

## Acceptance of E-learning among university students in UAE: A practical study

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### ABSTRACT

The objective of the study is to find out the factors which affect the acceptance of E-learning among students and how the students' purpose of using E-learning is determined by these factors. The research was based on the Technology Acceptance Model (TAM). The researcher developed a questionnaire to gather data from a sample of 366 university students who actively used the E-learning system. According to the results of the study, subjective norms, perceived usefulness, perceived ease of use, enjoyment, and accessibility are the vital predictors behind the intention of students for using E-learning systems. This indicates that extended TAM is applicable in the UAE. The results show that policymakers and education developers should take E-learning system seriously since it can be opted not just as a technological solution but also as a learning platform for students belonging to a distant area. The results present practical implications for education developers, policymakers and practitioners in devising useful plans to implement E-learning systems.

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## 1. INTRODUCTION

As the Information technology continues to evolve at a very fast pace [1], World Wide Web, also called as the Web, has emerged as an influential source through which learning and teaching have become possible at a distance [2]. Through the Internet, users can get a lot of information and can get better chances to interact and cooperate with others. By relying on Internet, students can get access to several learning tools for devising new techniques and means for the implementation of the gathered knowledge or creating new ones [3]. Different terms like E-learning, online learning, and web-based learning are used to explain the teaching and learning experiences gained via the Internet and Web technology [4, 5]. E-learning refers to a virtual class through which different kinds of information can be achieved through the internet where, unlike an actual classroom environment, the teachers or students are not present [6]. Students can rely on Internet as a source of information through which they can learn whenever and wherever they want [7]. The course materials available on the Internet can be accessed at any time which means that students can study the same material repeatedly [5]. The flexibility and ease that E-learning offers are very fascinating for numerous students involving adults as well as professionals who might not have been able to get advanced degrees if the only option they had was the conventional studying technique. Several top organizations are now implementing E-learning into their present business operations [5]. Furthermore, many high education institutions and corporate training are adopting E-learning for sorting out different learning and performance related issues [5, 8]. E-learning is among the most important modern advancements that occurred in the IS industry which has placed a new challenge for schools as well as the industry. It is important to study this topic as a number of schools are educating their students through E-learning

courses [9, 10]. Clearly, E-learning plays a vital part in a world where achieving the up-to-date information and expertise are important for benefitting from the present knowledge-based economy.

Organizations and educational institutions are keen to incorporate E-learning technology into their current practices as a source of learning so that target people and/or employees can be educated using the most updated information. As E-learning is becoming more common in the educational institutions, there is a need to study student acceptance of such technology because it is a critical factor in becoming successful in its application [11-13]. Significance of user acceptance behavior can be understood through different techniques. During the early stages, the end-users like students utilize the technology regularly for the purpose of studying. Any such decision which through which their learning behavior is influenced should be taken as their readiness to embrace the change. On the basis of this concept, the empirical evidence has demonstrated that technology acceptance which included end-users were more effective as compared to the technology acceptance where no end-users were involved [14]. To find out the causes of information technology acceptance, researchers have created numerous models and tested them. The Technology Acceptance Model (TAM [15], the theory of reasoned action (TRA) [16] are among the common theories. Though, the technology acceptance model (TAM) has achieved great scientific support via justifications, implementations, and repetitions. As compared to the other models, the TAM is considered as more predictive, robust and grasping [17]. In addition to this, on the basis of technology adoption literature, TAM is perceived as an important model in IS domain. The study intends to determine the causes of student's acceptance of learning in higher education setting through the integration of certain E-learning external factor external factor (Enjoyment, Accessibility, Subjective norm) which affect the Perceived Usefulness, Perceived Ease of Use, and to examine the ways in which these factors can form students' intention to employ E-learning. This involves direct authoritative inferences in backing the classy E-learning programs and encouraging the effective E-learning courses. The research has been structured in the following manner.

The subsequent part summarizes the literature review of the researches done on the area of E-learning system acceptance. Literature review and hypothesis included in the research have been explained in section two. Section three gives a detailed explanation of data analysis and findings. Results and discussions are offered in section four whereas the conclusion is explained in the last section along with major findings of the study.

## **2. LITERATURE REVIEW AND HYPOTHESIS**

### **2.1. External variables**

#### **2.1.1. Enjoyment**

Enjoyment (ENJ) is defined as “the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use” [18]. Enjoyment in the studies of technology acceptance has been fascinating various researchers since it is assumed that these intrinsic variables may have a positive effect on the users' views [19]. The enjoyment experienced while using a new system can minimize the perception of effort being made by the user [20]. Therefore, an important factor which describes the E-learning adoption or acceptance is perceived enjoyment. The previous research showed that perceived ease of use [21-28] and perceived usefulness [23, 27-29] of E-learning systems are significantly affected by the perceived enjoyment. When a student finds out that using E-learning systems is enjoyable, there is a higher possibility that usefulness and ease of use of such systems will positively impact that student [5]. Two hypotheses can be generated from the aforementioned arguments. H1a: Enjoyment has a significant influence on the perceived ease of use (PEOU). H1b: Enjoyment has a significant influence on perceived usefulness (PU).

#### **2.1.2. Accessibility (ACC)**

Accessibility (ACC) refers to “the degree of ease of how a user can access and use the information and extracted from the system” [30]. According to [31], system accessibility refers to the degree of ease with which the students can access and use the E-learning system. It was stated that the more an E-learning system is easily accessible to the students, the higher the chances of students to consider the system as easy to use [32]. System accessibility, as per [33], directly signifies the website's perceived ease of use. Studies conducted by [26, 34-37] revealed that perceived ease of use of E-learning system is greatly affected by the system accessibility. The findings of the past researches show that an E-learning system's perceived ease of use [38] and perceived usefulness [39] are significantly affected by the perceived accessibility. When students can easily access the E-learning systems, there is a greater possibility that they will positively affect the usefulness and ease of use of such system [34, 35, 37, 40]. Therefore, the following assumptions are made:

H2a: Accessibility has a significant influence on the perceived ease of use (PEOU).

H2b: Accessibility has a significant influence on perceived usefulness (PU).

### 2.1.3. Subjective norm (SUB)

Subjective norm and social influence is the idea that significant people believe that the system should either be used or not [41]. The subjective norm refers to “the person’s perception that most people who are important to him or her think he or she should or should not perform the behavior in question” [42]. Under some circumstances, rather than concentrating on their personal emotions and beliefs, people may adopt a system just to adapt to the needs of others [43]. Many researchers have been conducted on how E-learning adoption or acceptance is affected by subjective norms. A research conducted by [22] showed that perceived ease of use [9, 22, 23, 25, 36, 37, 44-46] and perceived usefulness of E-learning system [23, 37, 45-48] are considerably affected by subjective norms. Hence, the subsequent hypothesis has been developed:

H3a: Subjective norm has a significant influence on the perceived ease of use (PEOU).

H3b: Subjective norm has a significant influence on perceived usefulness (PU).

## 2.2. The technology acceptance model and user beliefs

The perceived usefulness and perceived ease of use aid the acceptance of new technology. TAM and other relevant studies show that these factors considerably affect the behavior intention to use. The views of a user concerning the ease of comprehending a system significantly aids in recognizing the effectiveness and the degree to which the user shows adoption to new technology [49, 50]. A previous study demonstrated that perceived usefulness is considerably affected by the perceived ease of use (PEOU) [29, 40, 45, 46, 51-55]. There are many studies that show a direct as well as an indirect positive relationship between the behavioral intention to use E-learning system (IU) and perceived ease of use (PEOU) [29, 40, 46, 52, 54, 56-59]. It was stated by [51] that the intention to directly or indirectly approve of and adapt to an E-learning system will be affected by perceived usefulness (PU). The past studies show that there exists a positive connection between the perceived usefulness (PU) and intention to use the learning system (IU) [23, 54, 56, 60-66]. While keeping in view the literature, the research states the following hypotheses, along with showing a significant positive relationship between IU, PU, and PEOU.

H4: Perceived ease of use (PEOU) has a significant influence on the perceived usefulness (PU).

H5: Perceived usefulness (PU) has a significant influence on the intention to use the E-Learning system (IU).

H6: Perceived ease of use (PEOU) has a significant influence on the intention to use the E-Learning system (IU).

The research model is based on these hypotheses as demonstrated in Figure 1. The theoretical model is first given the form of a structural equation model and then it is assessed by using scientific methods.

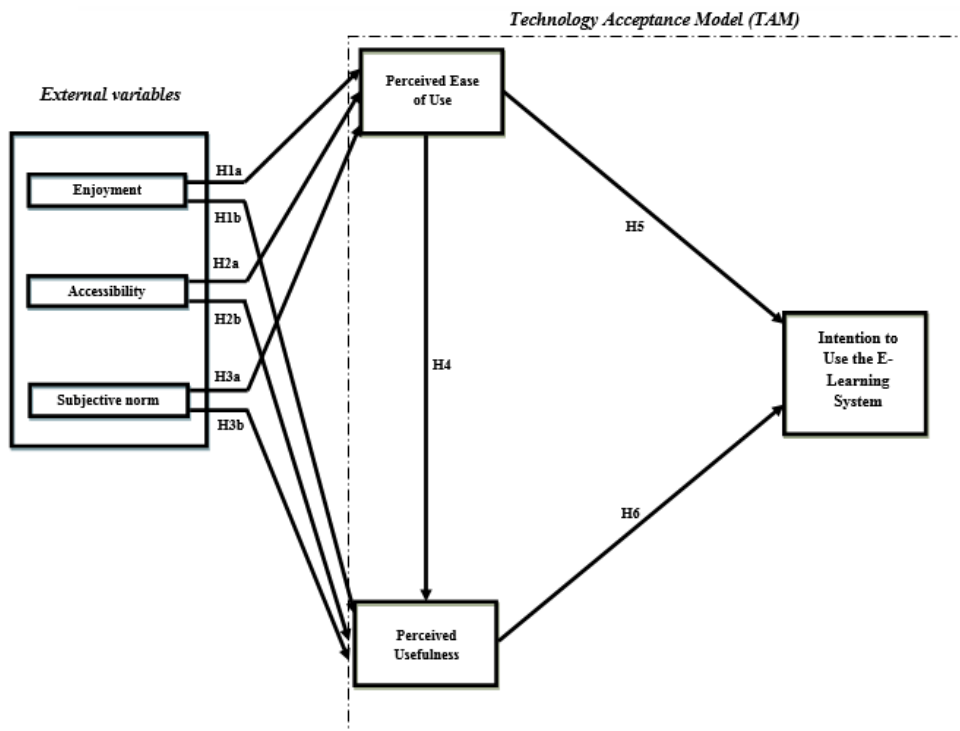


Figure 1. The study model

### 3. RESEARCH METHODOLOGY

#### 3.1. Sample and data collection

The data was gathered from two renowned educational institutions in the United Arab Emirates (UAE) who had been using E-learning systems. The online survey involved 400 respondents. Two web-based E-learning systems created by two E-learning platform/system providers were being used in these universities. These E-learning platforms were created and organized about 4 years before and were already being used by the students regularly. The study was carried out through Smart PLS Version T3.2.7 i.e. Structural equation modeling or SEM. SEM was used to assess this measurement model and final path model was managed in the later stages. A detailed image of the collected data has been shown in Table 1. Thirty-four incomplete responses questionnaires had to be discarded from the gathered responses. After that, 366 questionnaires were available that were completed by the respondents which indicate a response rate of 91.5%. A total of 366 responses which involved only valid responses were considered and transformed into a sample size used by [67]. For a population of 300, a sampling size of approximately 169 respondents is used. The conceptual model was then used to examine the responses. It is acceptable to analyze the data through structural equation modeling and create a sample size; hence, the sample size of 366 used in the study was way more than the unnecessary requirements used for hypotheses testing [68]. It must be remembered that the stated hypotheses were developed in the light of present theories but were taken in the context of E-learning.

Table 1. Participant's details

University	No. of students
University of Fujairah (UOF)	216
The British University in Dubai (BUiD)	150

#### 3.2. Study instrument

As mentioned before in the research, the hypothesis was tested through a survey instrument. The number of sources of the constructs involved in the questionnaire is shown in table 2. The survey involves seventeen items with the goal of assessing the six constructs in the questionnaire. Some questions were also taken from the previous studies and included in this study as an attempt to make the study more logical and relatable. Though the questions which the researcher took from the past studies were changed and adjusted according to the study context.

Table 2. Construct and their sources

Constructs	Number of items	Source
Accessibility	3	[9], [26], [51]
Enjoyment	3	[26], [27], [51]
Subjective norm	3	[51], [69], [70]
Perceived Ease of Use	3	[23], [51], [69]
Perceived Usefulness	3	[51], [69], [71]
Intention to Use the E-Learning System	2	[9], [51]

#### 3.3. Instrumentation

A tough phase of pre-testing and pilot testing of measures was started once some E-learning users and experts were chosen. The genuine measures of the research are shown in table 3. In the questionnaire, there are three items for each construct and a five-point Likert scale was used to measure these constructs. The scale goes from "strongly disagree" to "strongly agree". The respondents were asked to choose the response they agree to while keeping in view the given statements. In addition to this, demographic information was also required by the respondents.

#### 3.4. Pre-test of the questionnaire

University of Fujairah (UOF) and The British University in Dubai (BUiD), two very renowned educational institutions, took part in the study. The researcher took these universities as the target population consisting of a group of E-learning users who have good experience and knowledge about online learning system. For the pilot study, the researcher used 10% of the total sample size of the research survey i.e. 400 respondents. The sample size was chosen in light of the standard research practices. In addition to this, all the questions involved in the questionnaire were pre-tested where 40 students were used who were chosen on random basis. Moreover, as per [72], the reliability of the study was found through Cronbach's Alpha

whose results showed that the alpha values of all variables exceed 0.7, which has been demonstrated in Table 3. The results indicate the questionnaire used for the study is very reliable. It was ensured that all the respondents understood the final questionnaire as an attempt to further increase the overall reliability and survey quality.

Table 3. Cronbach's Alpha values for the pilot study (Cronbach's Alpha  $\geq$  0.70)

Construct	Cronbach's Alpha
Accessibility	0.825
Enjoyment	0.889
Subjective norm	0.766
Perceived Ease of Use	0.798
Perceived Usefulness	0.728
Intention to Use the E-learning System	0.880

### 3.5. Students' personal information/demographic data

The detailed information regarding the respondents can be seen in Table 4. Nearly the same features were shared by all the participants of the study. A total of 198 females were included which makes 54% of the total participants where 168 males were included which makes 46% of the total participants. Majority of the respondents were between the ages of 18-29, where 65% of the respondents were between the ages of 30-39, 27% were between the ages of 40-49, 5% between the ages of 50-59. The detailed demographic information of the respondents is demonstrated in Table 4.

Table 4. Summary of Students' demographic characteristic

Variables	No. of respondents	Percent %
Gender:		
Male	168	46%
Female	198	54%
Age:		
18 to 29 years	238	65%
30 to 39 years	100	27%
40 to 49 years	18	5%
50 to 59 years	10	3%
College:		
College of Business	219	60%
College of IT	53	14%
College of Education	29	8%
College of Humanities	65	18%
Level of education:		
Bachelor	274	38%
Master	92	25%
PhD	0	0%

## 4. FINDINGS AND DISCUSSIONS

Smart PLS software, which was developed by [73], is used in this study for Partial Least Squares Structural Equation Modeling (PLS, SEM). It is a renowned software and is extensively used in academia [74, 75]. The software is easily accessible to academics and researchers. In addition to this, the software involves an extremely user-friendly interface and modern reporting characteristics. Due to these characteristics, the software has been gaining a lot of popularity since its introduction in 2005 [76]. The two classes of validities i.e. convergent validity and discriminate validity are usually used to assess any measurement model [77]. The measurement model describes the link between the indicators and latent construct that is being assessed.

### 4.1. Data analysis

The Reliability of indicators can be assessed easily by examining the extent to which indicators show internal consistency in a relationship with any construct. Hence, the reliability of indicators can be measured through Cronbach coefficient alpha [78] and the composite reliabilities coefficient [79]. The minimum acceptable limit of composite reliabilities is 0.70 [80, 81]. The values of all the coefficients and Cronbach coefficient alpha levels are shown in Table 5. All the values were greater than 0.70, which verifies the quality of research [82]. The data was analyzed by employing a two-stage methodology in which

at first the measurement model is developed and then assessed independently from the complete structural equal model [83]. Due to that, every item, convergent and discriminate validity of constructs were checked for reliability as an initial step. Each item is checked for individual reliability through loadings or correlations that exist between the items and construct. The convergent validity per construct is appropriate in case of a loading greater than 0.505 [84]. Table 5 shows that there is a strong agreement between the loadings for each item and established conditions.

Factor loading, variance extracted and reliability is used as indicators by following [72] in order to guess the convergent validity's relative value. The composite reliability (CR) and reliability coefficient go above 0.7 for each construct which shows that different measurements of a construct are internally consistent with each other [72]. Cronbach's alpha values go beyond the acceptable value of 0.7 [80, 81] whereas composite reliabilities of constructs go from 0.7444 to 0.874. This has been shown in Table 5. Moreover, the standard of explaining a minimum of 50% of variance extracted from a collection of items triggering the latent construct is fulfilled by all average variance extracted (AVE) values which vary from 0.636 to 0.778 [84]. Therefore, it is believed that the scales through which constructs are measured have convergent validity.

It was recommended to consider two criteria i.e. Cornell-Barker criterion and the Hetero traditionalism proportion (HTMT) for achieving the measurement for discriminate validity [85]. Table 6 presents that Cornell-Barker measure verifies that the square roots of all AVEs are more important than its correlation with the remaining constructs [86]. Table 7 presents the HTMT ratio which clearly shows that each construct's value does not exceed the threshold value of 0.85 [87]. This, therefore, verifies the HTMT ratio value. The existence of discriminant validity is confirmed by these results. The data analysis indicates that reliability and validity of the measurement model were measured easily and no issues were encountered. Hence, the collected data can be used to assess the structural model.

Table 5. Convergent validity results which assure acceptable values. (Factor loading, Cronbach's Alpha, composite reliability  $\geq 0.70$  & AVE  $> 0.5$ )

Constructs	Items	Factor loading	Cronbach's Alpha	CR	AVE
Intention to Use the E-learning System	IU1	0.891	0.803	0.768	0.651
	IU2	0.728			
	IU3	0.887			
Enjoyment	ENJ1	0.918	0.879	0.781	0.639
	ENJ2	0.893			
	ENJ3	0.797			
Accessibility	ACC1	0.868	0.778	0.808	0.778
	ACC2	0.882			
	ACC3	0.867			
Subjective Norm	SUB1	0.700	0.888	0.778	0.718
	SUB2	0.778			
	SUB3	0.820			
Perceived Ease of Use	PEOU1	0.818	0.789	0.744	0.636
	PEOU2	0.769			
	PEOU3	0.753			
Perceived Usefulness	PU1	0.894	0.769	0.874	0.727
	PU2	0.711			
	PU3	0.709			

Table 6. Fornell-larcker scale

	IU	ENJ	ACC	SUB	PEOU	PU
IU	0.837					
ENJ	0.236	0.769				
ACC	0.400	0.367	0.883			
SUB	0.443	0.538	0.109	0.821		
PEOU	0.358	0.269	0.169	0.550	0.834	
PU	0.222	0.399	0.405	0.220	0.529	0.747

Table 7. Heterotrait-monotrait ratio (HTMT)

	IU	ENJ	ACC	SUB	PEOU	PU
IU						
ENJ	0.292					
ACC	0.636	0.219				
SUB	0.255	0.339	0.336			
PEOU	0.367	0.344	0.568	0.692		
PU	0.611	0.447	0.715	0.455	0.299	

**4.2. Hypothesis testing and coefficient of determination**

The structural equation modeling (SEM) approach [88-96] was used to test the aforementioned nine hypotheses together. The variance described (R2 value) by each path and every hypothesized connection's path significance in the research model were assessed. The standardized path coefficients and path significances are demonstrated in Figure 2 and Table 3. Table 8 shows that the R2 values for the intention to use the E-Learning system, perceived ease of use and perceived usefulness ranged between 0.466 and 0.537. Therefore, these constructs appear to have Moderate predictive power [88]. Generally, the data supported eight out of nine hypotheses. According to previous studies, all TAMs' constructs were verified in the model (PEOU, PU, and BI). Based on the data analysis hypotheses H1a, H1b, H2a, H2b, H3a, H4, H5, and H6 were supported by the empirical data, while H3b was rejected. The results in table 9 showed that Perceived Ease of Use (PEOU) significantly influenced Enjoyment (ENJ) ( $\beta = 0.380, P < 0.001$ ), Accessibility (ACC) ( $\beta = 0.365, P < 0.05$ ), and Subjective norm (SUB) ( $\beta = 0.280, P < 0.05$ ) supporting hypothesis H1a, H2a, and H3a respectively. Perceived Usefulness (PU) was determined to be significant in affecting Enjoyment (ENJ) ( $\beta = 0.655, P < 0.05$ ), Accessibility (ACC) ( $\beta = 0.473, P < 0.001$ ), and Perceived Ease of Use (PEOU) ( $\beta = 0.275, P < 0.001$ ) supporting hypotheses H1b, H2b, and H4. Intention to Use the E-Learning System (IU) has significant effects on Perceived Ease of Use (PEOU) ( $\beta = 0.369, P < 0.001$ ) and Perceived Usefulness (PU) ( $\beta = 0.515, P < 0.001$ ) respectively; hence, H5 and H6 are supported. Finally, Subjective norm (SUB) has insignificant effects on Perceived Usefulness (PU) ( $\beta = 0.190, P < 0.001$ ) then, H3b is not supported.

Table 8. R2 of the endogenous latent variables

Constructs	R2	Results
Intention to Use the E-Learning System	0.466	Moderate
Perceived Ease of Use	0.537	Moderate
Perceived Usefulness	0.526	Moderate

Table 9. Summary of hypotheses tests at  $p^{**} < 0.01, p^* < 0.05$  Significant at  $p^{**} < 0.01, p^* < 0.05$

H	Relationship	Path	t-value	p-value	Direction	Decision
H1a	Enjoyment -> Perceived Ease of Use	0.380	11.288	0.001	Positive	Supported**
H1b	Enjoyment -> Perceived Usefulness	0.655	5.219	0.021	Positive	Supported*
H2a	Accessibility -> Perceived Ease of Use	0.365	4.469	0.011	Positive	Supported*
H2b	Accessibility -> Perceived Usefulness	0.473	8.179	0.002	Positive	Supported**
H3a	Subjective norm -> Perceived Ease of Use	0.280	3.866	0.027	Positive	Supported*
H3b	Subjective norm -> Perceived Usefulness	0.190	1.109	0.246	Positive	Not supported
H4	Perceived Ease of Use -> Perceived Usefulness	0.275	16.891	0.000	Positive	Supported**
H5	Perceived Ease of Use -> Intention to Use the E-Learning System	0.369	20.590	0.000	Positive	Supported**
H6	Perceived Usefulness -> Intention to Use the E-Learning System	0.515	18.137	0.000	Positive	Supported**

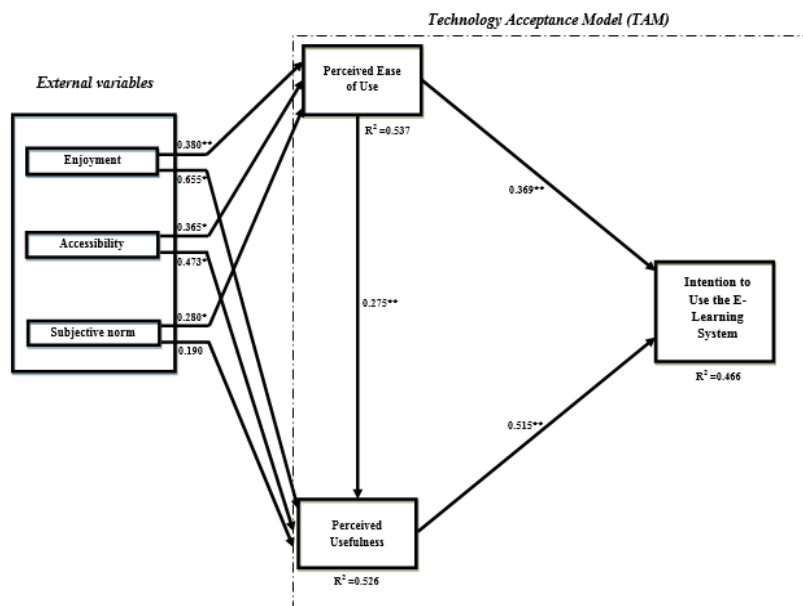


Figure 2. Hypotheses testing results (significant at  $p^{**} < 0.01, p^* < 0.05$ )

## 5. CONCLUSION AND FUTURE WORKS

The study aims to extract factors through which the views concerning E-learning are affected. The study is conducted on the students of UAE. In order to present the proposed research model relevance and hypothesis used for analyzing the behavioral intention to accept E-learning system, the outcomes of data analysis are paid considerable attention. Structure equation modeling (PLS-SEM) was used to analyze the research hypotheses. Figure 2 shows the structural model which is evaluated by examining the structural paths, variance explained (R-squared value) and t-statistics. Table 9 shows the results of data analysis. PLS technique has been used to test the aforementioned nine hypotheses. Upon the path significance of every hypothesized association which is included in the research model and the variance explained (R<sup>2</sup>) by each path, an assessment was done. Out of all nine hypotheses, eight hypotheses were supported. The hypotheses which were achieved through TAM model (H1a, H1b, H2a, H2b, H3a, H4, H5, and, H6) have been confirmed. The results show that factors like perceived ease of use, subjective norm, accessibility, enjoyment, and perceived usefulness can improve the behavioral intention to embrace E-learning system. The literature review supports these results. Accordingly, it can be assumed that E-learning is quite important when it comes to proficiency and high confidence levels while using online learning platforms.

The study has some limitations which have been mentioned in this part. The research was conducted using only two universities in UAE which is the biggest limitation since the selection was quite limited to study how E-learning system acceptance is affected by different factors. The study could have become more appropriate had the researcher included more universities in UAE in the research. By conducting more research and developing a more genuine understanding of the E-learning system, the factors which affect the actual E-learning system can be understood in a much better way. Another limitation was taking only 366 students as the participants of the study. A survey questionnaire was used to collect the data. In order to achieve more accurate results, a better instrument and sampling method could be used and more educational institutions from other areas such as the Arab Gulf region in which countries like KSA, Kuwait, and Bahrain could be included. In addition to this, in future research, more students will be asked to participate in the study. For better results, focus group, as well as interviews, will be performed. We will also encourage the Arab universities that have participated in the study to incorporate E-learning systems.

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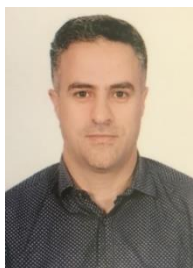
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