CHAPTER 12

A REVIEW OF E-LEARNING MODEL TO IMPROVE STUDENTS' PERFORMANCE

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ABSTRACT

The E-Learning system is one of the standard tools widely used to improve student performance and the continuous intention to use e-learning in higher education. A massive e-learning system is used at the higher education level, such as Moodle, MOOC and e-learning systems, enhancing students' performance. This concept paper presents a systematic review of potential e-learning systems used effectively and with continuous intention to improve students' performance. The comparison was made based on the literature review of the essential factors used for e-learning purposes. The paper also provides extracting causal relationships between these factors to develop a better model with full element constraints. The conclusion shows that TAM2, TAM3 and ECT are the latest acceptance model used to improve students' performance.

Keywords E-Learning, Acceptance Models, HEI, TAM

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INTRODUCTION

An e-learning system is a type of learning utilising electronic technology to assist and support learning in the educational sector. The exponential growth of students who used developed communication technologies, and different tools, versions, and capacities has opened doors to some e-learning system changes. The e-learning system is growing to support active learning collaboration among students via web-based technologies and e-learning practice. Therefore, it refers to any course, material or program delivered by an online system. E-learning aims to add new knowledge of technologies used in higher education institutions. Therefore, e-learning refers to learning objectives, courses, assessments and participants of Learning Management Systems (LMS).

Moreover, e-learning systems are utilised nowadays for creative collaboration among students via e-learning web-based technologies such as 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 the learning methods that the teachers will assess.

Prior studies in e-learning mainly focused on exploring essential factors that affect institutional relationship effectiveness in Higher Education Institutions (HEIs). However, continuous intention to use the e-learning systems is not evaluated with all the essential factors related to student perceptions. Thus, it is apparent that it should include the constant purpose of using an application or system through the whole learning identification or criteria for supporting assessment and improving student satisfaction items.

Like Davis (1989), and Fishbein and Ajzen (1991), many studies utilised technology testing and acceptance theories in exploring factors of e-learning. Ideas like those by Tawafak, et al. (2022) are constructed in users' continuous intention. However, these theories focused more on significant factors. There are many models, including the Theory Acceptance Model (TAM) by Davis

(1989), Task-Technology Fit (TTF) by Islam (2016) and Expectation Confirmation Theory (ECT) by Oliver (1991),

This study's main contribution is the review of the e-learning acceptance model and its factors, which can adapt to improve students' performance in the educational sector. This research includes various kinds of literature to identify the suitable models, standard practices, techniques and tools adopted to enhance e-learning. This research contains many sub-sections about how e-learning can improve academic outcomes based on the constant choice to use an e-learning system. This research also revises the common types of acceptance technology models that enhance the e-learning systems. There are various models, TAM, TTF and ECT identified as the most relevant for this study. Subsequently, this research describes models that utilised previous existing models in various research disciplines, useful to the conceptual model development for this research. Besides, this research provides a discussion that encompasses the different factors used in this study, followed by the causal relationships between factors and factors attribute. Lastly, a summary of the research is presented.

E-LEARNING IN HIGHER EDUCATION INSTITUTION

E-learning has many definitions, to decrease classroom time and improve interest in the education processes (Tawafak et al., 2020). E-learning has become a famous educational solution (Hone & El Said, 2016; Tawafak et al., 2022; Tatnall, A. 2020). The general use of e-learning requires a new development in technology and education to increase the delivery outcomes of continuity of students through various platforms, to improve e-learning (Mathew et al., 2019; Tawafak, et al., 2022).

The relationship of peer-student interaction between themselves through technology integration improves continuous e-learning use (King & Doerfert, 1996; Karnouskos, 2017). The interaction factor is essential to give feedback and indicate the satisfaction level of the educational process. Interaction indicates

the level of interactivity between peer students and teachers (Malik, et al., 2021). Thus, interactivity should explore the goals of continuous intention to use e-learning systems.

There are many acceptance models for an e-learning system to fulfil e-learning needs, namely TAM, TTF and ECT. The e-learning system is accepted and adopted in different Gulf Cooperation Council (GCC) areas. This study also needs to highlight e-learning system difficulties and how to enhance the system for continuous intention to use e-learning. 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 3 and 4. This study proposes to combine TAM and TTF models, and some factors of the ECT model with constructivism features are grouped towards attaining an acceptance model for the continuous intention to use the e-learning system.

E-Learning System

E-learning systems are the educational enablers of the 21st century and have a significant impact on educational ecologies (Tawafak et al., 2019). Researchers use different terms to identify the e-learning system as Web 2.0 (Lin et al., 2017), application software (Malik et al., 2020) or internet use. Web 2.0 is the most frequently used e-learning system. According to Tawafak et al., (2019), an e-learning system is defined as "technology-enhancement describes the use of technology to support and enhance learning practice". Besides, Liu (2016) explains an e-learning system as "a group of internet-based applications that build on the technological foundation of Web 2.0, and allow the creation and exchange of students' generated content". These applications or systems like Blogs, Wikis, and video sharing enable the students to connect for continuous intention to use the e-learning system.

The E-learning system has several features such as creating a new method of interaction, enhancing the relationship, can share content and developing the communication between students. These features are essential for the continuous intention to use the

e-learning system in the educational environment. These features can also be identified clearly with the same critical factors determined by theoretical e-learning models of TAM, TTF and ECT.

The e-learning system has challenges and critical issues that need the effort 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 for a free online course. Participants must self-regulate and set their own goals". That is why this research proposes to develop an acceptance model of contributing factors for continuous intention to use the e-learning system. This gap in web 2.0, blog and wiki application systems helps users to determine the enhancement for constant intention to use e-learning systems. For this reason of missing factors contributing to satisfaction and academic performance, this research tries to explain the e-learning acceptance models in addition to the e-learning system used to find the contributing factors that affect the continuous intention to use e-learning systems.

E-learning System Acceptance

The e-learning system is a type of self-assessment used to carry out benchmarking or rating a particular domain. The standard e-learning assessment checks if the HEI has attained the required level of acceptance in the universities' context. For an e-learning system, many factors are used to assess system acceptance. One aspect is the teacher-subject knowledge, which is based on teachers' pedagogical strategies, qualifications and experience (Hafsah et al., 2021).

The first stage is based on motivating students towards accepting e-learning. The second stage entails the teachers' teaching tools used in the material of courses offered, and teachers' experience in using the technology integration for teaching and assessment towards continuous intention to use the e-learning system. Besides, it is aligned to validate students' satisfaction regarding the constant choice to use the 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 (Tawafak et al., 2021).

No matter how many factors are used to construct a genuinely useful e-learning system, there are still factors that suffer from inconsistent intention to use the e-learning system. Table 1 shows a description of the earliest studies related to the different types of e-learning systems. Table 1 summarises the authors, each model problem, the method applied, the sample size, Data collection material, limitations and the derived factors from each study.

The summarised table discusses 18 different studies from a variety of times, from 2011 to 2022. They used a survey distribution between students among many universities or institutions to evaluate the suggested e-learning system's acceptance. As a result, there are inconsistencies in the findings from the literature review of studies in Table 1 regarding the continuous intention to use the e-learning system among students regarding their perception of the constant choice to use the e-learning system and their purpose of learning.

Table 1: Summarised studies for assistance-derived factors

Authors/Year	Model Problem	Method Applied Mechanism	Limitation	Derived Factors
Tawafak, Alfarsi, Khudayer. (2022)	How to increase the effectiveness	Use of AI techniques	General view without model	Effectiveness Student-Satisfaction
Posey & Pintz (2016)	Evaluating student and lecture notes	Different applications used in learning process	An effective model of TAM used	Academic- Perform Interactivity
Lin, et al., (2017)	How to assess the learning outcome of students' academic performance	The web-based survey, online communication tools and wiki chat	Factors of ease of use, interactivity and effectiveness are not considered	Academic- Perform
Farsi, et al., (2022)	How TEL is used to optimise SLO in universities	Different application such as video log and web 2.0 to improve the learning	Only SLO is considered without relating to another need	Academic- Perform Continue Intention
Tawafak et al. (2022)	How does online assessment help in SLO	Pre and post text method used	The study ignores the continuity intention and technology integration	Support-Assessment Student-Satisfaction

Authors/Year	Model Problem	Method Applied Mechanism	Limitation	Derived Factors
Malik (2019)	Missing the model of instructor in the study approach	Use of TEL and online exams	Only assessment and acceptance are available	Teacher-Subject-Knowledge Student-Satisfaction
Tricky & Buckley (2016)	How to reflect interactivity to improve SLO	Develop a Wiki program for student chat purpose	The study is not related between courses, teachers and learners.	Academic- Perform Continue Intention Student-Satisfaction
Malik (2021)	Using chat to improve students' learning outcomes	Design an application to assess student in learning	We are only developing students' purpose	Effectiveness, Student Satisfaction
Mathew et al. (2019)	impact of Wiki chat on student learning	Using different technologies as a learning tool	Only serving student purpose in learning	Interactivity, Technology Integration Effectiveness
O'Bannon and Britt (2011)	Using wiki in learning among English students	Using different technologies as a learning tool	Deliver material successfully	Course Content Perceived usefulness Effectiveness
Lytras et al. (2015)	Using a blended learning in the teaching method	A combination of blended learning and daily classes live.	Not approved by learners and staff	Student Satisfaction Academic Performance Effectiveness

Authors/Year	Model Problem	Method Applied Mechanism	Limitation	Derived Factors
Naidu And Derani, (2016)	Investigating the quality of system performance	An electronic survey to assess the learning process	Low level of student satisfaction	Student-Satisfaction Academic-Perform Support-Assessment
Chmiel, et al. (2017)	How to improve evaluation framework	Use of TEL and administrative staff to do the system	Not connected with the intention of the portal	Support-Assessment
Lin & Wu (2016)	The problem with traditional marking and assessment method	TEL tools to do normal assessment	Not many factors included	Academic-Perform Support-Assessment
Tawafak, et al. (2019)	An assessment model for assessment tools with course performance	Committees of collection staff and students	No e-learning system used	Student-Satisfaction Academic-Perform Support-Assessment
Hafsah et al. (2021)	Using a VR model with a convence use of e-learning	Connecting assessment as direct and indirect assessment categories.	Less of teachers' perception towards students' marks.	Course content Student satisfaction
Graffigna et al. (2014)	How to evaluate the right assessment	Use of Self-assessment for accreditation program and institute evaluation	Think about accreditation more than e-learning benefits	Support-Assessment

Authors/Year	Model Problem	Method Applied Mechanism	Limitation	Derived Factors
Tawafak (2021)	How to improve learning and teaching quality outcomes	develop on applying web-based Google forms for managing different assignments		Student-Satisfaction Academic-Perform Support-Assessment
Chmiel, et al. (2017)	How to improve evaluation framework	Using different sources and tools for the model elements	Not connected with the intention of the portal	Support-Assessment

BACKGROUND OF ACCEPTANCE MODELS

Researchers use many acceptance models in assessing e-learning acceptance, which has been the focus of the e-learning systems. The goal of these models is to understand the factors that relate to the adoption of new models (Clustering, 2019; Pikhart, & Tawafak, 2022). Various studies described the significant relationship factors in adoption, technology acceptance and the continuous intention to use the e-learning system. Numerous models justify the relations between factors to explore the acceptance and continuous use of the e-learning system, like models explained in Table 1. It can be seen from Table 2 that it is mainly done in developed countries, as well as Asian countries, but no reviews are known to have been done in the Gulf Cooperation Council (GCC), particularly in the Sultanate of Oman.

Table 2: Relevant Theories for E-learning System in HEI

Authors/Year	Research Objective	Models Used	Mechanism Applied	Sample Size	Country of study
Ajzen (1991)	Use belief and behaviour concepts for model understanding	E-learning	Internet-connection	215	---
Tawafak (2022)	Examine factors that relate e-learning adoption	TTF	Online Learning	220	Taiwan
Theng & Sin (2012)	Design a MOOC for e-learning supporting system	Developed TAM	E-learning	451	---
Lin (2013)	Investigate the relationship between TAM and usability	TAM + E-learning	Online learning	1525	Taiwan
Tan (2013)	Taiwanese universities investigation needs for e-learning system.	TAM	E-learning	---	Taiwan
Stone, Barker-Eveleth (2013)	Develop the e-textbooks for continuous e-learning systems.	ECT	Electronic Textbooks	469	United State
Alraimi et al. (2015)	Combine TAM and ECT as a general model	TAM + ECT	E-learning	346	---

Authors/Year	Research Objective	Models Used	Mechanism Applied	Sample Size	Country of study
Baker-Eveleth and Stone (2015)	Define the factors of e-learning	TAM + ECT	Online learning	1434	USA
Pikhart, & Tawafak (2022)	Use of e-learning towards engagement of technology continuous intention to use	E-learning	E-Learning	250	---
Hone, El said, (2016)	Understand MOOC factors and their retention	---	MOOC	379	Cairo
Islam (2016)	Moderate students' 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
Jabbar, et al., (2021)	Determine the major relationships among all factors of e-learning system	TAM	MOOC	222	---

The TAM model has been used across various research domains with different e-learning systems (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 their usability and the performance of their features (Tawafak et al., 2020). Hafsa, et al., (2021) 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) used TAM, TTF and ECT models, and extended factors in assessing acceptance and task performance.

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM), designed by Davis (1989), is a model of investigating system to the acceptance of using technologies. The model has four interrelated constructions: belief, attitude, intention and behaviour.

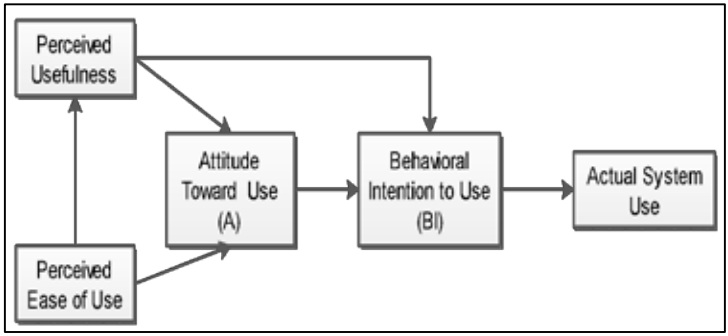

Figure 1: Technology Acceptance Model (TAM)
(Davis et al. 1989)

Figure 1 shows that the 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 be used for the behavioural purpose. These factors are highly accepted to be validated using the e-learning system (Tawafak, et al., 2022). PEOU refers to the degree of 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 as the easiest to determine e-learning acceptance (Al-Hawari & Mouakket, 2010; Saadé & Kira, 2009).

Expectation-Confirmation Theory (ECT)

ECT has been introduced for the marketing domain in 1991. This model was developed by Oliver (1991), as seen in Figure 2. The ECT model by Oliver (1991) consists of five constructs, namely 1) perceived usefulness, 2) expectation, 3) confirmation, 4) satisfaction and 5) repurchase intention.

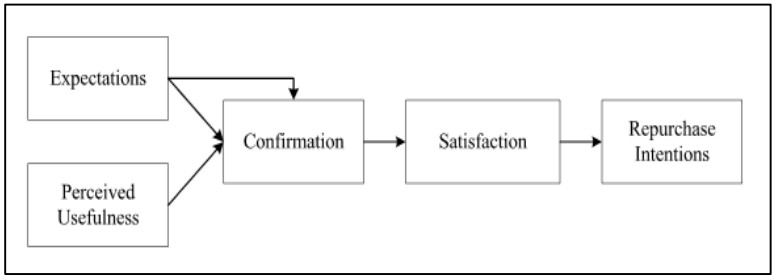

Figure 2: Expectation-Confirmation Theory (ECT) (Oliver, 1991)

When a buyer buys a product, it may be due to the knowledge of perceived usefulness. If the purchase meets the users' expectations, it may seal loyalty upon confirmation and satisfaction. In the education sector, satisfaction is related to the student's acceptance of the development of their academic performance, improving their continuous intention to use.

Task-Technology Fit (TTF)

Task-Technology Fit (TTF) model is illustrated in Figure 3. TTF consists of three factors (Individual, Task, and Technology) characteristics, of which each one has a relationship over TTF.

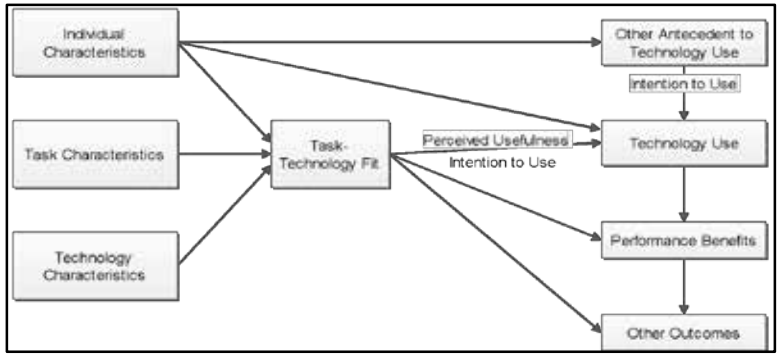

Figure 3: Task Technology Fit (TTF)

This model uses the relationship between individual characteristic factors that justify the teacher's task for the student's e-learning system (Huang, Zhang & Liu 2017; Wu, & Chen, 2017; Islam, 2016). According to Karnouskos (2017), technology characteristic used as interactivity factor refers to student interactions between themselves and between student-teacher to communicate about the course using technology tools that indirectly relate to the system.

RELATED THEORIES AND MODELS USED IN PRIOR STUDIES

In this section, there are 18 studies collected from the open database of journals and conference proceedings, and will be discussed in the Discussion section. In a previous study by Huang, Zhang, and Liu (2017), the model factors involved course content in improving teacher-subject knowledge with the interactivity and effectiveness of intention to use technology. This study was adopted from the original TTF model (Tawafak et al., 2019; Tatell, 2019). Furthermore, interactivity can indicate social influence pointing to communication and information knowledge progress between students (Hone, El said, 2016; Huang, Zhang, Lin, 2017).

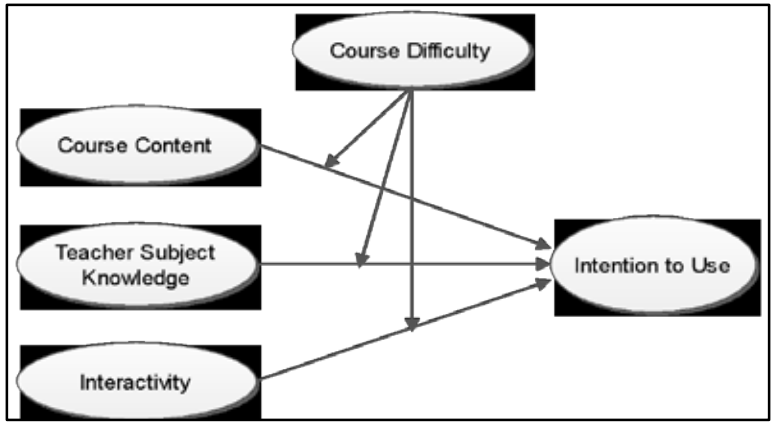

Figure 4: Research Intention to Use Composite Factors (Huang, Zhang, Liu, 2017)

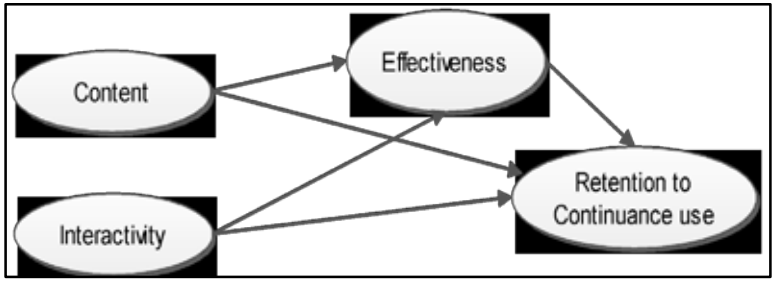

Figure 5: Research Model of Effectiveness Relationship to Continuous use (Hone, El said, 2016)

Conversely, other studies such as Alraimi et al., (2015) investigated the impact of student learning progress on internal and external factors like course content and teacher-subject knowledge that affect teaching and e-learning system used. The model is shown in Figure 6, where they selected some elements for an e-learning system. This study model views agreement among factors. Therefore, this study used a core study to re-select the needed elements to enhance use of e-learning (Iqbal, et al., 2021; Malik, et al., 2021).

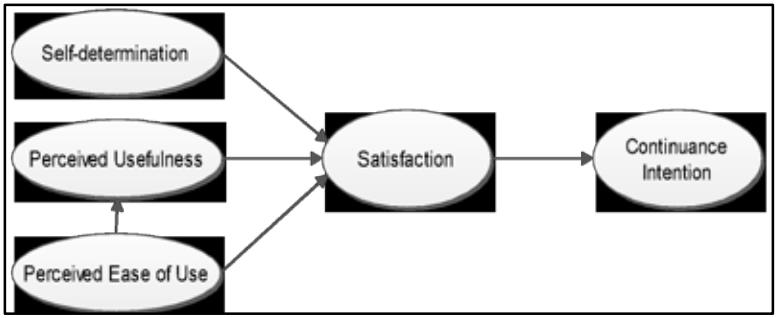

Figure 6: Research Model for Continuous Intention

In conclusion, from all the previous acceptance models mentioned in section 3 as the most common acceptance model, the additional models are explained in section 4. Not all these models still serve all the educational process needs of HEIs (Pikhart, & Tawafak, 2022). Furthermore, these models somehow limited the factors used, and limited the target for some parts such as focusing on effectiveness, system use and enhancing academic performance. Still, they did not consider all these factors as contributing factors to keep the success of the system.

METHODOLOGY

In this section, the study shows the review process of 18 different studies from a variety of times, from 2011 to 2022. They used a survey distribution between students among many universities or institutions to evaluate the suggested e-learning system's acceptance. As a result, there are inconsistencies in the findings from the literature review of studies in Table 1 regarding the continuous intention to use the e-learning system among students regarding their perception of the constant choice to use the e-learning system and their purpose of learning. Figure 7 shows the filtering process of the selected papers.

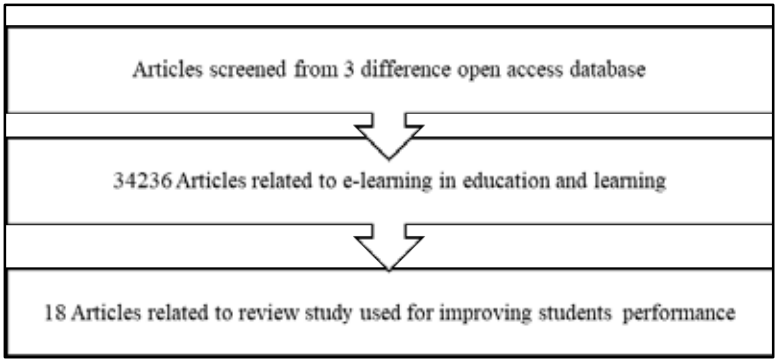

Figure 7: Research Model filters of selected related works

FACTORS ATTRIBUTES

Many factors significantly affect continuous intention to use e-learning systems. However, not all of them were tested on the same study or platform. Currently, the teachers rely heavily on their students' communications to redesign adopted courses and get consistency with the continuous intention to use the e-learning system. Table 3 shows the independent factors derived from TAM, TTF and ECT, in addition to the e-learning factors (King & Doerfert, 1996).

Table 3: Independent Factor Attributes

Factor	**Attributes**
Perceived Usefulness (PU)	-People's belief regarding how new technology will enhance their learning performance -Positive impact on satisfying level
Perceived Ease of Use (PEOU)	-Fess is free -Easy to acquire skills -Significant impact on perceived usefulness
Interactivity (INT)	-Develop the whole learning process -Illustrate the communication with all partners -Encourage peers to learn from previous students
Teacher-Subject-Knowledge (TSK)	-Optimising teacher's continuous development -Degree of understanding of developed courses and materials
Course-Content (CC)	-Determined by the teachers' knowledge -Determining the course difficulty and whole coverage of course contents
Technology Integration (IT)	-Usability of communication tools - using an electronic material - Be familiar with conversion between different technologies
Behaviour-Intention (BI)	-Perceived usefulness that affects students' perception -Positive impact on the system portal use -Positive impact on improving academic performance

Factor	Attributes
Academic Performance (AP)	-Easy login to online learning -Data and Material available with full descriptions. -Competition between students to upgrade their grade score
Effectiveness (EFE)	- Adding and acquiring student skills and trust. - Varieties of materials and assessments used throughout the semester work
Student-Satisfaction (SS)	- Determine the level of feeling - Submit the feedback for assessment and learning process - Achieve the target of learning process and outcomes
Support-Assessment (SA)	-Varieties of materials and assessments used throughout the semester work - Teacher and technical support for application problem solving
Continue-Intention-To-Use (CI)	-Learning refers to student's satisfaction and improving their preference - The continuous intention of the model access and beneficial use -Direct access to the Online system

DISCUSSION

The reviewing papers related to the acceptance model provide a medium for practitioners to measure the continued intention of using an e-learning system based on the verified factors that include the perceived usefulness, perceived ease of use, technology integration and interactivity. Thus, the Acceptance Model should organise to pick the requirements to improve the students' performance. Finally, this study offers a model to help HEIs in Oman to ensure that each course's importance should be deliberate in measuring the effect of academic performance and support assessment. The students' behavioural intention and satisfaction are essential to facilitate continuous choice to use the e-learning system.

This research tries to find the factors that affect the student's continuous intention to use the e-learning system that considers the technology integration, support assessment and student satisfaction as the significant factors to encourage the students to continue using e-learning. More than focusing on the student's psychological perception or computer feature effects. Thus, this research decides to use the original TAM with its essential factors to shed light on the system services that directly affect the continuous intention to use the e-learning system.

This study favours integrating TAM, TTF and partial aspects of the ECT model that indicate the students' achievements by looking at Effectiveness in the HEIs. Notably, ECT can use organisational benefits more than individual services, but some factors are still interrelated with personal use.

CONCLUSION

This research reviews studies related to e-learning system usage in universities. This research examines the history of using e-learning systems in higher education institutions. Besides, the existing platforms are used for continuous intention and e-learning use. This research compares the e-learning acceptance models

such as TAM, TTF and ECT, and their performance with constant use. This research focuses on determining the critical 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 that offers enhanced results in a continuous practical intention to use the e-learning system. This research also reviews and compares previous studies in the models used, for the constant purpose to use the e-learning system and some of them are used for individually.

In contrast, others are used for organisational use or management level. Besides, this research reviews models related to continuous intention to use e-learning, where they used different based factors like student satisfaction, support assessment, effectiveness, and academic performance, respectively. Then, the study explains the elements used. Moreover, this research extracts the causal relationships between the factors. Lastly, this research discusses the attributes that play an essential role in identifying the contributing factors to the use of the e-learning system.

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