INVESTIGATING FACTORS AFFECTING STUDENTS' SATISFACTION WITH E-LEARNING: AN EMPIRICAL CASE STUDY

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ABSTRACT

Many higher education institutions offer elearning courses and programs to facilitate their teaching-learning processes, address the various educational requirements of students, and stay up to date with improving technology. Since the web is a novel medium of learning for educators and learners alike in most universities, it is still unknown what moderating variables in the online environment contribute to online learning success. This study provides an empirical evaluation of an extension of the Technology Acceptance Model (TAM) and information systems (IS) success model to identify the factors that contribute to and influence students' satisfaction of elearning systems to help policymakers in higher education make decisions about learning. The objectives of the research are to identify the key factors affecting students' satisfaction with elearning and to develop and empirically examine an integrated model of acceptance and satisfaction with elearning systems among Aldar University College students. A total of 178 questionnaires were collected and analyzed using a Structural Equation Modelling (SEM) technique. The findings show that perceived usefulness, perceived ease of use, computer self-efficacy, subjective norms, instructor's factors, administrative support, and technical support, along with system quality, influence students' behavioral intention to accept elearning. The study further addresses the implications of the findings for researchers and practitioners.

Keywords—elearning, TAM, Perceived Usefulness, Perceived Ease of Use, subjective norms, self-efficacy, student satisfaction

INTRODUCTION

The fast growth of information and communication technology has resulted in the use of elearning in higher education institutions to enhance learners' performance in their learning process. In this globalized world, the widespread use of the internet has significantly contributed to various fields, especially business, government affairs, transactions, and education (Rahman et al., 2019). This has ended up benefiting humankind at unprecedented levels (Abdallah et al., 2019b). According to Tella (2013), the information explosion experienced in the past few decades, particularly the exponential increase in internet use, has led to the metamorphosis of this delivery and the segregation of information in several higher education institutes.

The way computers have been employed in education applications has significantly changed in the last decade. This is a direct result of the rise in the use of computers in education. Currently, elearning is regarded an ideal solution for today's educational needs and takes advantage of resources with the most advanced technology (Keskin &

Yurdugül, 2020). The enormous increase in the number of students seeking an education makes elearning technologies an important means of providing information to a large number of students and trainees (Adam et al., 2017). Following these advances in information and educational technologies, many institutions have struggled to keep up with the new techniques and adapt to new technologies and give up traditional and long-standing methods (Al-Rahmi et al., 2018). As far as education is concerned, many countries have built comprehensive learning media and resources to help in solving contemporary problems.

It should be noted that many changes have been recently made to the teaching and interactive technologies whereby tertiary education institutions continuously strive to provide a quality education to increasing numbers of students. In the United Arab Emirates (UAE), the main concern of decision makers is the quality of higher education in various institutions (Fernandes et al., 2013). Worldwide higher education institutions have slowly embraced information technology (IT) techniques for teaching, student learning, curriculum, and staff development (Soomro & Ahmad, 2012). University administrators and policymakers have perceived IT as a fundamental part of training and teaching. According to Basri et al., (2018), information and communications technology (ICT) is more robust and much easier to implement, allowing it to penetrate through academic activities at various levels.

Recently, a key trend has been the initiation of web-based interactive learning at all levels. Bauk et al., (2014) stated that the breakthrough of ICT and its wide application in education has led to the introduction of new terms in the pedagogical field, such as elearning and web-based learning management systems. There has been a great growth of elearning in tertiary education in the UAE (Salloum, Al-Emran, et al., 2019). The main drivers for implementing the elearning system are the COVID-19 related lockdowns in countries and the restrictions imposed on travel that make it very difficult to move within the country. This severely influences both instructors' and students' mobility and leads to problems in the education process and results in additional stress on higher education in general and on learners and instructors in particular. Thus, elearning innovation is a viable program that extends learning beyond the boundaries of time, space, and location. Universities have adopted elearning using Elearning System as a platform to support knowledge transfer between the instructors/teachers and students (Lim et al., 2020).

Elearning has been one of the advances in education delivery in many parts of the world that was driven by the rapid growth of IT worldwide. To offer such elearning systems, higher education institutions have invested considerable assets into integrating and sustaining elearning infrastructure. Nevertheless, many educational establishments are still not ready to provide excellent elearning courses (Abuhassna et al., 2020). Many universities that offer elearning must first overcome enormous difficulties to be successful, including delivery, effectiveness, satisfaction, and acceptance of the systems. The students using web-based learning systems have not been able to keep pace with the development of the elearning tools in HEI (Kew et al., 2018). Since the internet is a modern learning tool for instructors and students, it is uncertain which moderating factors effectively contribute to the acceptance and use of elearning in most universities (Vululleh, 2018). Successful implementation of this technology to a desired level relies on key variables connected with the behaviors and beliefs of instructors and students, knowledge of IT systems and technology, and support of higher education institutions. As put by Shahdan et al., (2020), there are significant challenges in students' satisfaction with their academic achievement in the elearning (i.e., online learning) environment.

It is important to classify the variables that contribute to and affect students' satisfaction with elearning technology to assist policymakers at learning institutions make decisions. Conducting further studies would have some value in examining the factors impacting the satisfaction of students in elearning systems to improve learning outcomes. Hence, the purpose of this study is twofold: (a) to identify the key variables affecting students' satisfaction with elearning and (b) to develop and to empirically test an integrated model of acceptance and satisfaction of elearning among Aldar University College students incorporating various factors.

LITERATURE REVIEW

A methodological review of past literature is

crucial for any academic research as the review uncovers what is already known before initiating the study. Based on Halimi (2015), the IT industry has shown that companies make significant investments in information technology as a primary driver for corporate success. However, if people do not use IT applications as expected and required, it is difficult to achieve successful productivity gains in IT. The problems of under-utilized information technology persist, despite advancements in computer hardware and software capabilities. The under use of installed IT was identified as a major factor underlying the productivity paradox surrounding poor profits from corporate information technology investments (Sun & Zhang, 2006).

Organizations that spend significant resources on IS primarily concentrate on how their involvement in these systems affects their corporate and individual results (Rizun & Strzelecki, 2020). Unless IT is optimally adopted and used, the anticipated productivity gains and the organizational benefits provided by IT applications will not be realized. That is why recent information system (IS) research has focused on the use of information technology. The use of information technology by individuals has been the subject of IS research in contemporary IS studies and is regarded as one of the most advanced areas of study. Most IS studies seek to comprehend and clarify the elements of information technology acceptance and success (Al-Mushasha, 2013). Accordingly, this recent research aims to develop a research framework by bringing the existing literature into an information system context to examine the factors that affect students' satisfaction with elearning.

Elearning Satisfaction

Based on Kumar et al., (2018), elearning is defined as "a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via the internet, intranet/extranet (LAN/WAN), audio and videotapes" (p. 2). Due to the rapid development of IT in higher education, universities across the world are making major investments in various education systems capable of providing and managing elearning services (Caputi & Garrido, 2015). For several countries, elearning is an optimal solution to the growing demand for higher education (Ngampornchai & Adams, 2016).

Elearning is internationally perceived in higher education as a compulsory teaching and learning method. Despite its importance and popularity, there are still many unaddressed issues concerning its use and efficiency. Universities have problems with the low use of elearning among students and university employees (Ibrahim et al., 2017). The student's acceptance of elearning is an integral requirement in the education cycle and the learners' satisfaction is a prerequisite for the effective application of elearning in online environments. The learners' acceptance typically leads to their enjoyment of the online learning environment when an instructive approach is utilized (Abuhassna et al., 2020). For that reason, learner's satisfaction is an integral indicator of the standard of the education curriculum, alongside an important component of the course completion.

Technology Acceptance Model

Davis (1989), developed the technology acceptance model (TAM). To date, TAM is one of the most commonly used information and communication technology models to explain technology acceptance attitudes based on beliefs, intentions, and behaviors. TAM is considered one of the most commonly accepted and used models in a range of areas including information systems and information technology studies (Asiri et al., 2012). Being a substantial technology model, extensive empirical support and studies have used it. According to Lee et al. (2009), although research on IT uses several theoretical models, TAM, out of all the theories, is considered the most relevant and widespread theory to describe the use of IT by individuals. Concerning IS research, TAM remains the most commonly used theoretical model.

The technology acceptance model has gained wide acceptance with Information Technology researchers due to three factors. First, it has a strong theoretical basis. Venkatesh et al., (2003) suggested strong support for the technology adoption models, both theoretically and empirically. Second, TAM is used to build effective applications. Finally, a range of research studies have recently supported the robustness of the model in various contexts, populations, and IT applications. TAM examines the mediating role of perceived ease of use and perceived usefulness in their relation between

external variables and the probability of system use (an indicator of system success). Determinants of TAM are divided into two main sections:

- Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) and
- Attitude, Intention, and Actual Use

Even though TAM effectively clarifies and explains some features of information technology's behavioral acceptance and usage, the model still has some weaknesses. TAM alone is inadequate to completely explain the relationship between the information systems and its users' adoption behavior because TAM comprises only two main explanatory variables (PU and PEOU). The basic structure of TAM does not completely embody the particular impact of technical and individual factors affecting the acceptance of IT by individuals (Feriady et al., 2020).

DeLone and McLean IS Success Model

DeLone and McLean (2002) presented a broad analysis of the information system studies literature and proposed a model of IS success. Their model is one of the most widely mentioned success models of IS, which shows that a consistent blend of individual IS success plays a key role in creating an integrated measuring tool. The model consists of the following six categories or dimensions of IS success: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. "these dimensions of success are interrelated rather than independent" (Delon and McLean, p. 11). The model contributes two crucial aspects to understanding the quality of IS: furnishing a plan to classify the various IS success measures used in the literature and proposing a model of interdependence between temporal or causal categories.

RESEARCH FRAMEWORK AND MEASUREMENTS

Within the domain of IS, models and theories are frequently adapted in different studies that tackle the causes of user satisfaction and their usage of elearning systems and tools. These theories and models deliver a valuable recommendation for researchers on technology acceptance and utilization. The model of this current study is based on TAM (Davis, 1989), and the DeLone and McLean IS success model (2002).

Concepts always need to be operationally defined so they are measurable. To empirically test the hypotheses of the research framework, all the variables in the framework need to be operationally defined and measured. To meet the objectives of this research, a questionnaire was adopted and used as a major instrument to collect data from the sample size. A 5-point Likert scale was used to allow respondents to answer questions, thus increasing the quality of the answers (Leung, 2011). Also, Muries and Masele (2017) add that a five-point Likert scale is preferable for better information distribution for a large study (N > 100).

Measurement of User Belief Factor

This dimension is based on the relationship between perception and conduct as illustrated in the generic TAM. Users' beliefs examine the cognitive perception of individuals about the system's functionality and their belief that the system has generally employment-related and utilitarian results (Salloum, Alhamad, et al., 2019). The perceived usefulness (PU) scale is adapted from Davis (1989) and measures how the individual believes that using elearning web-based systems will enhance their learning performance. PU is one of the two dominant constructs of TAM for evaluating user's acceptance. The current study used a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree to measure the level of PU. All items were adapted from Davis (1989). A higher scale indicates a higher level of perception toward PU. According to TAM, belief is separated into PEOU and PU, which enables researchers to devise strategies to persuade users to accept an information technology system using controllable factors with a considerable influence on either PEOU, PU, or both. According to Salloum Al-Emran et al., (2019), students are more likely to accept elearning systems only when they believe that their use positively affects their learning and improves their performance. Elearning literature shows there is a significant positive correlation between elearning usefulness and students' satisfaction with elearning.

On the other hand, Ibrahim et al., (2017) hypothesized that due to the perceived problems and risks associated with educational technologies, users avoid learning something new. Concerning elearning, PEOU refers to the extent to which a student perceives that the use of the elearning system would not require a lot of effort and would

be easy to use. Similarly, Salloum Al-Emran et al., (2019) found that PEOU had a substantial impact on students' behavior to adopt elearning. Consequently, PEOU in elearning i.e., little effort, less frustrating, flexible, less rigid, easy to understand, helpful guidance in performing tasks might impact students' behavior to accept elearning. In the context of elearning, the framework proposes that the advanced level of PEOU and PEOU of elearning systems will increase students' efficiency and satisfaction. Therefore, the following hypotheses were proposed:

H1: Perceived Usefulness (PU) has a positive effect on students' satisfaction with elearning.

H2: Perceived Ease of Use (PEOU) has a positive effect on students' satisfaction with elearning.

Measurement of Students' Factor

The behavioral decision to accept and use information technology systems is affected by an individual's attitude. In a teaching institution, students play a dominant part in the acceptance of elearning systems. Relevant student characteristics for this include computer efficacy and subjective norms. A combination of internet and computer experience along with computer anxiety and computer efficacy factors leads to computer self-efficacy.

Self-efficacy refers to the individuals' confidence in their capacity to take steps needed to deal with future situations (Sánchez & Hueros, 2010). In this research, self-efficacy is connected to computer systems through the users' trust in the use of the elearning system. Similarly, computer anxiety is the degree of an individual's apprehension or even fear, when she/he is faced with the possibility of using computers Venkatesh et al., (2012) theorized that computer anxiety would inspire students to formulate negative attitudes concerning their intention to accept a system. Students must connect and communicate with their teachers using IT systems in their elearning environment, and students who are afraid or not comfortable with elearning are less willing to accept it as a new medium of teaching and learning (O'Dell & Sulastri, 2019). Wongvilaisakul and Lekcharoen (2015) proved that computer anxiety is one of the major elements that constrained students' satisfaction with elearning.

Previous findings from IT research verified the important role played by computer self-efficacy in recognizing the satisfaction of students with IT. Students with a poor sense of computer efficiency can be easily frustrated by obstacles and respond by lessening their understanding of their computer or IT capability. In comparison, people with a good sense of machine self-efficiency will not be easily distracted by challenging problems and will continue to work through any emergent challenges (Zaili et al., 2019). Al-Rahmi et al., (2015) concluded that computer self-efficacy presented a robust positive influence on the PEOU of elearning systems. Self-efficacy is continuously recognized as a key element of IT acceptance. Consequently, students with decent computer self-efficacy are more likely to accept IT systems in their learning process. The more confident a student is in using IS/IT, the more likely they will be satisfied with the elearning system. Thus, the following hypothesis is based on the literature presented above:

H3: Computer self-efficacy has a positive effect on students' satisfaction with the elearning.

Subjective norm (SN) is a part of the social impact variable and shows the perceived social obligation to perform or prevent a behavior. SN represents a person's perception that most people who are important to him/her think he should/should not perform the behavior in question" (Venkatesh et al., 2003). People usually do something if they think it is good and believe it should be done by them. In a related study, Al-Rahmi et al., (2015) denoted that the subjective norm construct is a substantial element impacting the attitude of students in accepting elearning. This leads to the following hypothesis:

H4: Subjective norm has a positive effect on students' satisfaction with elearning.

Measurement of Instructors' Factor

The teacher's attitude and skill affect the attitudes of the students towards elearning, and the teaching style of the teacher affects the excitement, involvement, and behavior of the learners towards elearning as well (Lee et al., 2009). The instructor's characteristics are defined as the degree to which they care, assist, and accommodate the students (Abdallah et al., 2019a). An empirical analysis of the students' attitudes to elearning shows that teacher characteristics are the most important factor in student performance of elearning (Abdallah et al.,

2016). According to Zaili et al., (2019), an instructor is the one who can best predict course satisfaction. The instructor's interaction occurs when a teacher provides appropriate content knowledge, simplifies students' misunderstandings, and enhances students' satisfaction. That is why the performance of the instructor was found to correlate highly with student satisfaction. This contributes to the following hypothesis:

H5: Instructors' factor has a positive effect on students' satisfaction with elearning.

Measurement of University Factor

Many factors explain organizational capabilities as determinants of IT innovation adopted by organizations. Organizational capabilities and organizational influences are significant motivators when adopting online systems. Various organizational characteristics are associated with the success of elearning at the user level. Organizational factors are the organizational attributes or features such as university management support, technical support, and facilitating conditions.

Numerous kinds of university support (e.g., technical support, information or materials availability, and administrative support) are rated by students as very significant variables that affect their satisfaction with IT in learning. Technical support is defined as "people trained to help users in solving problems related to computer hardware and software, in the form of help desks, hotlines for complaints and suggestions, technical support on-line, by fax, telephone, etc" (Ramírez-Anormaliza et al., 2016, p. 23). The technological facilities of a university play a crucial role in the decisions made by faculty members and students whether to take part in web-based elearning. Facilities related to logistics are the type of equipment deemed appropriate for teaching, the equipment for students learning, the computer software needed, and the ways in which the internet is accessed (Asiri et al., 2012). Fidalgo et al., (2020) understood that how management and technical support were performed was the main problem for students' satisfaction with elearning. Hence, for the learners to make optimal use of the elearning technology, the current social, technological, and organizational obstacles need to be completely recognized and either reduced or removed to ensure the best use of elearning.

As an organizational factor, facilitating conditions have been defined as the availability of support and assistance given to users in integrating the technology. There are environmental factors that affect the individual's will to do the job. Studies show many barriers that prevent the acceptance and use of elearning systems, many of which include a lack of adequate resources, a lack of specific technical skills, and inadequate management support. (Ngampornchai & Adams, 2016). The available infrastructure, management support, facilitating conditions, and technical support are included under the organizational/university dimension since these play a central role for the students. Therefore, the following hypothesis was developed:

H6: Organizational/university factors have a positive effect on students' satisfaction with elearning.

Measurement of System Factor

Information quality and system quality are the main variables under the system dimension factor (DeLone & McLean, 2002). From the learners' perspective, these quality factors influence the user's direct intentions in elearning (Ngampornchai & Adams, 2016). System quality defines how the accessibility, efficiency, flexibility, and adaptability of the program affect users' perspectives on the acceptance of the elearning system. The literature and previous related studies showed that system quality characteristics have a central part in the adoption and acceptance of elearning (Salloum, Alhamad, et al., 2019). Good system quality ensures a relaxed atmosphere in which users can easily identify information systems features and navigate the materials supplied by the elearning system. This means that system quality has a positive influence on the total adoption and use of the elearning system. Thus, once students believe that web-based learning systems are reliable, available, and easy to use, they strongly accept them. Hence, is the following hypothesis:

H7: Elearning system factors have a positive effect on students' satisfaction with elearning.

RESEARCH DESIGN AND METHODOLOGY

Population and Unit of Analysis

This study adopts the quantitative methodology via the use of a survey instrument. A survey is the

most common methodology in research because it allows data to be collected from a sizable population. In this study, data from undergraduate elearning course-students enrolled at Aldar College University located in Dubai, United Arab Emirates, were collected in the spring 2019 semester. Therefore, the population of this study consisted of students from the above-mentioned higher educational institution. The sample unit of a study refers to the subject under analysis from whom information is collected. According to Zikmund et al., (2013), in the context of market research, a sampling unit is a person. As this research focuses on students' satisfaction with elearning systems, this research regards higher education students at Aldar College University as the units of analysis. According to Hill and Hamilton (1998), the questionnaire tool is used to translate the researcher's information needs into a form that extracts data from the respondents.

Sample Size and Sampling Design

Sampling design is a mathematical function that gives you the probability of any given sample being drawn (Lohr, 2009). As sampling is the basis of almost any research project, sampling design analysis is a key component of statistics. The main reason to use sampling is to save time, effort, and money. Based on Silverman (2004), sampling is the process of selecting a sufficient number of elements from the population to understand the properties and characteristics that would enable researchers to generalize such properties of characteristics to the population elements. A well-recognized ratio of a sample size to estimated parameters is N:p = 5:1 (Kline, 2015). A ratio of five questionnaires per parameter is mandatory to achieve a reliable valuation. Thus, questionnaires were distributed to 200 students consisting of 35 items. Using a random sampling method, the questionnaires were randomly distributed to Aldar University College students based on their availability and time. With 183 valid questionnaires, a high response rate of 91.5% was achieved.

The Survey

The self-administered survey questionnaire was developed to attain university students' perceptions of using elearning systems as part of their learning. The questionnaire consisted of five pages organized in several sections and preceded by a cover letter. The purpose of the cover letter was to persuade the reader to complete and return the questionnaire. The organization of the content of the questionnaire consisted of three sections: Section A, background information; Section B, user satisfaction factors; and section C, open-ended questions for participants to provide additional comments on factors influencing their acceptance of and the success of elearning systems.

The perceived usefulness (PU) scale was adapted from Davis (1989). This scale measured how the individual believes that using elearning web-based systems will enhance their learning performance. The perceived ease of use (PEOU) scale was also adapted from Davis (1989). It measured the degree to which a person believes that using a particular web-based elearning system would be free from effort. Self-efficacy was developed based on the work of Lee et al., (2009). This scale measured the degree to which an individual believes that they can perform a specific task or job using the computer system. Subjective norm was adapted from Ma et al., (2005). It measured the perceived external pressures to use an LMS. The scale consisted of five items measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Management and technical support factors were developed based on the work of Khasawneh and Yaseen (2017). This scale measured the support given by the top management and IT departments in promoting and accepting information system use and success. The system quality construct was adapted from Cho et al., (2009). This scale measured the accessibility, response, and interactivity of the elearning system. Finally, instructor factors were adapted from Abdallah et al., (2016). Within the domain of elearning acceptance, instructors' characteristics as investigated by previous researchers include instructor competency, attitude toward the system, teaching style, IT personnel innovativeness, and resistance to change.

Instrumentation Quality

To ensure that the respondents understood the instrument, a pretest of the questionnaire was conducted to verify the content and construct validity of the instrument by an expert. Pretesting is a significant measure needed to ensure the accuracy and consistency of the responses (Hair et al., 2012). Questionnaires should be composed and tried out, improved, and tried out again. Hence,

in implementing the pretesting exercise, the survey instrument's content validity was appropriately checked to evaluate whether the measurement precisely reflected the intended domain of the content. The questionnaire was first pretested by two associate professors from the Faculty of Information Technology, Aldar University College in Dubai. Next, the questionnaire was pretested by five academicians from the Faculty of IT at the university. All participants of the pretesting exercise were requested to evaluate and appraise the questionnaire in terms of content accuracy, clarity, length, ease of completion, and overall presentation. They were also encouraged to comment and constructively criticize the questionnaire. The exercise's main objective was to reduce biases and ambiguity, and, before the evaluation, all participants were briefed on the research objectives and context of the study. Based on the feedback and recommendations, the questionnaire was modified accordingly.

While pretesting is considered important to ensure the quality of the questionnaire, a pilot study was considered as well. Sekaran and Bougie (2016) stated that a pilot study is useful to reduce biases in the instrument's wordings and format. In an attempt to accomplish the objectives of the pilot study, 58 questionnaires were evenly distributed among respondents, out of which 42 were returned yielding a response rate of 72%. Using the questionnaires of the pilot study, an analysis using the Statistical Package for Social Science (SPSS) version 21 was performed to test the reliability of the instrument. Research instrument reliability is often estimated by Cronbach's alpha formula. According to Hair et al. (2010), Cronbach's alpha is a measure that provides a reliability coefficient to indicate the internal consistency of the instrument. In this method of analysis, if the overall Cronbach's alpha coefficient of all the items of a construct is greater than 0.7, the items are considered highly reliable. Also, if alpha is less than this value, it indicates that the items are unlikely to reliably measure the same thing. The results showed that all measures recorded Cronbach's alpha value greater than 0.7, suggesting that the measures are highly reliable. Therefore, there was no need to change and refine the questionnaire to increase the alpha coefficients.

Data Analysis Strategy

Upon completion of the data collection, I embarked on the data analysis. To achieve the research objectives, the data analysis was divided into two stages. In the first stage, I performed preliminary data analysis with the help of SPSS version, 23. The findings generated at this stage of analysis provided the general picture of the respondent's demographic statistics and their response to the survey instrument. In the second stage, I employed the evolution of the structured model using the structural equation modeling (SEM) technique with the help of AMOS version 23.0. At this stage, I examined interrelationships between independent and dependent variables to test the proposed hypothetical framework. Additionally, I used SEM to test the hypotheses. SEM is a powerful tool that offers precise statistical measures to handle challenging models. Usually, SEM is performed in a two-step approach, i.e., a measurement model, also known as Factor Analysis (FA), and a structural model, also known as path analysis. The primary purpose of FA is usually achieved by the following: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA helps researchers in exploring the data and information about the number of possible factors that best represent the data, while CFA helps to test the correlational structure of the data set against a hypothesized structure and rates the goodness-of-fit (J. F. Hair et al., 2012).

CFA evaluated the measurement model in terms of goodness-of-fit (GOF), discriminant validity, and convergent validity. To evaluate the total GOF of a model, the seven most commonly employed model fit measures were used, such as the ratio of X2 to degrees-of-freedom (DF), the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), the norm fit index (NFI), the Tucker-Lewis Index (TLI), the comparative fit index (CFI), and the adjusted goodness-of-fit index (AGFI). As shown in Table 1, GOF indices were categorized into three categories, i.e., parsimonious fit, incremental fit, and absolute fit measures. The results of the initial CFA model fit indices were found to be within acceptable limits. All model fit indices presented in Table 1 showed a sufficient measurement model.

Table 1. Model FIT Indices for CFA

Measure indices	Fit indices	Result	Criteria
Absolute fit measure	X2/DF	1.566	1< χ/df<3
	RMSEA	0.024	<0.05
Incremental fit measure	NFI	0.901	≥ 0.90
	TLI	0.938	≥ 0.90
	CFI	0.943	≥ 0.90
Parsimonious fit measure	AGFI	0.814	≥ 0.80

DATA ANALYSIS AND RESULTS

Response Rate and Students' Personal Information

Data collection was conducted for two months. A total of 175 samples were required to achieve statistically significant results identified through the sampling procedure previously discussed. I distributed 200 questionnaires to students in different academic departments at the university and received 183 responses was, yielding a 91.5% response rate. This response rate is considered high compared to other IS studies involving students in a higher education setting. This could be due to the duration period given to complete the questionnaire, as the time duration was considered ample for the respondents to respond, even though it was the end of the academic year and students were busy with final exams.

A review of the data indicated that five of the questionnaires were invalid due to data entry errors or missing responses to some questions, and thus I eliminated them from the study. After excluding the invalid responses, 178 valid questionnaires were obtained, which resulted in a usable response rate of 89%. According to Rubin and Babbie (2013), "a response rate of at least 50% is usually considered adequate for analysis and reporting, a response rate of at least 60% is good, a response rate of 70% is very good" (p. 117). Thus, the response rate of this study is acceptable. In determining whether the completed questionnaires were usable or not, I considered the completeness factor and questionnaires found to be incomplete were excluded as well.

In any survey research, nonresponse bias could be a threat to producing reliable findings. According to Creswell and Clark (2017), bias denotes that if nonresponders respond, their responses will substantially change the overall results of the study. There were no significant differences observed between late and early responders across departments as all the p-values were well above the significant level of 0.05. Similarly, the overall comparison also revealed that the results were consistent. This finding implied that responses from all respondents were free from the nonresponse bias and hence it can be safely assumed that those who have not responded would have a similar profile as those who did. The demographic profile of 141 respondents including their frequency in satisfaction towards elearning usage at Aldar University College is shown in Table 2 below.

Table 2. Students' Demographic Data

Measure	Item	Frequency	Percentage
Gender	Male	109	61.23%
	Female	69	38.76%
Age	<20	30	16.85%
	20–26	65	36.51%
	>26	83	46.62%
Department	Engineering	85	47.75%
	and IT Business	67	37.64%
	Social Science	26	14.60%

Based on the data collected from 178 questionnaires, the percentage of male students was 61.23% while only 38.76% were female. For age, 46.62% of the students' age were more than 26 years old, and almost 36% of students' ages ranged between 20 and 26. Also, almost half of the participants (47.75%) were studying for a bachelor's degree in engineering and information technology, and 37% were studying business administration. This is reasonable given the size of each department at the university.

Measurement Model Evaluation

I implemented the SEM approach to analyze the proposed model. The SEM is a multivariate analysis technique with many analysis methods to handle unique cases. It is based on a group study of causal relationships where the alteration in one variable causes an alteration in another variable (Kline, 2015). There are two kinds of variables in SEM, observed and latent. Observed variables are measured by the data pool process of surveys or tests. Latent variables are measured explicitly by a set of linked observed variables (i.e., indicators).

Variables are defined as endogenous (dependent) and exogenous (independent). The endogenous variables are those influenced by another variable through a causal input with error terms, whereas exogenous variables are those that are not influenced by another variable in the model and hence do not require error terms themselves. In modifying a model, the standardized residual covariance matrix is also examined to find any item with a standardized residual larger than 2.58 (the absolute), because a large value indicates a particular covariance is not well explained by the model. Problematic items or constructs are often eliminated to produce a valid and better fitting model. Once a researcher achieves no error with acceptable residual covariance, then fit measures are examined. The model is usually modified based on coefficients and several models fit indices to improve it. In assessing the model as a whole, the following goodness-of-fit statistics are reported at each stage of the analysis: chi-square, the associated degree of freedom and its p-value, the GFI, AGFI, RMSEA, Normed fit index, and CFI.

Cronbach's alpha is used to evaluate the internal reliability of the factors' items. A 0.70 or higher reliability coefficient is regarded as appropriate (Hair et al., 2010). Validity reflects the extent to which the indicators measure what is supposed to be measured. Sekaran and Bougie (2016) stated that validity is determined by using the magnitude and significance of the path between latent variables and their indicators. The assessment of the construct's validity is examined through discriminant validity and convergent validity as well. Convergent validity, which is also called correlational analysis, is one way of establishing construct validity other than discriminant validity (Zikmund et al., 2013). Convergent validity assesses the extent to which two measures of the same concept are correlated. According to Hair et al. (2010), all of the items in factor analysis should highly load on their latent variables to show good convergent validity. Similarly, as reported by Tabachnick and Fidell (2007), factor loadings of an item on its corresponding construct should be at least 0.32. If it is over 0.45, it is considered fair as follows: over 0.55 is good, over 0.61 is very good, and over 0.71 is excellent. To assess the convergent validity of each of the constructs, factor loadings of the construct, composite reliability (CR) estimation, and average variance extracted (AVE) are the required details to be assessed (Hair et al., 2012). Based on the recommendation of Hair et al., (2012), the best results of convergent validity are obtained if standardized loading estimates are 0.7 or higher, where estimation of AVE is greater than 0.5 and estimation of reliability is above 0.7. Following the above-mentioned recommendation, I assumed the minimum cut-off criteria for factor loadings, AVE, and composite reliability as 0.7 > 0.5 > 0.7, respectively, in assessing the convergent validity. Further, it is also verified that the findings of composite reliability (CR), Cronbach's alpha, and AVE are above the recommended limit. Therefore, convergent validity is confirmed, as seen in the convergent validity results shown in Table 3. Likewise, discriminant validity is associated with the relationship among the variables. To be free from discriminant validity complications, all items should load highly on one variable. This is possible when the AVE square root is higher than any other components (Bollen, 2005). Further, proof that AVE is true is that it exceeds the Average Shared Variance (ASV) (Hair et al., 2010) and the square root of AVE exceeds the correlation of the construct with other constructs.

Table 3 shows that all factor loadings were higher than the 0.70 threshold, which is an indication of a good convergent validity. The results of Average Shared Variance for all variables ranged from 0.642 to 0.873, which exceeds the minimum requirements of 0.50 and is an additional indication of decent convergent validity. Likewise, the CR values for all constructs were well above the recommended level of 0.70, supporting the convergent validity as well. The reliability metrics used are CR and Cronbach's alpha coefficient. Consequently, the alpha value is over 0.7 and both reliabilities were reached, whereas CR scores were between 0.826 and 0.921, which supports that all the elements have an accepted internal consistency. Concerning the discriminant validity, AVE's square root is higher than the correlation of other constructs, as shown in Table 4. Therefore, the discriminant and convergent results support the validity of the measures. This finding proposes that the model is robust and accurate enough to allow the study to continue to the structural model evaluation.

Table 3. Convergent Validity Results

Construct	Items	Loading Factor	Cronbach's alpha	CR	AVE
Perceived Usefulness	PU1	0.846	0.874	0.921	0.873
	PU2	0.813			
	PU3	0.884			
	PU4	0.877			
	PU5	0.834			
Perceived Ese of Use	PEOU1	0.767	0.811	0.891	0.844
	PEOU2	0.794			
	PEOU3	0.801			
	PEOU4	0.799			
	PEOU5	0.802			
Computer Self-Efficacy	SE1	0.783			
	SE2	0.833			
	SE3	0.823			
	SE4	0.789			
	SE5	0.843			
Subjective Norms	SN1	0.723			
	SN2	0.756			
	SN3	0.833			
	SN4	0.789			
	SN5	0.812			
Instructors' Factors	IF1	0.854	0.802	0.826	0.748
	IF2	0.832			
	IF3	0.867			
	IF4	0.708			
	IF5	0.867			
Management and Technical Support	MS1	0.756	0.745	0.872	0.725
	MS2	0.789			
	MS3	0.832			
	MS4	0.876			
	MS5	0.732			
System Quality	SQ1	0.903	0.837	0.904	0.848
	SQ2	0.847			
	SQ3	0.824			
	SQ4	0.784			
	SQ5	0.805			

Table 4. Discriminant Validity

	PU	PEOU	SE	SN	IF	MS	SQ
PU	0.87						
PEOU	0.06	0.73					
SE	0.04	0.07	0.91				
SN	0.02	0.01	0.02	0.87			
IF	0.05	0.07	0.11	0.06	0.81		
MS	0.04	0.52	0.12	0.13	0.11	0.82	
SQ	0.13	0.28	0.13	0.12	0.21	0.23	0.93

Structural Model and Hypotheses Testing

The coefficient of determination (R2) is the best-known measure to evaluate the structural model. Nakagawa et al., (2017) defined the coefficient of determination as "a statistical measurement that examines how differences in one variable are explained by the difference in a second variable when predicting the outcome of a given event" (p. 10). When the R2 value is more than 0.67, it is perceived as "high," while the values between 0.33 and 0.67 are regarded as "moderate," and the values between 0.19 and 0.33 are considered "weak" (Salloum, Alhamad, et al., 2019). The R2 values for the constructs were found to be between 0.63 and 0.77; hence, the predictive power of these constructs is considered as "high." Coefficient parameter estimates are another important aspect of the structural model evaluation. Research hypotheses are evaluated by evaluating the significance of the path of each relationship, and parameter estimates were used for the structural model to generate the approximate population covariance matrix. Critical percentages, standardized figures, and p-value are used to test the hypotheses from this analysis.

A relationship is considered to be statistically significant at the 0.05 level when the critical ratio (CR or t-value) is found to be greater than ± 1.96 (Hair et al., 2010). The path estimates and CR (t-value) are used to analyze all the casual paths in the model. The results demonstrated that t-values for 22 causal paths estimate were found above the 1.96 critical value and significant at $p \leq .05$. However, t-values for 13 casual paths were found statistically insignificant. The parameter estimates are presented in Table 5.

Table 5. Regression Estimates for Latent Constructs

H	Relationship	Stand. Reg Weights (β)	Critical Ratio	P-Value	Decision
H1	PU→Satisfaction	0.288	1.997	0.05	Supported
H2	PEOU→ Satisfaction	0.155	2.197	0.043	Supported
H3	SE→Satisfaction	0.199	2.358	0.019	Supported
H4	SN→Satisfaction	0.151	3.115	0.011	Supported
H5	IF→Satisfaction	0.295	2.352	0.004	Supported
H6	MS→ Satisfaction	0.364	5.070	***	Supported
H7	SQ→ Satisfaction	0.193	3.241	0.019	Supported

The results presented in Table 5 show that all seven hypothesized paths among the constructs are significant. As shown in Figure 1, the results of critical ratio and standardized regression weight for the path between PU and students' satisfaction of elearning were 1.997 and 0.288 respectively, showing that hypothesis H1 is statistically significant at p = 0.001. Therefore, it can be assumed that when the students perceive that elearning has greater usefulness, their satisfaction increases gradually.

Figure 1 also demonstrates that the results of the critical ratio between PEOU and students' satisfaction were found to be 2.197, while the standardized regression weight was 0.155. This indicates that the path between these constructs is statistically significant at the p = 0.001 level and hypothesis H2 is supported. Based on these results, it can be concluded that there is a strong significant effect of PEOU on students' satisfaction with elearning systems, implying that an increase in the ease of use positively influences user's intention toward acceptance of elearning.

Similarly, statistical findings revealed that the values of the critical ratio (2.358) and standardized regression weight (0.199) for the path between self-efficacy and students' satisfaction demonstrate its statistical significance at p = 0.001. Besides, the results show strong support for hypothesis H3. Therefore, it is clearly inferred that the role of self-efficacy has a strong significant effect on students' acceptance of elearning. The results also revealed that subjective norms significantly influence the students' satisfaction ($\beta = 0.151$, $p < 0.001$) and this gives support to hypothesis H4. The findings also show that instructors' factors

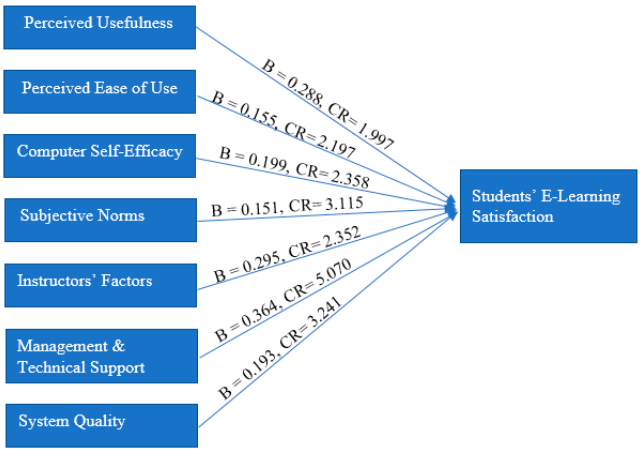

Figure 1. Structural Model

significantly influence the students' satisfaction of elearning ($\beta = 0.295$, $p < 0.001$) and the university/organizational factors ($\beta = 0.364$, $p < 0.01$), supporting hypotheses H5 and H6. The results of critical ratio and standardized regression weight (3.241 and 0.193 respectively) are shown in Figure 1 and reveal strong support for hypothesis H7. The results demonstrate that system quality has a positive direct effect on university students' satisfaction with elearning. These results reveal that the path between system quality and students' satisfaction is statistically significant at p = 0.001.

DISCUSSION

The findings of this research reveal that the perceived usefulness of elearning has a significant effect on students' satisfaction with this mode of teaching and learning. Also, this study reveals significant effects of perceived ease of use on the actual students' acceptance of elearning. So, students first determine how easy or how challenging the elearning system is to work with, and then they see how useful it is. They build a good attitude about it if they regard it as an "easy to use" and "useful" technology for them. The optimistic attitudes contribute to creating a positive intent to use it, and good intention ultimately affects the satisfaction of such technology. The PU findings show that elearning is beneficial and that students continue to take up the technology and use it to learn. The outcome of PEOU indicates that students embrace elearning if they think the use of technology is free from effort, and the incentive of students to consider and use elearning is the product of their estimation of the fundamental aspect of technology usage, such as the interfaces and processes used. These findings are supported as well by the previous literature and are consistent with other research (Al-Mushasha, 2013; Chang et al., 2017; Ibrahim et al., 2017; O'Dell & Sulastri, 2019; Tarhini et al., 2013).

In terms of the student dimension, the study's results also reveal that computer self-efficacy and subjective norms were significant and salient factors in determining students' acceptance of elearning. Accordingly, students are required to learn more about the characteristics, functionality, and technical aspects to gain a thorough insight and understanding of elearning features and feel comfortable with them. Students need university

classes, seminars, and training services to help improve participation and satisfaction levels when using elearning platforms. These findings are in accordance with the findings of other research studies (Al-Mushasha, 2013; W. M. Al-Rahmi et al., 2015; Chang et al., 2017; Wei & Chou, 2020). Such findings indicated that the use of the elearning system can be improved if the students have sufficient computing skills and a healthy propensity to communicate randomly with the elearning system.

In the same vein, the findings indicate that subjective norm has a substantial optimistic influence on students' satisfaction. These findings suggest that elearning is socially accepted by the students' classmates, where students are persuaded that the elearning system will be simple and beneficial to them. This result correlates with other studies such as Chang et al., 2017; Ngampornchai & Adams, 2016; Salloum, Al-Emran, et al., 2019; Yakubu et al., 2020. Thus, the acceptance attitude of students in elearning relies on the favorable views of their peers, colleagues, or teachers. This aspect plays a crucial part in embracing and using elearning in the students' behavioral intention.

Concerning the system characteristics, the findings demonstrate that system quality has a significant positive effect on the students' acceptance of elearning. The research discovered that system quality is a robust, prominent variable that shapes students' satisfaction with elearning. Consequently, LMS programmers and university administrators must work on enhancing the efficiency of elearning services so they can be made more accessible for students and instructors alike. The user-friendliness of the elearning system and its availability and consistency are significant parts to focus on. The interface functions, design, tasks, contents, navigation speed, and interaction functionality of the elearning application should be occasionally checked and enhanced to meet the students' needs. These results are in line with new research in IS adoption such as Abdallah et al., 2019b; Fathema et al., 2015; Ibrahim et al., 2017; Jaber, 2016; Yang et al., 2017. When the information underlying the elearning system and its quality is well-established, the students' PEOU will unquestionably improve. Therefore, policy makers and IT administrators in these organizations need to address these differences by improving the efficiency of their elearning programs to reach high acceptance rates.

Concerning organizational factors, this research supports that strong relationships among top management and technical support correlate with students' satisfaction with elearning. The satisfaction of elearning increases if students feel there is an adequate level of support from management. The finding that organizational factors have a direct positive impact on students' satisfaction is consistent with the results of other research (Al-Mushasha, 2013; Fathema et al., 2015; Ramirez-Anormaliza et al., 2017; Salloum, Al-Emran, et al., 2019). The deployment of multiple connectivity channels to help students quickly solve challenges related to IT and IS have a beneficial impact on elearning satisfaction among students. Considering instructors' factors, the findings reveal that instructors play an important role in influencing students to accept or reject the elearning system. The quality of the course presented and the instructor's motivation, skills, attitude toward the system, and support mainly increase students' satisfaction with elearning. Yet, this result disagrees with the results reported in previous studies such as Abdallah et al., 2016; Fathema et al., 2015; Shahdan et al., 2020. These findings indicated that faculty members with higher self-efficacy and high levels of IT innovativeness increase students' satisfaction and motivation with elearning. The findings of this research indicate that PU, PEOU, management support, self-efficacy, subjective norms, and system quality increased students' satisfaction with elearning. Nevertheless, the influence of management and technical support ($\beta = 0.364$) was the most significant compared with other factors. Distinguishing these constructs assists in improving the potential of researchers and increasing the elearning adoption rates in the UAE.

CONTRIBUTIONS

The results of this study present several theoretical and methodological contributions. The study has extended the body of knowledge for innovation adoption and IS literature related to the acceptance and adoption of elearning systems. It is, therefore, able to enrich and furnish students with the required understanding and to broaden their knowledge related to elearning and information systems during an era of rapidly changing new technologies. This research examined an integrated

framework composed of various constructs from some well-known and established theories that are most commonly used for investigating IS adoption and acceptance. The applied theoretical framework was established based on a thorough literature review to develop a big picture of technology adoption research. The study also contributes to the IS success theory, providing the fact that learners as individuals need to be considered while developing a system. It is also a contribution to the system that will revolve around the learners, who are best able to determine the success of the system.

Importantly, the findings of this research also have several implications for decision makers and scholars in the areas of IS quality and IS technology. More importantly, the current research findings strongly assist university administrators and decision makers in determining the necessary steps required to facilitate and increase the use of elearning systems by faculty members and students. Moreover, universities should mitigate the passive reaction of lecturers toward elearning and ensure that lecturers received adequate training to handle the organizational and technical resources used in elearning in public and private universities.

CONCLUSION

The rapid advances in the field of ICT and the use of elearning resources have been important in the educational processes. The objective of this research was to adapt TAM and IS success models to examine the acceptance of elearning amongst students at Aldar University College in Dubai, UAE, by identifying the key factors influencing students' satisfaction.

The results of this research also showed that perceived usefulness, perceived ease of use, computer self-efficacy, subjective norms, instructors' factors, management and technical support, system quality innovativeness, perceived trust, and social influence are the main variables influencing students' satisfaction with elearning. The findings of this research are helpful for both academics and nonacademic practitioners of online learning to design online courses. The university administration needs to establish the appropriate infrastructure for elearning systems and evaluate the readiness of students to use elearning systems. The study relied upon a single case study to spot the forces that influence elearning system acceptance in the UAE. The scope of this research was limited to explore the factors influencing the satisfaction of students with elearning at Aldar University College. Likewise, the findings of the report do not necessarily reflect the overall use of IT in higher education and do not reflect the use of IT in public universities. As regards future studies, they should expand the population or sample size to cover other areas with various populations. The target population can include lecturers and students in various universities to carry out an in-depth comprehension of elearning satisfaction. It will be much better in the future to employ multiple cases to create more diverse factors that affect elearning acceptance by considering the multidimensional aspects of this study. It is also important that future researchers incorporate policymakers and academicians as they can provide a different perspective on the topic. Broadening the scope of the population sample in social research helps in visualizing new venues and new dimensions of the topic. Despite its limitations, this paper has presented empirical data on the satisfaction and acceptance of elearning systems in the higher education context.

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