same experiences as low-quality discussion, misunderstanding contents and so on.

4.5.5 The Effect of Independent Factors and Effectiveness

H6, which proposed that technology integration relationships behavioural intention, was not supported. This is seen in the technical integrity of student motivation and behavioural intention of the use of technologies that e-learning is fundamentally different from traditional classroom-based instruction (Anderson, 2013). On the other hand, H7 which suggested that course content determines effectiveness and H8 which proposed that course content supports assessment, were all supported by the data. However, H9, which proposed that teacher-subject knowledge relationships effectiveness, was not supported. These results are consistent with the findings from prior studies (Huang, Zhang, & Liu, 2017), where the authors stated that students use easy course contents and all electronic materials that are available. Moreover, teacher-subject knowledge is not highly required in this type of model, because e-learning is more than delivering content, as students expect to be guided and the delivery of complex contents is to be engaging and easily understood in addition to assisting the struggling e-learners. This is true because teachers' knowledge and the approach they employ in teaching the complex subject matters can help students to have a better understanding of the course content. These findings reveal the underlying dynamic relationship between course content and teacher-subject knowledge. Therefore, teachers' knowledge is important and relationships students' intention to learn even when the course is more complex.

4.5.6 The Effect of Interactivity and Behaviour Intention

Considering H10-H11 which suggested the relations between interactivity and support assessment and between interactivity and effectiveness, however, both suggestions were not supported by data as shown in Tables 4.8 and 5.1. The findings also indicate that interactivity of the e-learning system does not make any significant difference in either relatively easy or complex courses of supporting assessment or with course effectiveness. However, some studies (Hew & Cheung, 2014) found that the mixture of flip videos with practical experiences and immediate feedback help students in their support assessment, and this may prove to be much more effective than traditional learning approaches. Therefore, the interactivity factor explained in the literature does not strongly affect this model with two different factors of effectiveness or support assessment.

Furthermore, H12 which suggested that behavioural intention relationships academic performance was supported as shown in Table 4.8. The result indicates that

when students use the integrated research model that their behavioural intention to use is high and is determined by the indirect effect of perceived usefulness and perceived ease of use, which was supported in the results, even with less support for technology integration effect on behavioural intention.

4.5.7 Continuous Intention to Use

For hypotheses H13-H16, H13 which proposed that academic performance relationships continuous intention to use e-learning system, effectiveness to continuous intention, support assessment to continuous intention, and student satisfaction to continuous intention were all supported by the survey data as shown in Table 4.8.

Similarly, for H14, the effect of effectiveness on continuous intention to use the e-learning system was also supported. This result is aligned with the findings from prior studies (Peltier et al., 2003; Hone & El Said, 2016) which revealed that the course content has a significant effect on effectiveness, of which the effect is mediated by the effectiveness of continuous intention to use e-learning system as a type of retention.

Likewise, for H15 the study proves there is a significant effect of course content to teacher-subject knowledge on support assessment. This result is consistent with the results from a previous study (Huang, Zhang, & Liu, 2017), where the effect is a direct reflection of continuous intention to use e-learning through the acceptance model.

Equally, for H16, the results suggest that perceived usefulness positively relationships satisfaction. Thus, according to similar findings from prior studies (Alraimi et al., 2015) where the researchers stated that perceived usefulness positively relationships the continuous intention to use e-learning applications based on their study that examined the relationship with TAM, to achieve satisfaction in relation to the continuous intention to use e-learning system.

4.6 Practical Effect of the Model

The acceptance model provides a medium for practitioners to be able to measure the continued intention of using e-learning system based on the verified factors which include the perceived usefulness, perceived ease of use, technology integration, and interactivity. Thus, the perceived usefulness and interactivity are the most important determinants of continuous intention to use e-learning system; this is because the continued intention of students can be increased by improving their beliefs in the effectiveness of e-learning.

Secondly, this study provides evidence that the continuous intention to use e-learning system determines the course content, interactivity and teacher-subject knowledge as well as support assessment that is mediated by these three factors. Thus, the Acceptance Model should be organized to determine the requirements and challenges of courses, including the levels of prior knowledge needed and the availability of online and electronic resources necessary for students. The acceptance model practitioners should be particularly aware of the importance of technology integration, interactivity and teacher-subject knowledge to better match the individual. Finally, this study offers a model to help HEIs in Oman to ensure that their courses are useful for students. However, the importance of each course should be deliberated to measure the effect of academic performance and support assessment, for which the behavioural intention and satisfaction of the students are important to facilitate continuous intention to use e-learning system.

4.7 Summary

This chapter summarizes the effect of each hypothesis proposed in this study. These hypotheses were listed in Chapter 3, where the new model was tested with the new and existing types of relationship between constructs. In this chapter, statistical tests such as the exploratory factor analysis and reliability analysis test were carried out to validate the validity and consistency of the data if the reliability value > 0.7 for all items. Moreover, results from the analysed survey data using PLS-SEM suggested that out of the 16 hypotheses, 12 hypotheses were accepted with real positive values tested by β, R^2, F^2 and Q^2 (were $\beta>0.1$ when $p<0.01$ or 0.001, $R^2>0.3$, and $F^2>1.2$) and the remaining 4 hypotheses were rejected in this study. Accordingly, H6 which is technology integration relationship on behavioural intention has a bad regression and not supports this hypothesis, and H9 which is teacher-subject knowledge to effectiveness is also rejected in this study. Likewise, H10 and H11 which measured the effect of interactivity relationship on effectiveness were also rejected because of low performance and unaccepted results with these three hypotheses. In addition, the current path model of the coefficient model showed an acceptable predictive relevance for Q^2 for the relationship between the independent factors and the dependent factors. Lastly, the effect size of F^2 suggested there was a small effect between the independent factors and the dependent factors. This chapter shows the validity of the testing the acceptance model that achieved the objective 3 of this study as mentioned in Chapter 1, section 1.4.

CHAPTER 5

CONCLUSION, IMPLICATION AND FUTURE WORK

5.1 Introduction

This thesis contributes to the knowledge of developing an acceptance model for contributing factors of continuous intention to use e-learning systems in Omani higher educational institutions. This model comprises the independent factors that have a significant relationship to be indirect implementation towards the continuous intention to use e-learning systems. Besides, the developed acceptance model used to merge most of the factors used in collaborative theoretically among TAM, TTF, and ECT models. Accordingly, this chapter presents a summary of the thesis by describing the overall research objective accomplished and the findings from the analysed survey data. Thus, the results from PLS-SEM are used to derive a conclusion, as well as implications for students, teachers, administrators, and decision-makers in universities. Furthermore, this chapter presents a discussion on the practical effects of the acceptance model. Lastly, the limitations and suggestions for further research related to this study are discussed.

5.2 Research Conclusion

Continuous use of e-learning become has progressively become significant to identify the factors that contribute to continuous intention to use in HEIs. The fast changes produced in the acceptance of continuous intention to use e-learning systems need a responding on the developed theoretical models' factors and merging among important factors. Thus, the initial work on developed theories and combined models are implemented to have an acceptance model on continuous intention to use e-learning systems in HEIs. Nevertheless, since 1971, theories and models of assessing the developed e-learning models were produced with a variety of theories as (TAM) by Davis (1989), Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1973), Task-Technology Fit (TTF) by Islam (2016), Expectation Confirmation Theory (ECT) by

Oliver (1980), Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh (2003). Accordingly, these theories and models were used for acceptance of the use and some for continuous intention to use e-learning in individual work of the e-learning process. Thus, there is still a need to develop a more general and common model that tests and validated the acceptance level and the continuous intention to use e-learning systems. Furthermore, there is a need to identify the contributing factors that are necessary to develop the continuous intention to use e-learning, but not can be fixed only to these theories' factors. That is why an additionally developed model added to clarify the additional factors used and justify the significance of their use (Huang, Zhang, and Liu, 2017; Hone and El said, 2016; Joo, So and Kim, 2018; Ifinedo, Pyke and Anwar, 2018).

To show the results connection between the research objectives connected to the research questions that all translated to the developed model of acceptance model for contributing factors for continuous intention to use e-learning systems in Oman higher education institutions. The three objectives were accomplished in this research.

For the first research question, "What are the factors that contribute to the continuous intention to use e-learning system?" this question is converted to a research objective as " To identify the factors that relationship the continuous intention to use e-learning system." The action taken of the first objective is this study came out with identifying the independent and dependent factors to develop the acceptance of contributing factors for continuous intention to use e-learning systems. Besides, there were many papers used to analyse the selected factors that have a high effect on the continuous intention to use the e-learning system as seen in Chapter 2. These factors are classified derived from original theories and developed models that have a significant relationship between selected factors to validate the proposed acceptance model of this research. These derived important factors explained in Chapter 2, sections (2.5.1 to 2.5.12). To achieve this objective, this research analysed many theoretical tested models like TAM, ECT, TTF, TPB, UTAUT to justify the nominated factors proposed from each model. All original models explained in the background of the acceptance model, Chapter 2, sections (2.3.1 to 2.3.5). Furthermore, this research selects the important factors that were adopted with the new studies determined by Sections (2.4) and their adoption. Also, it highlighted these adopted models and the way of building these relationships to came out with a model useful for continuous intention to use e-learning systems.

Moreover, this research analysis of the Literature review of different application tools and applicable models like MOOC, e-learning systems in Chapter 2, Table 2.1.

Furthermore, Table 2.1, explained the problem statement of each study with their tools and the related derived factors recommended for this research. The main objective of this research is to highlights the factors and their impacts to develop the acceptance model for continuous intention to use the e-learning system. These factors must be useful use in both the theoretical model and practical implementation of the e-learning system. In the end, the first objective extracting related models and causal relationships between factors.

For the second research question, " How can the contributing factors to the continuous intention to use e-learning system be constructed in an acceptance model?". Second research objective has been identified to solve this research question as " To develop an acceptance model that examines the relationship of the factors of the continuous intention to use e-learning system in higher education institutions". The main aim of this study is to develop an acceptance model contributing factors for continuous intention to use the e-learning system for Oman higher education institutions. To accomplish this aim, by the discussion of the second objective, the action taken was constructed with 16 hypotheses. Accordingly, to develop and acceptance model that identified the contributing factors are derived from the original theories. Also, some extended factors derived from the developed adopted model explained in section (2.4) were conceptualized and developed to new research models explained in Chapter 3 section 3.4.2.2 as Figure 3.2. The model comprises 6 independent factors (Perceived Ease of Use, Perceived Usefulness, Technology Integration, Course Content, and Interactivity). Besides, 6 dependent factors as (Behaviour Intention, Academic Performance, Effectiveness, Support Assessment, Student Satisfaction, and Continuous Intention to Use). The finalized recommended factors were explained in Table 3.3. The tested values find out there were only 12 hypotheses were significantly accepted the relationship between factors. Nevertheless, only 4 factors not supported by the target of this research title. The continuous intention to use factor has come with the last four hypotheses (H12- H16) that significantly supported the relationships between factors of effectiveness, support assessment, student satisfaction and academic performance with the continuous intention to use e-learning system factor.

For the third research question, " How can the developed model be assessed in the e-learning system?". There is a research objective used as " To validate the developed model through the survey in the e-learning system and analyse it by using statistical analysis methods". This objective was accomplished by a survey distributed among four selected HEIs in Oman with 295 responses from participants who completed all thirteen-partition related to the proposed model as seen in Appendix B, and Chapter 3, Table 3.5.

The survey was previously checked and revised by four members of expert teachers and most of the questions used were in the adapted form from previously cited papers as seen in Table 3.6. The results were analysed by the PLS_SEM program and the reliability, validity, and normality were evaluated in Chapter 4 with effective values in mean and standard deviation. Moreover, the evaluation of the cross leading between factors and the AVE, R^2, F^2, Q^2, and test the β, α, P-values that match with the model target. The model finds that (H1-H5) are significantly supported the model hypotheses as shown in Tables 4.8 and 4.9. Furthermore, (H7- H8) also significantly supported, (H12-H16) are significantly supported the hypotheses developed in the research model as Figure 3.2. However, H6 and (H9- H11) are not supported the model hypotheses and remarks negative results as shown in Tables 4.8, 4.9.

Table 5.1, summarized research conclusion, research question, research objectives, the Hypotheses, and the decisions of each point regarding the research model.

Table 5.1 Summarized research objectives, research questions, and hypotheses

Objectives	**Questions**	**Action Taken**	**Decision**
i. To identify the factors that contribute the continuous intention to use the e-learning system.	i. What are the factors that contribute to the continuous intention to use e-learning system?	- Derive the independent/ dependent factors that have significant influence and validated by theoretical tested models like TAM, ECT, TTF, TPB, UTAUT. -Analysis of the Literature review of different application tools and applicable models like MOOC, e-learning systems, with their tools and the related factors tested them.	-Identify the main valuable factors. - Tool analyzed, relationship determined. -extracting related models and causal relationships between factors.
ii. To develop an acceptance model that examines the contribution factors of the continuous intention to use the e-learning system in higher education institutions.	ii. How can the contributing factors to the continuous intention to use an e-learning system be constructed in the acceptance model?	Determine 16 hypotheses to develop the integrated model as follows: H1: There is a significant positive relationship between perceived ease of use and perceived usefulness. H2: There is a significant positive relationship between perceived usefulness and behavioral intention. H3: There is a significant relationship between perceived ease of use and behavioral intention. H4: There is a significant positive relationship between perceived usefulness and Student Satisfaction. H5: There is a significant relationship between perceived ease of use and Student Satisfaction. H6: There is a significant relationship between technology integration and behavior intention.	 Supported Supported Supported Supported Supported Not Supported

Table 5.1 Continued

Objectives	Questions	Action Taken	Decision
		H7: There is a significant relationship between course content and effectiveness.	Supported
		H8: There is a significant relationship between course content and support assessment.	Supported
		H9: There is a significant relationship between teacher subject knowledge and effectiveness.	Not Supported
		H10: There is a significant relationship between interactivity and support assessment.	Not Supported
		H11: There is a significant relationship between interactivity and effectiveness	Not Supported
		H12: There is a significant relationship between behavioral intention and academic performance.	Supported
		H13: There is a significant relationship between academic performance and continuous intention to use.	Supported
		H14: There is a significant relationship between effectiveness and continuous intention to use.	Supported
		H15: There is a significant relationship between support assessment and continuous intention to use.	Supported
		H16: There is a significant relationship between student satisfaction and continuous intention to use.	Supported
iii. To validate the proposed acceptance model	iii. How can the developed model be assessed in the e-learning system?	-Use of PLS-SEM program to calculate Alpha Cronbach's, AVE, CR. -Evaluate the influence of R^2, F^2, Q^2, and test the β, α, P- value that match with the model target.	-Rules tested -Evaluation supported

5.3 Research Contributions

This research offers a practical and theoretical contribution. Theoretically, this study employed the TAM, TTF, and part of ECT model factors to enhance and further investigate the acceptance model as an adopted model. Furthermore, this research provides a theoretical contribution by extending TAM, TTF, and part of ECT model constructs and associated items to improve the learning process and to enhance the continuous intention to use e-learning system through the Acceptance Model for technology validation and continuous intention to use the system. The model also provides a roadmap on how the following factors namely, course contents, teacher-subject knowledge, technology integration, and interactivity as adopted TTF model in the education sector, as independent factors relationship the continuous intention to use e-learning system.

In summary, the findings from this study provide the following important contributions:

i. This research analysed many e-learning systems, in addition to analysing a lot of technology testing and validation theories. Furthermore, the research developed the acceptance model based on the combined models factors that relationship directly or indirectly on continuous intention to use e-learning system in higher educational institution. This was from the first objective. This contribution generated sub-contributions as follows:
   a. This research identified the relationships between selected factors. In addition, it used the TAM model in its basic factors and TTF model factors with part of ECT model factors as the combinational of acceptance model.
   b. Moreover, the e-learning factors integrated with perceived usefulness and perceived ease of use of TAM model are determined to develop a theoretical model that is based on additional factors connected from adopted TTF and part of ECT models to improve the development of the continuous intention to use e-learning system.

ii. This research produced an acceptance model of continuous intention to use e-learning system by linking the previous factors (perceived usefulness, perceived ease of use, course content, teacher-subject knowledge, interactivity, and technology integration) with mediate factors which comprised of behavioural intention, academic performance, support assessment, effectiveness, and student satisfaction. The proposed four new factors were based on the continuous intention to use e-learning system analogous to the TAM and TTF models and part of ECT model that were employed in evaluating the use of the Acceptance Model as an adopted type of e-learning model in Oman. This was from the second objective.

iii. Lastly, this research validated the results generated from the modified TAM, TTF, part of ECT models by an acceptance model for technology acceptance and continuous intention to use the e-learning system. By doing so, the author extended the e-learning system to a more usable and interactive approach to produce efficient learning results for students.

Respectively, the Acceptance Model can importantly be adopted in universities to improve the current e-learning processes and further enhance students' acceptance and continuous intention use by combining the e-learning system approaches with the coursework of study programs.

5.4 Implications

This study has important implications for academicians in terms of theoretical implications and for students, in terms of practical implications.

5.4.1 Theoretical Implications

The most significant implication of this research is that it has developed an acceptance model derived from TAM and TTF models as well as part of the ECT model with a combination of other factors from different selected models. Also, this model comprised the independent factors that relationship the continuous intention to use e-learning system as a resource model and tool in this study. Therefore, the evaluated outcomes of this model gave a significant validity of the outcomes of checking academic performance acceptance, the effectiveness of model use, support assessment of assessing marks and evaluation progress, and finally the student satisfaction feedback on course evaluation. All of these factors were used in this model and tested within the acceptance model to enhance the teaching and learning process of higher education institutions.

For this reason, the factors of teacher-subject knowledge and course content were important factors to prove the students' continuous intention to use e-learning. In addition, the interactivity with technology integration as independent factors were added to the theoretical model to support the strength and power of the factors interconnection to enhance continuous intention to use e-learning system. The developed Acceptance Model drew the map of multi-factors interaction positively for the enhancement of continuous intention to use e-learning system and the relations between factors connections and as seen in Chapter 3, Section 3.4.2.1, research conceptual model and 3.4.2.2 research hypotheses.

As such, this study proposes that Acceptance Model be used in future to assess continuous intention to use e-learning.

5.4.2 Practical Implication

This study proves from its findings that the practice of this acceptance model and the validated PLS have resulted in the capability of this model to find the contributing factors for enhancing the continuous intention to use e-learning system and the acceptance of support assessment with the deployment of effectiveness, student satisfaction and construct academic performance factors. The practical part used the common e-learning system that applied in the four universities, MOODLE platform, then the theoretical model parts relies on the features available on this application to test and validate all the hypothesis and reveals the significant impact on relationships between the identified factors.

5.5 Limitations and Recommendations for Future Research

This study examined how to improve the existing models assessing the use of e-learning systems applied in HEIs, particularly because there is a gap of continuous intention to use e-learning systems from the student users' point of view. This study has developed the Acceptance Model that is able to do precisely that by combining TAM, TTF and part of ECT models. This Acceptance Model has proven that it can support the majority of the hypotheses (12 of 16 hypotheses); however, there are limitations to this study in terms of context, respondents, and psychological feedback.

In terms of context, this model was only tested in the context of 4 Omani HEIs. Before the other 4 failed hypotheses can be completely disregarded, perhaps this model can be tested and extended in other contexts, be they in other Omani HEIs, or even outside Oman. This will give better insights as to whether the selected constructs for the model are truly relevant and applicable to assess the continuous intention to use e-learning systems.

In terms of respondents, this study only tested the model from student users' perspective to reflect their continuous intention to use e-learning. Again, this study recommends that this model be tested on student users in other contexts, as well as on other groups such as teachers and administrators or management. By including the teachers, and administrators' continuous intention to use e-learning systems, this will give a more complete picture on how the systems can be enhanced to suit their needs.

Lastly, the model tested continuous intention to use e-learning system based on the behavioral intention factor to academic performance. Future research may want to look at other psychological feedback such as confidence level or relaxation to behavioral intention. This would give more generalisations on the individual continuous intention to use e-learning systems which is the focus of the Acceptance Model. Besides, the study needs to extend the testing to include teacher and administrator of the universities for more evidence to continuous intention to use an e-learning system.

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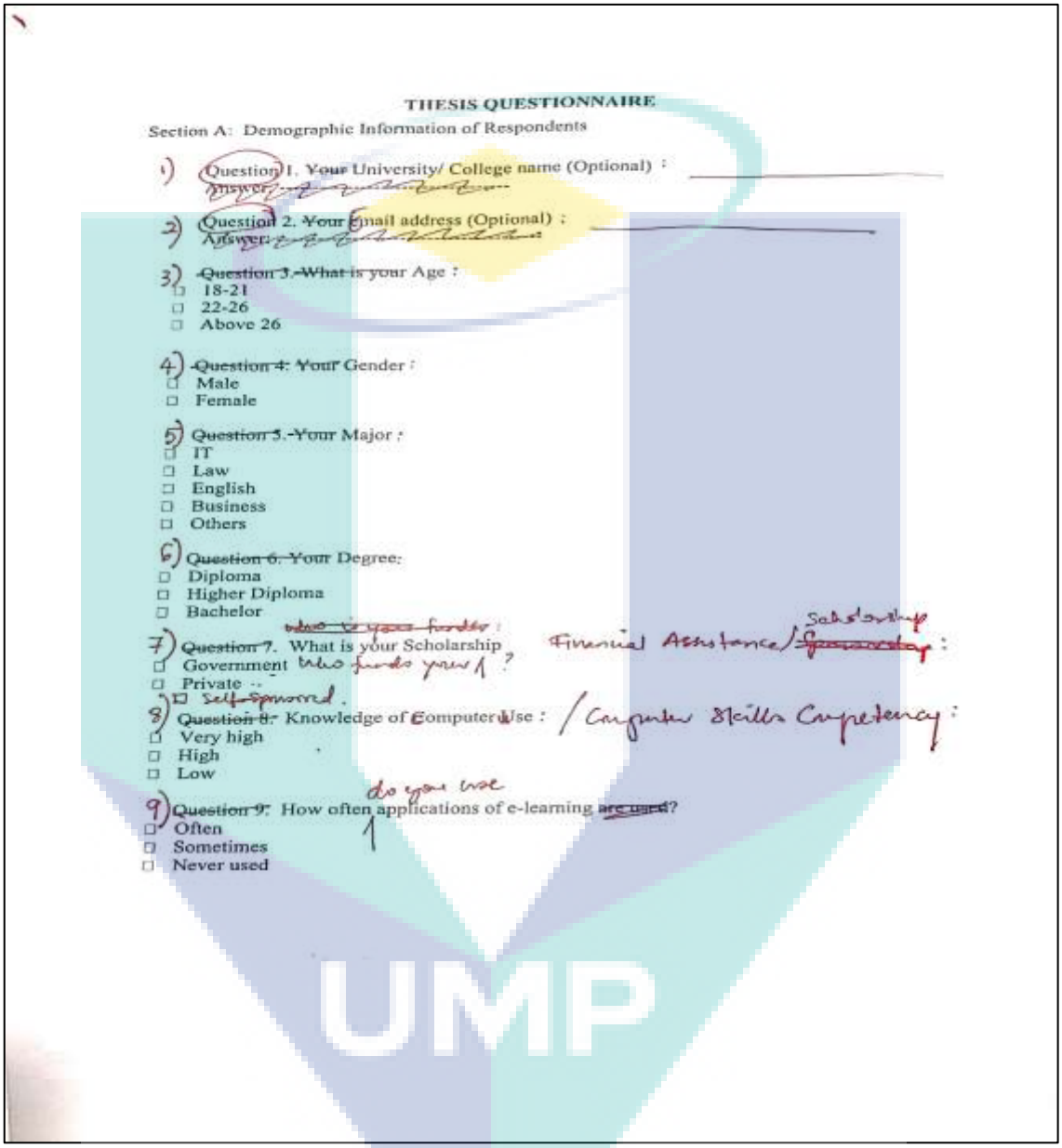
APPENDIX A

Reviewer Comments on Initial Questionnaire



THESIS QUESTIONNAIRE

Section A: Demographic Information of Respondents

1) Question 1. Your University/ College name (Optional) :
Answer:

2) Question 2. Your email address (Optional) :
Answer:

3) ~~Question 3.~~ ~~What is your~~ Age :
- 18-21
- 22-26
- Above 26

4) ~~Question 4: Your~~ Gender :
- Male
- Female

5) ~~Question 5.~~ ~~Your~~ Major :
- IT
- Law
- English
- Business
- Others

6) ~~Question 6. Your~~ Degree:
- Diploma
- Higher Diploma
- Bachelor

7) ~~Question 7.~~ What is your Scholarship
- Government
- Private
- Self-Sponsored.

8) ~~Question 8.~~ Knowledge of Computer Use :
- Very high
- High
- Low

9) ~~Question 9:~~ How often applications of e-learning ~~are used~~?
- Often
- Sometimes
- Never used

by circling the number that matches your agreement to

Section B: Please indicate with "√" the extent to which you agree to the given statements. Please mark your answer according to the following scale: (1) is "Strongly disagree", (2) "Disagree", (3) "Neutral", (4) "Agree" and (5) "Strongly agree".

Code	Factor items					
	Perceived Usefulness	SD	D	N	A	SA
PU1	E-learning systems enhance my effectiveness.	1	2	3	4	5
PU2	E-learning systems improve my academic learning performance.	1	2	3	4	5
PU3	E-learning systems easily translate the learning material into specific knowledge.	1	2	3	4	5
PU4	Using E-learning systems would enable me to accomplish tasks more effectively.	1	2	3	4	5
	Course Content	SD	D	N	A	SA
CC1	E-learning systems effectively challenge me to think.	1				
CC2	Course assignments are interesting and stimulating.					
CC3	This course is up-to-date with developments in the field.					
CC4	Student evaluation techniques such as projects, assignments, and exams are related to the E-learning objectives of this course.					
CC5	Course included applies E-learning and problem solving.					
	Perceived Ease of Use					
PEOU1	E-learning systems are easy to use.					
PEOU2	It's easy to get materials from E-learning systems.					

PEOU3	E-learning systems are clear and understandable.					
PEOU4	E-learning systems allow me to submit my assignments early.					
	Interactivity					
IN1	I feel free to express and explain my own views throughout E-learning systems.					
IN2	I have sufficient opportunity to interact with other students using E-learning systems.					
IN3	The instructor provides timely feedback on assignments, exams or projects.					
IN4	E-learning systems facilitate the collaboration among the students.					
	Teacher Subject Knowledge					
TSK1	E-learning systems are trusted by teacher to enhance learning.					
TSK2	E-learning systems can be used to improve 21st-century skills.					
TSK3	E-learning systems allow the student to enjoy privacy with the instructor.					
TSK4	E-learning systems guide ~~curriculum updating courses~~ teachers to update their course content. (what do you mean?)					
TSK5	E-learning systems increase the effectiveness of moderation.					
	Technology Integration					
IT1	The interactive content of E-learning systems are effectively communicated from the same course.					

IT2	The interactive content of e-learning systems includes information not covered in printed material of the same course.					
IT3	The interactive content of this course contributes to e-learning.					
	Support Assessment					
SA1	E-learning systems guarantee trust in assessment and quality.					
SA2	Projects/assignments are clearly explained using e-learning systems.					
SA3	E-learning systems guarantee to support my learning motivation.					
SA4	E-learning systems make technology more convenient.					
	Academic Performance					
AP1	I anticipate good grades in courses where e-learning systems are used heavily.					
AP2	I anticipate better grades in classes where e-learning systems are used heavily compared to where they are not used.					
AP3	E-learning models efficiently allow teacher-student interaction.					
	Behavioral Intention					
BI1	I am considering the new information I have learned with e-learning systems when taking action related to the topic.					
BI2	It is worth to recommend the e-learning systems to other students.					

BI3	I am interested to use the e-learning systems more frequently in the future.					
	Student satisfaction					
SS1	E-learning systems are user-friendly.					
SS2	I am really happy with e-learning systems after using them.					
SS3	E-learning systems are a very delightful experience.					
	Effectiveness					
EF1	I would recommend e-learning systems to friends/colleagues because e-learning is effective					
EF2	I have learned a lot in this e-learning system					
EF3	~~I have enjoyed e-learning systems.~~					
	Continuous Intention to use					
CI1	I intend to use e-learning systems in the future continuously.					
CI2	I intend to utilize e-learning systems for various purposes such as self-development ~~as well as earning credit hours.~~					
CI3	If e-learning systems become diverse in the future, I intend to use it frequently even after graduation.					

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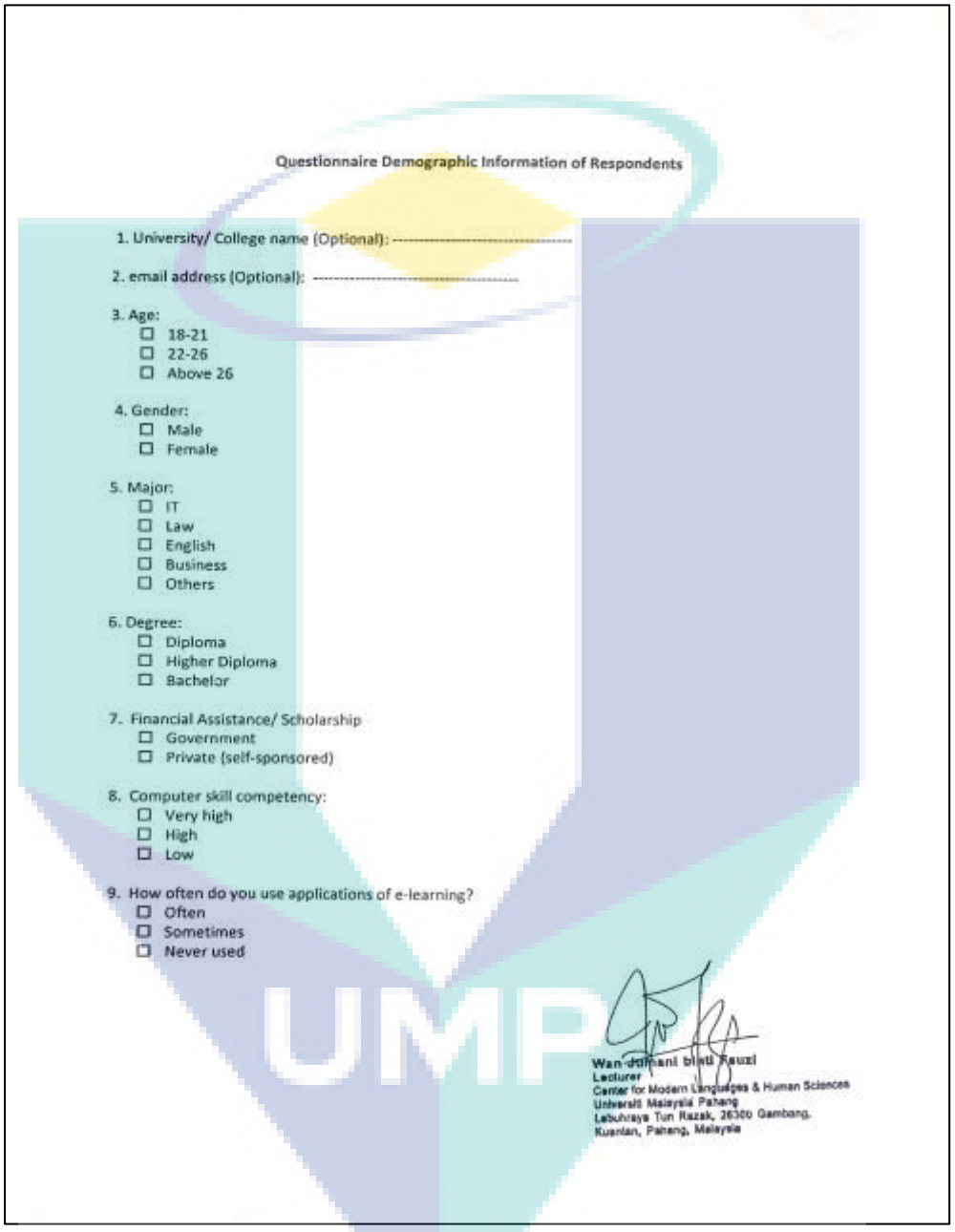
APPENDIX B

Final Validated Questionnaire



Questionnaire Demographic Information of Respondents

1. University/ College name (Optional): ----------

2. email address (Optional): ----------

3. Age:
   - ☐ 18-21
   - ☐ 22-26
   - ☐ Above 26

4. Gender:
   - ☐ Male
   - ☐ Female

5. Major:
   - ☐ IT
   - ☐ Law
   - ☐ English
   - ☐ Business
   - ☐ Others

6. Degree:
   - ☐ Diploma
   - ☐ Higher Diploma
   - ☐ Bachelor

7. Financial Assistance/ Scholarship
   - ☐ Government
   - ☐ Private (self-sponsored)

8. Computer skill competency:
   - ☐ Very high
   - ☐ High
   - ☐ Low

9. How often do you use applications of e-learning?
   - ☐ Often
   - ☐ Sometimes
   - ☐ Never used

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Section B: Please indicate by circling the number that matches your agreement to the given statements. Please mark your answer according to the following scale: (1) is "Strongly disagree", (2) "Disagree", (3) "Neutral", (4) "Agree" and (5) "Strongly agree".

Code	Items					
	Perceived Usefulness	SD	D	N	A	SA
PU1	E-learning systems enhance my effectiveness.	1	2	3	4	5
PU2	E-learning systems improve my academic learning performance.	1	2	3	4	5
PU3	E-learning systems easily translate the learning material into specific knowledge.	1	2	3	4	5
PU4	Using e-learning systems would enable me to accomplish tasks more effectively.	1	2	3	4	5
	Course Content	SD	D	N	A	SA
CC1	E-learning systems effectively challenge me to think.	1	2	3	4	5
CC2	Course assignments are interesting and stimulating.	1	2	3	4	5
CC3	This course is up-to-date with developments in the field.	1	2	3	4	5
CC4	Student evaluation techniques such as projects, assignments, and exams are related to the e-learning objectives of this course.	1	2	3	4	5
CC5	Course content applies e-learning and problem solving.	1	2	3	4	5
	Perceived Ease of Use	SD	D	N	A	SA
PEOU1	E-learning systems are easy to use.	1	2	3	4	5
PEOU2	It's easy to get materials from e-learning systems.	1	2	3	4	5
PEOU3	E-learning systems are clear and understandable.	1	2	3	4	5
PEOU4	E-learning systems allow me to submit my assignments easily.	1	2	3	4	5
	Interactivity	SD	D	N	A	SA
IN1	I feel free to express and explain my own views throughout e-learning systems.	1	2	3	4	5
IN2	I have sufficient opportunity to interact with other students using e-learning systems.	1	2	3	4	5
IN3	The instructor provides timely feedback on assignments, exams or projects.	1	2	3	4	5
IN4	E-learning systems facilitate the collaboration among the students.	1	2	3	4	5
	Teacher Subject Knowledge	SD	D	N	A	SA
TSK1	E-learning systems are trusted by teacher to enhance learning.	1	2	3	4	5
TSK2	E-learning systems can be used to improve 21st-century skills.	1	2	3	4	5
TSK3	E-learning systems allow the students to enjoy privacy with the instructor.	1	2	3	4	5

TSK4	E-learning systems guide teachers to update their course content.	1	2	3	4	5
TSK5	E-learning systems increase the effectiveness of moderation	1	2	3	4	5
	Technology Integration	SD	D	N	A	SA
IT1	The interactive content of e-learning systems are effectively communicates.	1	2	3	4	5
IT2	The interactive content of e-learning systems includes information of the same course not covered in printed material.	1	2	3	4	5
IT3	The interactive content of this course contributes to e-learning	1	2	3	4	5
	Support Assessment	SD	D	N	A	SA
SA1	E-learning systems guarantee trust in assessment in timeliness and quality.	1	2	3	4	5
SA2	Projects/assignments are clearly explained using e-learning systems.	1	2	3	4	5
SA3	E-learning systems guarantee support my learning motivation.	1	2	3	4	5
SA4	E-learning systems make technology more convenient.	1	2	3	4	5
	Academic Performance	SD	D	N	A	SA
AP1	I anticipate good grades in courses where e-learning systems are used heavily.	1	2	3	4	5
AP2	I anticipate better grades in classes where e-learning systems are used heavily compared to where they are not used.	1	2	3	4	5
AP3	E-learning systems efficiently improve my grades due to the teacher-student interaction feature.	1	2	3	4	5
	Behavioral Intention	SD	D	N	A	SA
BI1	I am considering the new information I have learned with e-learning systems when taking action related to the topic.	1	2	3	4	5
BI2	It is worth to recommend the e-learning systems to other students.	1	2	3	4	5
BI3	I am interested to use the e-learning systems more frequently in the future.	1	2	3	4	5
	Student Satisfaction	SD	D	N	A	SA
SS1	E-learning systems are user-friendly.	1	2	3	4	5
SS2	I am really happy with e-learning systems after using them.	1	2	3	4	5
SS3	Using e-learning systems is a very delightful experience.	1	2	3	4	5
	Effectiveness	SD	D	N	A	SA

EF1	Because e-learning is effective develop this show effectiveness.	1	2	3	4	5
EF2	I have learned a lot using e-learning system.	1	2	3	4	5
EF3	I have achieved the learning outcomes through e-learning systems	1	2	3	4	5
	Continuous Intention to use	**SD**	**D**	**N**	**A**	**SA**
CI1	I intend to use e-learning systems in the future continuously.	1	2	3	4	5
CI2	I intend to utilize e-learning systems for various purposes such as self-development.	1	2	3	4	5
CI3	If e-learning systems become diverse in the future, I intend to use it frequently even after graduation.	1	2	3	4	5

APPENDIX C

Table C.1: VIF Values

ITEM	VIF	ITEM	VIF
aa1	1.345	peou4	1.232
aa2	1.402	sp2	1.419
aa3	1.516	sp3	1.433
aa4	1.247	sp4	1.496
ap1	1.402	ss1	1.102
ap2	1.423	ss2	1.233
ap3	1.393	ss3	1.281
in1	1.228	ss4	1.379
in2	1.326	su1	1.16
in3	1.105	su2	1.16
in4	1.240	ts1	1.469
kd1	1.273	ts2	1.519
kd2	1.349	ts3	1.723
kd3	1.503	tsk1	1.38
kd4	1.357	tsk2	1.68
kd5	1.472	tsk3	1.327
peou1	1.23	tsk4	1.422
peou2	1.15	tsk5	1.465
peou3	1.214	sp1	1.181

Table C.2: Discriminant Cross Loading Factor

	Academic Performance	Behavioral intention	Continuous intention	Course content	effective	Inter-activity	PEOU	PU	Student satisfaction	Support assess	Teacher sub-know	Tech-integrity
AP1	1.000	0.360	0.202	0.193	0.205	0.100	0.148	0.152	-0.15	-0.053	0.037	0.173
BI1	0.33	0.937	0.580	0.311	0.369	-0.078	0.370	0.396	0.209	0.376	0.238	0.237
BI2	0.271	0.707	0.266	0.009	0.226	0.109	0.085	0.104	-0.147	0.025	0.007	0.175
CI1	0.145	0.373	0.873	0.400	0.571	-0.089	0.407	0.537	0.37	0.451	0.252	0.325
CI2	0.239	0.449	0.868	0.336	0.473	-0.091	0.397	0.674	0.293	0.292	0.446	0.402
CI3	0.123	0.613	0.765	0.353	0.421	-0.103	0.223	0.468	0.167	0.392	0.211	0.229
CC1	0.193	0.246	0.435	1.000	0.340	-0.075	0.482	0.435	0.327	0.289	0.309	0.084
EF2	0.165	0.167	0.317	0.235	0.725	-0.168	0.396	0.347	0.354	0.452	0.223	0.401
EF3	0.177	0.402	0.605	0.317	0.913	-0.310	0.187	0.432	0.184	0.544	0.099	0.258
IN2	-0.118	-0.111	-0.187	-0.068	-0.311	0.791	0.007	-0.22	-0.063	-0.267	0.040	-0.047
IN3	0.295	0.096	0.032	-0.043	-0.14	0.719	-0.146	-0.02	-0.229	-0.338	-0.026	0.001
PEOU3	0.195	0.337	0.380	0.422	0.444	-0.270	0.832	0.270	0.259	0.332	0.225	0.260
PEOU4	0.056	0.203	0.324	0.387	0.090	0.119	0.846	0.388	0.286	0.111	0.328	0.332
PU1	-0.019	0.174	0.462	0.245	0.311	-0.118	0.307	0.765	0.480	0.470	0.412	0.421
PU2	0.183	0.394	0.617	0.400	0.440	-0.131	0.394	0.908	0.422	0.470	0.397	0.625
PU3	0.21	0.264	0.569	0.36	0.426	-0.188	0.337	0.823	0.318	0.348	0.368	0.346
PU4	0.134	0.313	0.589	0.446	0.413	-0.138	0.276	0.851	0.456	0.292	0.469	0.368
SS2	-0.149	0.078	0.275	0.195	0.302	-0.176	0.305	0.442	0.849	0.288	0.357	0.271
SS3	-0.100	0.101	0.301	0.358	0.186	-0.134	0.240	0.399	0.828	0.33	0.336	0.067
SA2	-0.037	0.280	0.464	0.301	0.574	-0.331	0.122	0.412	0.308	0.894	0.124	0.294
SA4	**-0.054**	**0.208**	**0.250**	**0.149**	**0.396**	**-0.328**	**0.361**	**0.367**	**0.302**	**0.740**	**0.312**	**0.265**
TSK1	0.037	0.188	0.362	0.309	0.171	0.012	0.331	0.491	0.413	0.239	1.000	0.143
IT1	0.091	0.283	0.511	0.235	0.482	-0.097	0.426	0.609	0.344	0.483	0.222	0.930
IT2	0.237	0.214	0.154	-0.073	0.16	0.045	0.25	0.37	0.027	0.129	0.049	0.891
IT3	0.17	0.095	0.301	-0.06	0.288	0.006	0.16	0.374	0.074	0.186	0.035	0.868

Table C.3: Inner VIF Values

	Academic Performance	Behavioral intention	Continuous intention	Course content	effective	Inter-activity	PEOU	PU	Student satisfaction	Support assess	Teacher sub-knowledge	Tech-integrity
AP1	1.000	0.360	0.202	0.193	0.205	0.100	0.148	0.152	-0.15	-0.053	0.037	0.173
BI1	0.33	0.937	0.580	0.311	0.369	-0.078	0.370	0.396	0.209	0.376	0.238	0.237
BI2	0.271	0.707	0.266	0.009	0.226	0.109	0.085	0.104	-0.147	0.025	0.007	0.175
CI1	0.145	0.373	0.873	0.400	0.571	-0.089	0.407	0.537	0.37	0.451	0.252	0.325
CI2	0.239	0.449	0.868	0.336	0.473	-0.091	0.397	0.674	0.293	0.292	0.446	0.402
CI3	0.123	0.613	0.765	0.353	0.421	-0.103	0.223	0.468	0.167	0.392	0.211	0.229
CC1	0.193	0.246	0.435	1.000	0.340	-0.075	0.482	0.435	0.327	0.289	0.309	0.084
EF2	0.165	0.167	0.317	0.235	0.725	-0.168	0.396	0.347	0.354	0.452	0.223	0.401
EF3	0.177	0.402	0.605	0.317	0.913	-0.310	0.187	0.432	0.184	0.544	0.099	0.258
IN2	-0.118	-0.111	-0.187	-0.068	-0.311	0.791	0.007	-0.22	-0.063	-0.267	0.040	-0.047
IN3	0.295	0.096	0.032	-0.043	-0.14	0.719	-0.146	-0.02	-0.229	-0.338	-0.026	0.001
PEOU3	0.195	0.337	0.380	0.422	0.444	-0.270	0.832	0.270	0.259	0.332	0.225	0.260
PEOU4	0.056	0.203	0.324	0.387	0.090	0.119	0.846	0.388	0.286	0.111	0.328	0.332
PU1	-0.019	0.174	0.462	0.245	0.311	-0.118	0.307	0.765	0.480	0.470	0.412	0.421
PU2	0.183	0.394	0.617	0.400	0.440	-0.131	0.394	0.908	0.422	0.470	0.397	0.625
PU3	0.21	0.264	0.569	0.36	0.426	-0.188	0.337	0.823	0.318	0.348	0.368	0.346
PU4	0.134	0.313	0.589	0.446	0.413	-0.138	0.276	0.851	0.456	0.292	0.469	0.368
SS2	-0.149	0.078	0.275	0.195	0.302	-0.176	0.305	0.442	0.849	0.288	0.357	0.271
SS3	-0.100	0.101	0.301	0.358	0.186	-0.134	0.240	0.399	0.828	0.33	0.336	0.067
SA2	-0.037	0.280	0.464	0.301	0.574	-0.331	0.122	0.412	0.308	0.894	0.124	0.294

Table C.4: Indicator Data Correlation Impicial Values

	Academic Performance	Behavioral intention	Continuous intention	Course content	effective	Inter-activity	PEOU	PU	Student satisfaction	Support assess	Teacher sub-knowledge	Tech-integrity
AP1	1.000	0.360	0.202	0.193	0.205	0.100	0.148	0.152	-0.15	-0.053	0.037	0.173
BI1	0.33	0.937	0.580	0.311	0.369	-0.078	0.370	0.396	0.209	0.376	0.238	0.237
BI2	0.271	0.707	0.266	0.009	0.226	0.109	0.085	0.104	-0.147	0.025	0.007	0.175
CI1	0.145	0.373	0.873	0.400	0.571	-0.089	0.407	0.537	0.37	0.451	0.252	0.325
CI2	0.239	0.449	0.868	0.336	0.473	-0.091	0.397	0.674	0.293	0.292	0.446	0.402
CI3	0.123	0.613	0.765	0.353	0.421	-0.103	0.223	0.468	0.167	0.392	0.211	0.229
CC1	0.193	0.246	0.435	1.000	0.340	-0.075	0.482	0.435	0.327	0.289	0.309	0.084
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EF3	0.177	0.402	0.605	0.317	0.913	-0.310	0.187	0.432	0.184	0.544	0.099	0.258
IN2	-0.118	-0.111	-0.187	-0.068	-0.311	0.791	0.007	-0.22	-0.063	-0.267	0.040	-0.047
IN3	0.295	0.096	0.032	-0.043	-0.14	0.719	-0.146	-0.02	-0.229	-0.338	-0.026	0.001
PEOU3	0.195	0.337	0.380	0.422	0.444	-0.270	0.832	0.270	0.259	0.332	0.225	0.260
PEOU4	0.056	0.203	0.324	0.387	0.090	0.119	0.846	0.388	0.286	0.111	0.328	0.332
PU1	-0.019	0.174	0.462	0.245	0.311	-0.118	0.307	0.765	0.480	0.470	0.412	0.421
PU2	0.183	0.394	0.617	0.400	0.440	-0.131	0.394	0.908	0.422	0.470	0.397	0.625
PU3	0.21	0.264	0.569	0.36	0.426	-0.188	0.337	0.823	0.318	0.348	0.368	0.346
PU4	0.134	0.313	0.589	0.446	0.413	-0.138	0.276	0.851	0.456	0.292	0.469	0.368
SS2	-0.149	0.078	0.275	0.195	0.302	-0.176	0.305	0.442	0.849	0.288	0.357	0.271
SS3	-0.100	0.101	0.301	0.358	0.186	-0.134	0.240	0.399	0.828	0.33	0.336	0.067
SA2	-0.037	0.280	0.464	0.301	0.574	-0.331	0.122	0.412	0.308	0.894	0.124	0.294

Table C.4. Indicator Data Correlation Impicial Values (Cont.)

	Academic Performance	Behavioral intention	Continuous intention	Course content	effective	Inter-activity	PEOU	PU	Student satisfaction	Support assess	Teacher sub-knowledge	Tech-integrity
AP1	1.000	0.360	0.202	0.193	0.205	0.100	0.148	0.152	-0.15	-0.053	0.037	0.173
BI1	0.33	0.937	0.580	0.311	0.369	-0.078	0.370	0.396	0.209	0.376	0.238	0.237
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CI1	0.145	0.373	0.873	0.400	0.571	-0.089	0.407	0.537	0.37	0.451	0.252	0.325
CI2	0.239	0.449	0.868	0.336	0.473	-0.091	0.397	0.674	0.293	0.292	0.446	0.402
CI3	0.123	0.613	0.765	0.353	0.421	-0.103	0.223	0.468	0.167	0.392	0.211	0.229
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EF3	0.177	0.402	0.605	0.317	0.913	-0.310	0.187	0.432	0.184	0.544	0.099	0.258
IN2	-0.118	-0.111	-0.187	-0.068	-0.311	0.791	0.007	-0.22	-0.063	-0.267	0.040	-0.047
IN3	0.295	0.096	0.032	-0.043	-0.14	0.719	-0.146	-0.02	-0.229	-0.338	-0.026	0.001
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PU1	-0.019	0.174	0.462	0.245	0.311	-0.118	0.307	0.765	0.480	0.470	0.412	0.421
PU2	0.183	0.394	0.617	0.400	0.440	-0.131	0.394	0.908	0.422	0.470	0.397	0.625
PU3	0.21	0.264	0.569	0.36	0.426	-0.188	0.337	0.823	0.318	0.348	0.368	0.346
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SS2	-0.149	0.078	0.275	0.195	0.302	-0.176	0.305	0.442	0.849	0.288	0.357	0.271
SS3	-0.100	0.101	0.301	0.358	0.186	-0.134	0.240	0.399	0.828	0.33	0.336	0.067
SA2	-0.037	0.280	0.464	0.301	0.574	-0.331	0.122	0.412	0.308	0.894	0.124	0.294

Table C.4. Indicator Data Correlation Impicial Values (Cont.)

	Academic Performance	Behavioral intention	Continuous intention	Course content	effective	Inter-activity	PEOU	PU	Student satisfaction	Support assess	Teacher sub-knowledge	Tech-integrity
AP1	1.000	0.360	0.202	0.193	0.205	0.100	0.148	0.152	-0.15	-0.053	0.037	0.173
BI1	0.33	0.937	0.580	0.311	0.369	-0.078	0.370	0.396	0.209	0.376	0.238	0.237
BI2	0.271	0.707	0.266	0.009	0.226	0.109	0.085	0.104	-0.147	0.025	0.007	0.175
CI1	0.145	0.373	0.873	0.400	0.571	-0.089	0.407	0.537	0.37	0.451	0.252	0.325
CI2	0.239	0.449	0.868	0.336	0.473	-0.091	0.397	0.674	0.293	0.292	0.446	0.402
CI3	0.123	0.613	0.765	0.353	0.421	-0.103	0.223	0.468	0.167	0.392	0.211	0.229
CC1	0.193	0.246	0.435	1.000	0.340	-0.075	0.482	0.435	0.327	0.289	0.309	0.084
EF2	0.165	0.167	0.317	0.235	0.725	-0.168	0.396	0.347	0.354	0.452	0.223	0.401
EF3	0.177	0.402	0.605	0.317	0.913	-0.310	0.187	0.432	0.184	0.544	0.099	0.258
IN2	-0.118	-0.111	-0.187	-0.068	-0.311	0.791	0.007	-0.22	-0.063	-0.267	0.040	-0.047
IN3	0.295	0.096	0.032	-0.043	-0.14	0.719	-0.146	-0.02	-0.229	-0.338	-0.026	0.001
PEOU3	0.195	0.337	0.380	0.422	0.444	-0.270	0.832	0.270	0.259	0.332	0.225	0.260
PEOU4	0.056	0.203	0.324	0.387	0.090	0.119	0.846	0.388	0.286	0.111	0.328	0.332
PU1	-0.019	0.174	0.462	0.245	0.311	-0.118	0.307	0.765	0.480	0.470	0.412	0.421
PU2	0.183	0.394	0.617	0.400	0.440	-0.131	0.394	0.908	0.422	0.470	0.397	0.625
PU3	0.21	0.264	0.569	0.36	0.426	-0.188	0.337	0.823	0.318	0.348	0.368	0.346
PU4	0.134	0.313	0.589	0.446	0.413	-0.138	0.276	0.851	0.456	0.292	0.469	0.368
SS2	-0.149	0.078	0.275	0.195	0.302	-0.176	0.305	0.442	0.849	0.288	0.357	0.271
SS3	-0.100	0.101	0.301	0.358	0.186	-0.134	0.240	0.399	0.828	0.33	0.336	0.067
SA2	-0.037	0.280	0.464	0.301	0.574	-0.331	0.122	0.412	0.308	0.894	0.124	0.294

Table C.4. Indicator Data Correlation Impicial Values (Cont.)

	peou2	tsk1		peou2	tsk1		peou2	tsk1
AP1	0.117	0.003	EF2	0.201	0.342	SS1	0.058	0.183
AP2	0.145	0.138	EF3	0.035	0.132	SS2	0.004	0.092
BI1	0.209	0.186	IN1	0.095	0.061	peou1	0.292	0.162
BI2	0.204	0.298	IT1	0.252	0.179	peou2	1	0.28
BI3	0.12	0.115	IT2	0.249	0.089	tsk1	0.28	1
CC1	0.322	0.261	IT3	0.158	0.179			
CC2	0.265	0.15	PU2	0.269	0.4			
CI1	0.106	0.138	PU3	0.272	0.287			
CI2	0.3	0.246	PU4	0.287	0.335			
CI3	0.131	0.16	SA1	-0.048	0.119			
			SA2	0.143	0.218			

Table C.5: Indirect Effect: Mean, SD, T Value and P Value

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Perceived Ease of use -> Behavioral intention -> Academic Performance	0.075	0.078	0.034	2.18	0.03
Perceived Ease of use -> Perceived-usefulness -> Behavioral -intention -> Academic Performance	0.034	0.034	0.013	2.635	0.009
Technology-Integration -> Behavioral -intention -> Academic Performance	0.018	0.022	0.021	0.866	0.387
Perceived Ease of use -> Perceived-usefulness -> Behavioral -intention	0.094	0.095	0.034	2.742	0.006
Perceived Ease of use -> Behavioral -intention -> Academic Performance -> Continuous Intention to Use System	0.011	0.012	0.007	1.567	0.118
Perceived Ease of use -> Perceived-usefulness -> Behavioral -intention -> Academic Performance -> Continuous Intention to Use System	0.005	0.005	0.003	1.96	0.051
Technology Integration -> Behavioral -intention -> Academic Performance -> Continuous e Intention to Use	0.003	0.003	0.004	0.715	0.475
Course Content -> Effectiveness -> Continuous -Intention to Use System	0.123	0.125	0.038	3.278	0.001
Interactivity -> Effectiveness -> Continuous Intention to Use System	-0.119	-0.118	0.032	3.706	0
Teacher Subject Knowledge -> Effectiveness -> Continuous Intention to Use System	0.035	0.037	0.029	1.208	0.227
Perceived Ease of use -> Student Satisfaction -> Continuous Intention to Use System	0.029	0.031	0.019	1.558	0.12
Perceived Ease of use -> Perceived-usefulness -> Student Satisfaction -> Continuous Intention to Use System	0.033	0.034	0.011	2.974	0.003
Course Content -> Support Assessment -> Continuous Intention to Use System	0.036	0.036	0.024	1.495	0.136
Interactivity -> Support Assessment -> Continuous Intention to Use System	-0.052	-0.05	0.028	1.865	0.063
Perceived Ease of use -> Perceived-usefulness -> Student Satisfaction	0.174	0.177	0.034	5.06	0

Table C.6: Total Effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Academic -Performance -> Continuous-Intention to Use	0.152	0.149	0.061	2.504	0.013
Behaivoral-intention -> Academic Performance	0.36	0.367	0.065	5.508	0
Behaivoral-intention -> Continue Intention to Use	0.055	0.055	0.025	2.171	0.03
Course Content -> Continuous Intention to Use	0.159	0.161	0.042	3.761	0
Course Content -> Effectiveness	0.293	0.292	0.067	4.376	0
Course Content -> Support Assessment	0.261	0.26	0.062	4.212	0
Effectiveness -> Continuous Intention to Use	0.42	0.425	0.073	5.758	0
Interactivity -> Continuous Intention to Use	-0.171	-0.167	0.029	5.864	0
Interactivity -> Effectiveness	-0.284	-0.279	0.067	4.266	0
Interactivity -> Support Assessment	-0.377	-0.376	0.046	8.216	0
Perceived Ease of use -> Academic Performance	0.109	0.112	0.035	3.136	0.002
Perceived Ease of use -> Behaivoral-intention	0.302	0.304	0.072	4.189	0
Perceived Ease of use -> Continuous Intention to Use	0.079	0.082	0.026	3.042	0.002
Perceived Ease of use -> Perceived-usefulness	0.393	0.4	0.058	6.807	0
Perceived Ease of use -> Student Satisfaction	0.326	0.329	0.067	4.848	0
Perceived-usefulness -> Academic Performance	0.086	0.085	0.027	3.173	0.002
Perceived-usefulness -> Behaivoral-intention	0.239	0.235	0.069	3.434	0.001
Perceived-usefulness -> Continuous Intention to Use	0.098	0.098	0.024	4.115	0
Perceived-usefulness -> Student Satisfaction	0.442	0.443	0.062	7.154	0
Student Satisfaction -> Continuous Intention to Use	0.192	0.194	0.049	3.927	0
Support Assessment -> Continuous Intention to Use	0.138	0.135	0.077	1.788	0.074
Teacher Subject Knowledge -> Continuous Intention to Use	0.035	0.037	0.029	1.208	0.227
Teacher Subject Knowledge -> Effectiveness	0.084	0.088	0.068	1.25	0.212
Technology Integration -> Academic Performance	0.018	0.022	0.021	0.866	0.387
Technology Integration -> Behaivoral-intention	0.05	0.056	0.051	0.981	0.327
Technology Integration -> Continuous Intention to Use	0.003	0.003	0.004	0.715	0.475

Table C.7: Fit Summary

	Saturated Model	Estimated Model
SRMR	**0.105**	**0.187**
d_ULS	**3.591**	**11.409**
d_G1	**2.033**	**2.564**
d_G2	**1.335**	**1.867**
Chi-Square	**2,283.31**	**2,790.91**
NFI	**0.493**	**0.381**
rms theta		**0.214**

Table C.8: Common Method Bias Test

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.819	20.043	20.043	8.819	20.043	20.043
2	2.984	6.781	26.824	2.984	6.781	26.824
3	2.455	5.581	32.404	2.455	5.581	32.404
4	2.185	4.966	37.370	2.185	4.966	37.370
5	1.881	4.276	41.646	1.881	4.276	41.646
6	1.697	3.856	45.502	1.697	3.856	45.502
7	1.570	3.567	49.069	1.570	3.567	49.069
8	1.456	3.309	52.378	1.456	3.309	52.378
9	1.418	3.222	55.600	1.418	3.222	55.600
10	1.364	3.101	58.701	1.364	3.101	58.701
11	1.202	2.733	61.434	1.202	2.733	61.434
12	1.145	2.603	64.036	1.145	2.603	64.036
13	1.118	2.541	66.577	1.118	2.541	66.577
14	1.018	2.313	68.890	1.018	2.313	68.890
15	.984	2.235	71.125			
16	.904	2.053	73.179			
17	.790	1.796	74.975			
18	.755	1.717	76.691			
19	.731	1.662	78.353			
20	.681	1.549	79.902			
21	.661	1.501	81.403			
22	.640	1.455	82.859			
23	.584	1.327	84.185			
24	.564	1.281	85.466			
25	.541	1.230	86.696			
26	.485	1.103	87.799			
27	.464	1.054	88.853			
28	.444	1.010	89.862			
29	.441	1.002	90.865			
30	.415	.944	91.808			
31	.381	.866	92.675			
32	.357	.812	93.486			
33	.336	.764	94.250			
34	.329	.748	94.998			
35	.320	.728	95.726			
36	.288	.654	96.380			
37	.274	.624	97.004			
38	.258	.587	97.591			
39	.235	.534	98.125			
40	.212	.482	98.606			
41	.173	.392	98.999			
42	.156	.354	99.353			
43	.153	.348	99.701			
44	.131	.299	100.000			

Extraction Method: Principal Component Analysis.

APPENDIX D

Al Buraimi University College

كلية البريمي الجامعية

Research Ethics Checklist

I. General Information	
Name of Researcher (Applicant)	Ragad M Tawafak
Researcher's Affiliation (Please write the full address if you are affiliated with an institution other than BUC)	[1] Faculty of Computer Systems and Software Engineering, University Malaysia Pahang, 26300 Kuantan, Pahang, Malaysia [2] Faculty of Information Technology Department, AlBuraimi University College, Buraimi, Oman
Email Address	raghad@buc.edu.om
Phone Number	
Research Project Title	ACADEMIC PERFORMANCE FRAMEWORK IN UNIVERSITIES USING TEL FOR IMPROVING E-LEARNING ENVIRONMENT
Description of Project (150 words)	The technology enhancement learning (TEL) services presented for the academic accreditation process of universities and other educational institutions is a policy that has been installed in both national and international educational systems. The TEL is one of the suggested application tool for attaining faculty and student satisfaction though many problems are still restricting the monitoring and controlling of these applications. The challenges of these application tools include study investigates whether the universities' communication model (UCOM) and the technology acceptance model (TAM), which includes four factors, namely, academic performance, student satisfaction, effectiveness and support assessment, simultaneously enhance student satisfaction and improve the teaching method and academic performance level. The purpose of this study is to adapt a model to improve the assessment method and improve the model of student satisfaction. This study focuses on improving e-learning to activate the feedback of continued intention of using the model that helps to navigate the student understanding level and academic performance immediately.

Al Buraimi University College

Department of Scientific Research & Higher Studies

كلية البريمي الجامعية

دائرة البحث العلمي و الدراسات العليا

II. RESEARCH CHECHLIST

Please tick the appropriate answer for all the following questions:

	YES	NO
1. Does the project involve the engagement with human participants?		X
2. Does the project require the collection of data or access to personal information?	☐	X
3. Does the project involve a risk of emotional or mental distress?	☐	X
4. Does the project involve the collection or discussion of culturally sensitive information or topics?? (e.g., religious conflicts, sexual activity, drug use)	☐	X
5. Does the project involve financial payment to the participants?	☐	X

Final Remarks:

- If "NO" is your answer to all questions, you can proceed with your research project.
- If "YES" is your answer to any of the questions, you will need to provide a detailed description of how you plan to deal with the ethical issues raised by your research. You can proceed with your research after you receive the Scientific Research Committee's ethical approval.

Ethical Issue	Plans to Deal with it

Date: 24/01/2018

Researcher's Signature: _____

Al Buraimi University College

AL Buraimi University College

كلية البريمي الجامعية

الفاضلة مديرة وحدة المتطلبات المحترمة

الموضوع/ موافقة على جمع بيانات لنتائج الطلبة في قاعات محددة

اود افادتكم باني احتاج الى اخذ عينة من نماذج القاعات الدراسية التي تبين مقارنة بين عينة طلبة في الفصل الدراسي الاول للعام الاكاديمي 16/2015 مع عينة من طلاب الفصل الاول للعام الاكاديمي 18/2017

والتي توضح نسبة التحسن في المستوى التحصيلي للطلبة بعد تطبيقهم النظام الالكتروني الذي تم استخدامخ بالفصل الاول للعام 18/2017 والمقارب لتطبيق Google Classroom الذي يستخدم في كلية البريمي

وعلى القاعات التي تم توزيع الاستبيان العلمي بخصوص التطبيق المقترح في الدراسة

ارجو تزويدي بنتائج الطلبة في كل من مادة المجتمع العماني ومادة اللغة العربية تحت اشراف أ. سماح والتي تفضلت مشكورة بتقديم المساعدة المطلوبة وبدمع عينة الاستبيان من الطلبة في احدى قاعاتها الدراسية

يرجى ملئ البيانات على نحو الجدول التالي

اسم المساق، الرمز، الفصل الدراسي، حجم العينة، الدرجات العالية، نسبتها، معلومات القاعة (عدد البنات و الشباب)

علما انه في الفصل الدراسي 16/2015 لم يكن هناك اي تطبيق الكتروني يساند العملية التعليمية ونقارن النتائج مع الدفعة التي تم استخدام تطبيق تطوير Google classroom and UCOM model

وتقبلو منا فائق الشكر والتقدير

أ. رغد موفق/ باحثة في تطوير التعليم الالكتروني

بدرية الهنائية
مديرة وحدة المتطلبات العامة
06 NOV 2017

كلية البريمي (كلية جامعية)
AL BURAIMI COLLEGE (University College)
وحدة المتطلبات العامة
Unit of General Requirements

Al. Buraimi University College

كلية البريمي الجامعية

To Head of IT Department,

Subject\ Authority of using classes' data

I would like to inform you that I need to take some parts of the sample of the classrooms that show a comparison between student grades of students in the first semester of the academic year 2015/16 with a sample of students in the first semester of academic year 2017/18 which shows the rate of improvement in the level of achievement of students after the implementation of the proposed UCOM as electronic system, which was used in the first semester of 2017/18 in some candidate sections to test. Approaches to the application of Google Classroom, which is used in the Faculty of AlBuraimi. Also the wholes where the scientific questionnaire was distributed regarding the proposed application in the study.

Mrs. Ragad M Tawafak

IT Instructor

PhD candidate in UMP

17th December 2018

TO WHOM IT MAY CONCERN

This is to certify that the University has no objection of Ms. Ragad M Tawafak, PhD candidate in UMP- Malaysia to distribute questionnaire for her Study on:

"Academic performance framework in universities using tel for improving E-learning environment"

Kindly cooperate with her to do the necessary to distribute questionnaire within SQU.

Prof. Taher Ba-Omar
VC's Advisor, Academic Affairs

LIST OF PUBLICATIONS

[1] Tawafak, R. M., Mohammed, M. N., Arshah, R. B. A., Shakir, M., & Mezhuyev, V. (2018). Technology enhancement learning reflection on improving Students' Satisfaction in Omani Universities. *Advanced Science Letters*, *24*(10), 7751-7757.

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[10] Tawafak, R. M., Romli, A., & Arshah, R. A. (2019, August). E-learning prospect on improving academic performance in Omani Universities. In *IOP Conference Series: Materials Science and Engineering* (Vol. 551, No. 1, p. 012033). IOP Publishing.

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