



Analyzing student aspirations factors affecting e-learning system success using a structural equation model

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Abstract

E-learning system success factors identification is of major interest in higher education. Understanding the role of students' aspirations factor affecting the success of the e-learning system is a challenge for most educational institutions. The present study aims to analyze the effects of students' aspirations factors in ensuring the success of the e-learning system through a developed research model extended from the integrated updated *Unified Theory of Acceptance and Use of Technology and the DeLone and McLean Information System Success Model*. The study participants who made up the model data sample were collected from 379 students engaged in the e-learning system at universities across the Kingdom of Saudi Arabia. Students' aspirations are resumed in *Motivation, Expectation, and Enjoyment* factors. The structural equation model was used to analyze the main causes and effects that would guide students towards the use and success of the e-learning system. The study results showed the strong relationship between the students' aspirations factors (*Motivation, Expectation, and Enjoyment*) and the adoption factors (*Intention to Use and Perceived Usefulness*) that lead to increased students' confidence that e-learning adds value to their educational experience. In addition, results revealed the determining role of the effect of the *Enjoyment* factor on the benefits expected from the e-learning system process. Therefore, higher education institutions that aspire to benefit the most from the e-learning system should pay close attention to the aspirations of their students and enhance their enjoyment, and then redefine the "e" in e-learning as enjoy rather than simply electronic.

Keywords E-learning · Information System · Students Aspirations · Structural Equation Model

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1 Introduction

In such a digital era that we live in, it is self-evident that e-learning has become ubiquitous. The accessibility and ease of use of modern information and communication technology in education have made it possible to use e-learning in all fields and levels of education (Milićević et al., 2021). E-learning transforms the way knowledge is delivered to students and improves the educational process. Shifting from teacher-centered to student-centered, e-learning focuses on student engagement in the course (Havik & Westergård, 2020). Teacher-centered instruction aims to focus on teacher preparation and delivery of content, while student-centered instruction aims to prepare material in a structured and relevant manner for students so that teachers facilitate student participation in the material delivery process. In this sense, e-learning facilitates the active participation of students in the learning process by building knowledge for themselves. In addition, teachers limit themselves to training, supporting students, and answering their questions (Leow et al., 2021).

Many international universities have moved towards implementing an e-learning system even before it became mandatory during the COVID-19 pandemic (Hoq, 2020), which imposed on every institution to use all available technology tools to deliver learning (Tran et al., 2020). Paying attention to the success factors of the e-learning system is of paramount importance to higher education institutions during the pandemic and even after it, as it will impose its presence as a strategic option. Therefore, acceptance of a student's use of e-learning is a vital criterion for the success of an e-learning system (Almaiah et al., 2020). Indeed, studying the adoption of e-learning can lead higher education institutions to better understand the needs of their students and eventually lead to an effective e-learning system (Abbad, 2021).

Researchers strongly believe that the success of the educational process, in particular e-learning, lies in the extent to which students aspirate from the educational process (Jagešić, 2015; Moody et al., 2020). A motivated student who enjoys receiving learning and knowledge fulfilling his ambitions will inevitably result in the quality of educational outcomes (Firat et al., 2018; Mazonod et al., 2019).

E-learning targets the improvement of students' motivation to learn, as the latter is an important key factor (Sabah, 2020). It is possible to stimulate students' interest in education by providing them with many stimuli (Mazonod et al., 2019), whereas in the absence of these stimuli, their scientific and cognitive performance decreases (Pérez-Pérez et al., 2020). Moreover, learning is stronger when students feel ownership over the learning process, allowing them to relate what is taught to a wider set of objectives they pursue and to which they direct their attention.

These interactions can be described as aspirations that the student seeks to achieve their expectancy (Yunusa & Umar, 2020). When students have a well-defined vision in which they see themselves in the future, and when the education they receive smoothly propels them toward achieving that vision, they are extremely enthusiastic about giving and participating in the learning process without conditions (Sáinz & Müller, 2018).

Based on information system theory, several research studies have been undertaken on the external factors influencing student adoption of e-learning. El-Masri

and Tarhini (2017) integrate *Trust* as an external variable that impacts the adoption of technology, and Alam et al. (2021) deployed *E-learning Service* as an external variable to evaluate e-learning success and its impact on the learning and academic performance of students, and Mailizar et al. (2021) included *System Quality* and *E-learning Experience* as external components to improve understanding of students' intent to adopt e-learning. To our knowledge, no investigation into the components of the *Aspiration* construct that influence the effective adoption of an e-learning system based on information system theory has been conducted to far. The current research aims to study the extent of the success of the e-learning system using *Aspiration* as an external construct that affects the student's adoption of this technology. Therefore, measuring the success of university initiatives in providing solutions to the challenges of implementing a successful e-learning system is of paramount importance to what the institution needs to know more about students' aspirations to evaluate and act upon this information. This and other related studies are particularly important given the emergence of COVID-19, which has prompted educational institutions around the world to use e-learning systems and to revise their standard approach to face-to-face teaching. Through this research, we focus to shed light on the importance of students' aspirations for the success of the e-learning system. This study will be of value to researchers as well as to higher education institutions interested in implementing an effective e-learning system.

2 Literature review

2.1 E-learning system success

The challenge for the educational process remains to ensure the success of the e-learning system, which has become a central interest in monitoring the progress of the strategic implementation of university initiatives (Safsouf et al., 2020). In the last decade, many institutions have taken the implementation of e-learning system seriously. They were conscious of the importance of e-learning in transforming the way of delivering knowledge using the performance of technology merged with the Internet (Al-Fraihat et al., 2020). Using e-learning in education has shifted learning from teacher-centered to student-centered (Woolf, 2010). In this epoch, e-learning is treated and investigated as a new technology delivering information data (Bai et al., 2020).

E-learning and distance education were introduced at the time of the COVID-19 pandemic as a means of continuous learning in educational institutions around the world as a guarantee of avoiding the spread of this pandemic. However, the success of an e-learning system based on students' willingness and acceptance to use such a system depends primarily on understanding the factors behind their adoption (Almaiah et al., 2020). Indeed, a more in-depth understanding of the forebears of e-learning adoption in online platforms is crucial to guarantee the successful implementation of technology in learning and reaping enormous benefits (Panigrahi et al., 2018).

Many pieces of research have tackled the subject of e-learning to analyze the readiness (Bessadok, 2017) or the acceptance (Baby & Kannammal, 2020; Tarhini et al., 2017) and the adoption of such new technology by the stockholder (Abdou & Jasimuddin, 2020; Yim et al., 2019). The well-known model employed to achieve such objectives is the Technology Readiness Index (TRI) developed by Parasuraman (2000), which introduces a multi-item scale to embrace new technology. Under the theory of information systems, Davis (1989) developed the Technology Acceptance Model (TAM) that models how users come to accept and use technology as stated in Fig. 1.

The extension of the previous model to TAM2 (Venkatesh & Davis, 2000) that studied how the perceived usefulness and the intention to use constructs change with sustained information system usage and TAM3 that considered an extension of TAM and TAM2 by pinpointing and hypothesizing about the common determinants of perceived usefulness and perceived ease of use (Venkatesh & Bala, 2008).

Moreover, in the same context of the study of information technology acceptance, there are other well-used models, such as the Unified Theory of the Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003) to describe users' technology adoption behavior in an organizational context. The updated extension of UTAUT is UTAUT2, which focuses on individual perspectives in technology adoption (Venkatesh et al., 2012) as shown in Fig. 2.

Finally, to identify the crucial characteristics of an information system and to study how these factors can affect users' initial acceptance of the system, DeLone and McLean (1992) developed the information system success model and an updated version (DeLone & McLean, 2003) as presented in Fig. 3.

During the last five years, when COVID-19 has put e-learning at the center of interest for all educational institutions, researchers have shown an increasing interest in investigating the success of the e-learning system (Alqahtani & Rajkhan, 2020) and have studied it from several perspectives, as reported by Aparicio et al. (2016). Some researchers studied the success of e-learning through the TAM and TAM2 (Ramírez Anormaliza et al., 2016) and others who reviewed the TAM3 models (Bervell & Umar, 2017). Their studies proclaim that the intention of using e-learning gives a clear idea about its success.

In the same way, other researchers have considered students' satisfaction as a key factor that could measure the success of such systems. This concept was used in

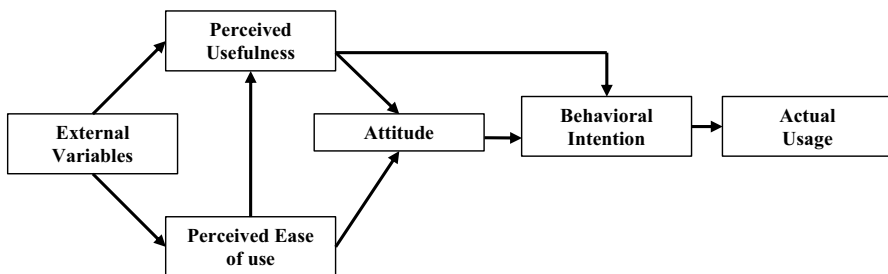


Fig. 1 Technology Acceptance Model Davis (1989)

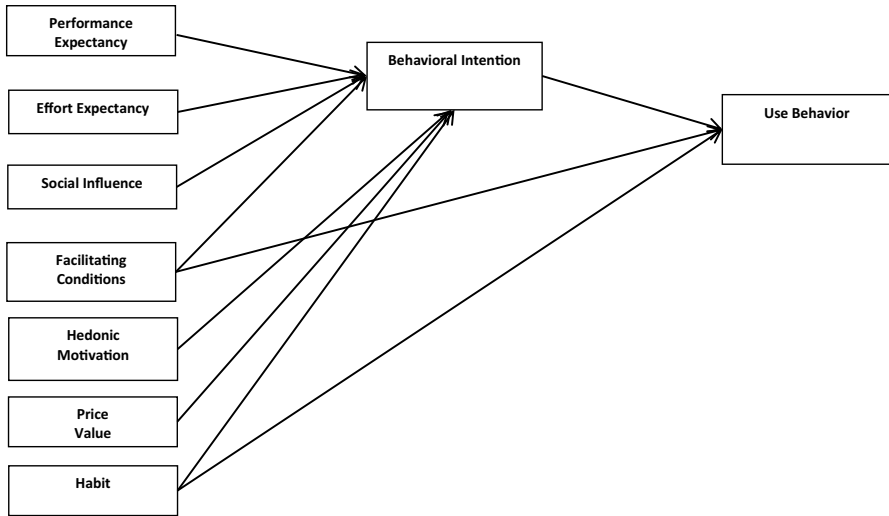


Fig. 2 Unified Theory of Acceptance and Use of Technology model Venkatesh et al. (2012)

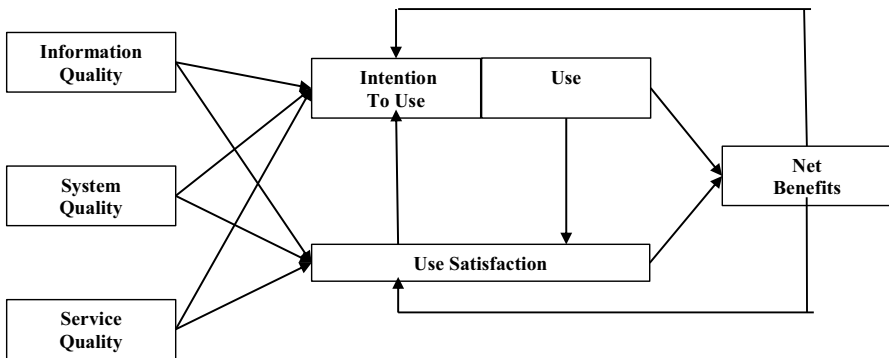


Fig. 3 Information system success model (DeLone & McLean, 2003)

UTAUT and UTAUT2 to analyze the behavior of the users in adopting e-learning (Abdou & Jasimuddin, 2020; Ngampornchai & Adams, 2016; Tan, 2013). For more precision on the context of success, many researchers have employed the DeLone and McLean information system success model and its extended version in evaluating the success of e-learning system as reviewed by Jeyaraj (Jeyaraj, 2020; Salam & Farooq, 2020).

These researchers consider the perception of e-learning quality as the main factor explaining the benefits acquired by users (Al-Fraihat et al., 2020; Martins et al., 2019). Other researchers believe that combining both models TAM and ISS or UTAUT and ISS or TAM with UTAUT and ISS is the best model for explaining the success of the e-learning system (Alshehri et al., 2020; Mohammadi, 2015).

Among the efforts deployed by researchers, the interest is to study the success of e-learning from an industrial point of view (Marjanovic et al., 2016; Tripathy & Devarapalli, 2020) or from the point of view of higher educational institutions (San-Martín et al., 2020), or from the point of view of instructors (Meriem, 2019; Ramírez Anormaliza et al., 2016; San-Martín et al., 2020) or instructors with student interaction (Hermita et al., 2019; Sun et al., 2008) and finally, from the point of view of students (Cheng & Yuen, 2019; Pérez-Pérez et al., 2020).

Those researchers investigated students' acceptance and engagement in an e-learning system (Liaw, 2008; Selim, 2007). However, we believe that the question of the success of e-learning from the point of view of student aspirations has not been addressed. Nonetheless, researchers studied students' aspirations from other angles, such as social and cultural aspects (La Ferrara, 2019; Van den Broeck et al., 2020) or from career vision (Holmes et al., 2018; Sáinz & Müller, 2018).

2.2 Students' aspirations

The term "aspiration", like any social construct, provides itself with a diversity of concepts and explanations (Quaglia & Cobb, 1996). Students' engagement in education has proven to be an important factor in their academic success (Tani et al., 2021), where aspirations play an important role in proving such engagement (Hazel et al., 2013). Students' aspirations express their interest in the education they receive, which represents an investment in their future careers. Aspirations lead students to appreciate the value and benefits of education for their future, which is manifested by fulfilling their expectations about the learning experience and satisfying their motivations and feeling enjoyment all the time to learn. In fact, there is a strong relationship between students' aspirations on one side and their expectations, motivations, and enjoyment on the other side.

Aspiration is what a student hopes will happen in the future. The expectation is what a student believes will happen in the future (Gorard et al., 2012). Khat-tab (2015) showed in his study that students with high aspirations or with high expectations are those who have higher school achievement than those who have low aspirations and low expectations. Moreover, (Khattab, 2015) clarifies that there is a perfect fit between high aspirations, high expectations, and high achievement that is considered as the most important indicator of future educational behavior among students. Therefore, we can conclude that the expectations and aspirations of students can interchangeably play a similar effect.

Students' motivation can be summarized as "the desire to learn" (Wigfield & Guthrie, 1995, p. 7). Aspiration, in this context, can be seen as a "long-term goal" (Quaglia & Cobb, 1996, p. 130). Students' aspirations can motivate them to work hard and get things done to achieve whatever goal it is. Ahmed and Mudrey (2019) stated that motivation predicted career aspiration in science, technology, engineering, and mathematics (STEM) fields among high school students. Domene et al. (2011) found that promoting career aspiration increased academic motivation among undergraduate and graduate students. This confirms that students' motivations partly explain their aspirations.

It is evident that higher levels of student engagement could manifest in greater enjoyment of education and thus improve learning (Gorard & See, 2011). Csikszentmihalyi (2014) confirms the hypothesis that enjoying school can also improve academic aspiration. According to Smith et al. (2016), students who enjoy school are more likely to continue devoting time in an academic environment than students who do not enjoy school and are less interested in doing so. Likewise, the students' enjoyment could interpret their aspirations.

3 Research model and hypothesis

In this study, we are interested in analyzing the importance of student aspirations in the evaluation of e-learning systems. Based on the literature review, we adopted an integrated model composed of TAM (see Fig. 1), the updated TAUT (UTAUT2) (see Fig. 2), and the DeLone and McLean models (see Fig. 3). The integrated research model components are simplified by *Aspiration*, *Adoption*, and *Success* factors. *Aspiration* as the first component of the research model, manifested in three constructs such as *Motivation*, *Expectation*, and *Enjoyment* inspired by the UTAUT2, DeLone and McLean models. *Expectation* construct was inspired from *System Quality*, *Performance Expectancy* and *Effort Expectancy* factors of the UTAUT2 model. *Motivation* construct was derived from *Service Quality* factor of the DeLone and McLean model. The *Enjoyment* construct, on other hand, was explicit from UTAUT2 model's *Hedonic Motivation* factor. Regarding the second model component, we kept the *Intention to Use* and the *Perceived Usefulness* constructs proposed in DeLone and McLean and TAM models, respectively. Likewise, in the third component of the research model, the concept of *Net Benefits* used in the DeLone and McLean model has been renamed to simply *Benefits*. Figure 4 illustrates the proposed research model.

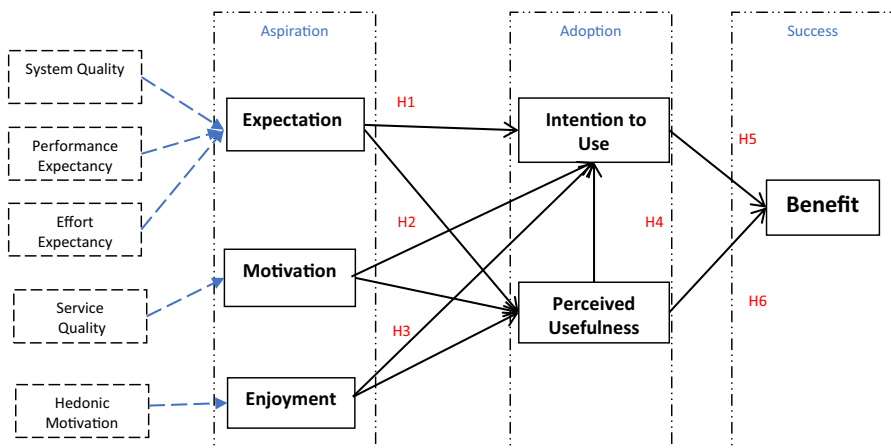


Fig. 4 Research model

The description followed by the measurement instrument of each construct in the research model and the associated assumptions for each factor relationship as presented in Fig. 4 are described below:

3.1 Aspiration

3.1.1 Expectation

System Quality in DeLone and McLean model refers to the features and characteristics that users expect to be available when using such systems (DeLone & McLean, 2003). In the same context, the UTAUT2 model uses *Performance Expectancy* and *Effort Expectancy* to explain respectively a better use performance and ease of use expectations from users (Loh, 2019; Venkatesh et al., 2012). We resume, in the research model, all these factors by *Expectation* factor are used to interpret student expectation from such e-learning experiences.

The hypotheses for this construct are:

H 1a: High Expectation affects positively student's perceived of e-learning use.

H 1b: High Expectation positively affects student's perceived usefulness of e-learning .

Table 1 presents the measurement instrument of the Expectation construct.

3.1.2 Motivation

The second *Aspiration* component manifests when students take ownership of the learning process characterized by their motivation in the use of the e-learning system as a force that leads them to act (Keskin & Yurdugül, 2020). Likewise, the DeLone and McLean models define *Service Quality* as the motivation of users to ensure a successful continuous use (DeLone & McLean, 2003; Santos et al., 2020). The relative hypotheses are:

H 2a: Motivation will positively impact perceived use.

H 2b: Motivation will have a positive impact on perceived usefulness.

The measurement instrument of the *Motivation* construct is shown in Table 2.

Table 1 *Expectation* construct description

Nomenclature	Measure	References
EXPECT_1	Being more competitive	DeLone & McLean, 2003
EXPECT_2	Improved diploma	Venkatesh et al., 2012
EXPECT_3	Enhanced skills	

Table 2 *Motivation* construct Description

Nomenclature	Measure	References
MOTIV_1	Flexibility in time and space	DeLone & McLean, 2003
MOTIV_2	Similarity with other students	
MOTIV_3	Be a part of a future education	

3.1.3 Enjoyment

The third *Aspiration* component happened when the student exhibits the maximum effort and participates fully in the learning process characterized by the enjoyment felt about the e-learning experience. Likewise, the UTAUT2 model uses *Hedonic Motivation* for seeking the users' enjoyment by the user. The corresponding hypotheses are:

- H 3a: Enjoyment positively affects students' perceived ease of use with e-course.
 H 3b: Enjoyment positively affects towards learners using e-learning.

The proposed measurement instrument for the Enjoyment construct is described in Table 3.

3.2 Adoption

3.2.1 Intention to use

The *Intention to Use* factor defines the willingness of the student to adopt an e-learning system. This factor was found in TAM, UTAUT, and DeLone and McLean models as reported in (Mardiana et al., 2015). The corresponding hypotheses are:

- H 4: Students with a higher level of intention to use e-learning are susceptible to having higher perceived usefulness.
 H 5: Students with a higher level of intention to use e-learning are confident that e-learning brings value to their learning experience.

The proposed measuring instrument of the Intention to Use construct is shown in Table 4.

Table 3 *Enjoyment* construct description

Nomenclature	Measure	References
ENJOY_1	Stress-free process	Venkatesh et al., 2012
ENJOY_2	Preferred doing course tasks	
ENJOY_3	entertaining to learn	
ENJOY_4	Enjoyable learning	

Table 4 *Intention to Use* construct description

Nomenclature	Measure	References
USE_1	Access learning resources materials	Davis, 1989
USE_2	Collaborate with peers or instructors	
USE_3	Frequently visits	
USE_4	Accomplish course requirements	

3.2.2 Perceived usefulness

The TAM, as well as UTAUT model, use the *Perceived Usefulness* to describe the extent to which a user thinks that using a specific system would improve their performance at work. The relative hypothesis is:

H 6: Students with a higher level of perceived usefulness are confident that the e-learning.

brings value to their learning experience.

The measurement instrument for the Perceived Usefulness construct is presented in Table 5.

3.3 Success

3.3.1 Benefits

The benefits that an e-learning system is able to deliver are an important facet of the overall value of the educational system towards its students. This was used as a factor in the DeLone and McLean model.

The proposed instrument to measure the benefits construct is shown in Table 6.

Table 5 *Perceived Usefulness* construct description

Nomenclature	Measure	References
PERUSE_1	Accomplish tasks quickly	Davis, 1989
PERUSE_2	Improved learning performance	
PERUSE_3	learn effectively	
PERUSE_4	Overall useful	

Table 6 *Benefits* construct description

Nomenclature	Measure	References
PERBNF_1	Increased knowledge	DeLone & McLean, 2003
PERBNF_2	Understanding educational objectives	
PERBNF_3	Easier communication	
PERBNF_4	Saves and reduces expenses	
PERBNF_5	Improves learning process	

4 Methodology

As described in the research model hypothesis, we adopt for the research model three original renamed factors inspired from System and Service Quality factors of the updated DeLone and McLean model (DeLone & McLean, 2003) and from Performance and Effort Expectancy and Hedonic factors of UTAUT2 model (Venkatesh et al., 2012). Based on these experts' advice, we finalized the research model as presented in Fig. 4 in six constructs with twenty-three items distributed as shown in the appendix.

4.1 Data collection

The research model hypotheses were tested through the quantitative method. A quantitative analytical survey was adopted using a self-administered questionnaire operationalized through the Google Forms online survey. The questionnaire comprised two main sections, namely the socio-demographic information and the constructs of the UTAUT2 model, which were measured using a 5-point Likert scale (as shown in the Appendix). The survey was conducted during the period from October 2019 to March 2020. Students enrolled in the Blackboard Learning Management System at Saudi public universities returned 400 completed questionnaires.

As for demographic information, respondents taking bachelor's degree courses constituted the majority of the data sample (89%), while those following graduates constituted (12%), and the rest of the sample were taking postgraduate courses. Women made up (46%) of the sample. A total of 386 responses were gathered in the database that fulfilled the minimum requirement of having at least two modules enrolled in Blackboard for the last year. This constraint is fixed to give a more comprehensive outcome for the students' perceived factors. More details about the measurement items used in this study are found in the Appendix. The IBM Statistical Packages for Social Science (SPSS) version 25 and IBM AMOS version 24 were utilized to analyze the research model data.

4.2 Data analysis and results

To estimate the research model parameters, where more than one dependent variable with multiple covariances relating to all model constructs, we need more sophisticated multivariate statistical methods, such as a structural equation model. In fact, SEM as a multivariate statistical method integrates Confirmatory Factor and Regression Analysis. SEM exists in two types, Covariance-based SEM (CB_SEM) (Jöreskog & van Thillo, 1972) and Partial least Square SEM (Lohmöller, 1989) coming from the same school of thought (Wold et al., 1984). CB-SEM is a favored and dominant method when the objective is to test or to confirm the theory or even to make a comparison between alternative theories (Hair et al., 2019). In this study, CB-SEM was used to estimate the research model parameters

using Maximum likelihood estimation procedures in alternating between IBM SPSS version 25 and IBM AMOS version 24 software, to assess the validity of the measures.

4.2.1 Pre-treatment

A preliminary data analysis was performed to ensure the significance of the final results. We first checked for missing and outlier data to omit the whole correspondent responses. 379 obtained responses were considered as valid results. Moreover, we checked for the normality of the model using IBM.SPSS 25 to perform the Shapiro–Wilk test, skewness, kurtosis, and plots that permit us to determine whether a variable is normally distributed. The results show the normality of the observations of the model.

5 Research model Assessment

The framework of SEM modeling is revealed in the basic steps as shown in Fig. 5 (Hair et al., 2014; Kline, 2015). After specifying the research model as presented in Fig. 4, the identification, as a crucial part, was validated (degree of freedom > 0) before dealing with the assessment of the model. SEM consists of the assessment of the measurement model and the structural model (David, 1993), where the former depicts how the measured variables represent constructs and the latter shows how the constructs are interrelated to each other with multiple dependence relationships. In measurement model assessment, EFA is principally adopted to specify construct dimension and deploy it during the process of scale development (Pallant & Manual, 2007). CFA is more appropriate with a well-established scale and a prior knowledge of the factor structure (Pallant et al., 2016).

The measurement model The measurement model does not specify the structure of the relationships among the variables in the research model as illustrated in Fig. 6 (Hair et al., 2014). Prior to the research model parameters estimation, we need to deploy CFA using alternatively EFA by removing low-loading (less than 0.5) as suggested by Bagozzi and Yi (1988) or cross-loading factor until ensuring the existence of the six model factors as principal constructs explaining the total observation variation as seen in Table 7.

First, we evaluated the measurement model based on reliability, convergent validity, and discriminant validity.

The reliability was measured by the Cronbach's alpha (CA) that should be greater than 0.7 for each latent variable (Jöreskog, 1993). The convergent validity was examined using Composite Reliability (CR) which should be at least 0.7 and Average Variance Extracted (AVE) with a cutoff value of 0.5 (Bagozzi & Yi, 1988). Whereas discriminant validity is established when the correlation value between two constructs is less than the square root value of the AVE (Fornell et al., 1982). The results presented in Table 8 confirmed that the required minimum criteria are met.

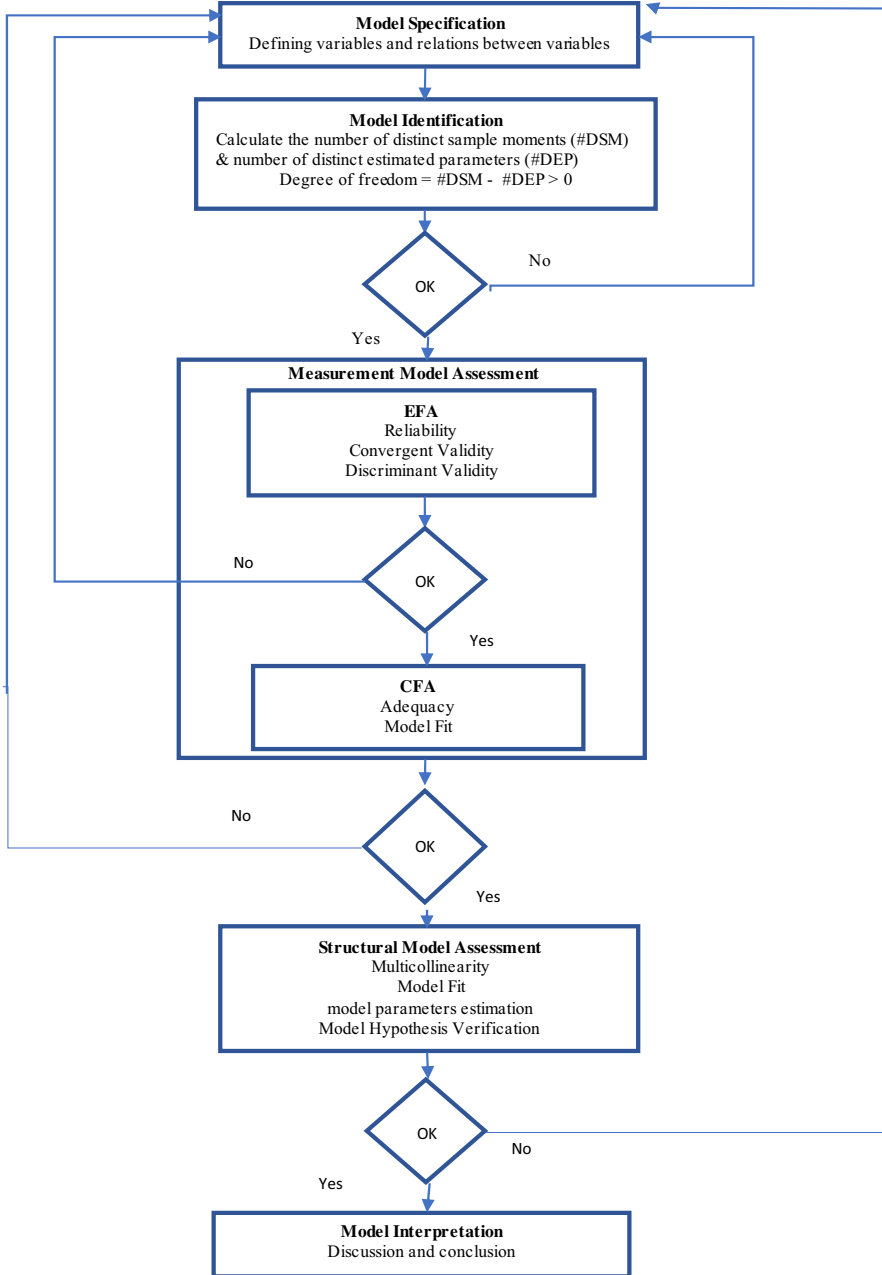


Fig. 5 SEM basic steps

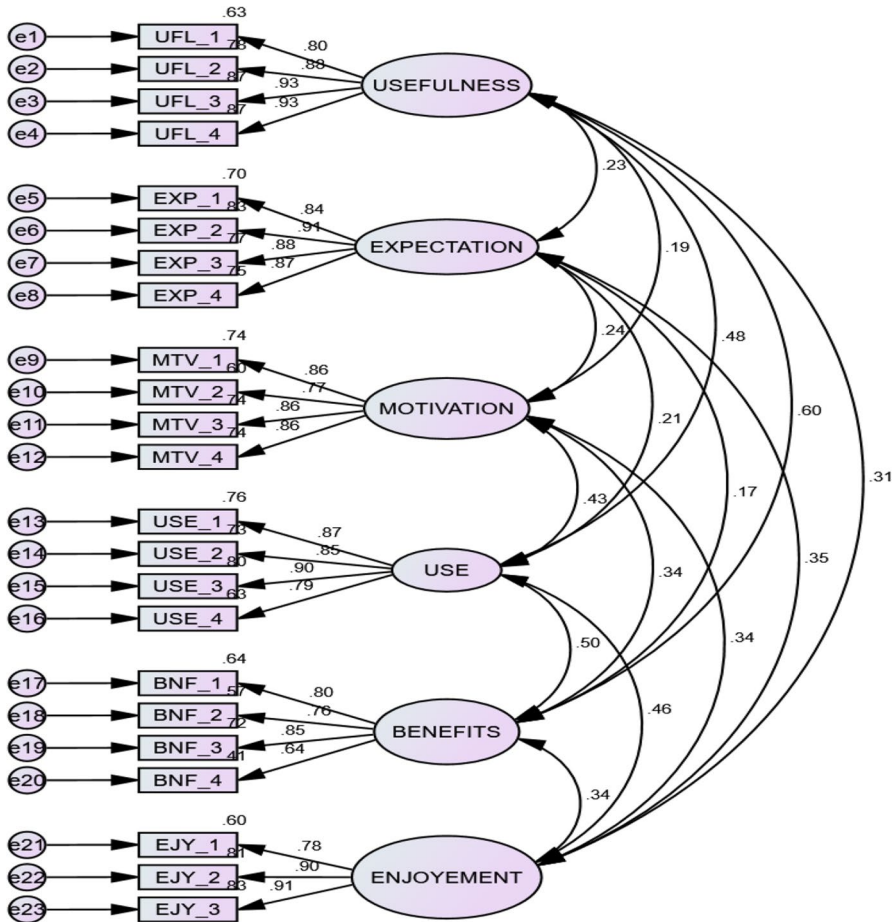


Fig. 6 Measurement Model Estimation

For the second step in the measurement model, we started by verifying the sampling adequacy for each variable in the research model using the Kaiser–Meyer–Olkin (KMO=0.890) test, which is greater than 0.8 putting in evidence the suitability of the sample (Hutcheson & Sofroniou, 1999). Then, we verified the measurement model fitting based on absolute, incremental, and parsimonious fit measures (Hair et al., 2006), as shown in Table 9 and Table 10.

The absolute fit indices category determines how well the supposed model reproduces the sample data, including the chi-square over the degree of freedom, goodness-of-fit index (GFI) and the standardized root mean residual (SRMR). The Incremental Goodness Index category compares the goodness of a defined model against an alternative base model, which includes the Tucker-Lewis Index (TLI) and the Comparative Goodness Index (CFI). For the Parsimonious fit indices category, these indices take into consideration the complexity of the model, which includes

Table 7 Factors loading

	Factor					
	1	2	3	4	5	6
EXP_1		0.839				
EXP_2		0.913				
EXP_3		0.871				
EXP_4		0.872				
BNF_1					0.719	
BNF_2					0.716	
BNF_3					0.905	
BNF_4					0.648	
MTV_1			0.878			
MTV_2			0.725			
MTV_3			0.881			
MTV_4			0.862			
USE_1				0.918		
USE_2				0.845		
USE_3				0.863		
USE_4				0.752		
EJY_1						0.722
EJY_2						0.922
EJY_3						0.918
UFL_1	0.773					
UFL_2	0.850					
UFL_3	0.945					
UFL_4	0.947					

Note: Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.

the root mean square error of approximation (RMSEA) and the adjusted goodness-of-fit index (AGFI). The results and the recommended critical value presented in Table 9 show that the research model, as required by the three fit indices categories, has achieved the standards for acceptance and has an excellent fit.

The structural model As the second step in SEM analysis, the structural model assessment was deployed using all causal relationships in the research model. We first checked for the absence of multicollinearity issues based on the variance inflation factor (VIF) that should be less than 5 (Grewal et al., 2004). The retrieved values of VIF ensure that the study data does not present any collinearity problem manifested by their inclusion in the accepted threshold. Then, we assessed the model parameters estimation that should be statistically significant (p -value < 0.05 or at least < 0.01 and absolute t -value > 1.65).

Table 10 showed the conformity of all factors except for the relation between the Expectation and the Intention to Use factors. After, we validate the model hypothesis

Table 8 Reliability, convergent and discriminant validity

	CA	CR	AVE	BENEFITS	USEFULNESS	EXPECTATION	MOTIVATION	USE	ENJOYMENT
BENEFITS	0.903	0.849	0.587	0.766					
USEFULNESS	0.937	0.937	0.789	0.601	0.888				
EXPECTATION	0.925	0.928	0.763	0.170	0.230	0.874			
MOTIVATION	0.904	0.905	0.705	0.342	0.192	0.244	0.839		
USE	0.914	0.916	0.731	0.503	0.476	0.213	0.434	0.855	
ENJOYMENT	0.896	0.899	0.748	0.345	0.311	0.351	0.335	0.460	0.865

Note: Diagonals are the square root of the AVE and others are the squared correlation.

Table 9 Measurement Model Fit

Fit Index	Recommended Critical value	Result
Chi-square/Degree of Freedom	≤ 3	1.790
GFI	≥ 0.9	0.918
SRMR	≤ 0.08	0.037
CFI	≥ 0.9	0.974
TLI	≥ 0.9	0.969
AGFI	≥ 0.8	0.895
RMSEA	≤ 0.05	0.046

Table 10 Structural Model Fit

Fit Index	Recommended Critical value	Result
Chi-square/Degree of Freedom	≤ 3	2.184
GFI	≥ 0.9	0.898
SRMR	≤ 0.08	0.011
CFI	≥ 0.9	0.960
TLI	≥ 0.9	0.954
AGFI	≥ 0.8	0.873
RMSEA	≤ 0.05	0.056

by verifying the sign of each model parameter coefficient (path coefficient β). All validated model hypotheses were supported, as illustrated in Fig. 7 and Table 10.

Finally, to measure the suitability of the structural model, we also used the measurement model fit based on absolute, incremental, and parsimonious fit measures as those shown in Table 11, which confirms that all the requirements of the indicators and the adequacy of relationships with the proposed factors of the model were met.

6 Discussion and Conclusions

The success of the e-learning system is a strategic goal for higher education institutions worldwide, where the students' aspirations can play an important role in achieving this. This research study highlights the importance of a student's aspiration in the adoption and success of the e-learning system. The research model constitutes an integration of TAM, UTAUT2, and the updated DeLone and McLean models.

The main contribution of the present research is the incorporation of the aspiration construct into the integrated model. The model was tested empirically using SEM analysis. The statistical results showed the important role that aspiration

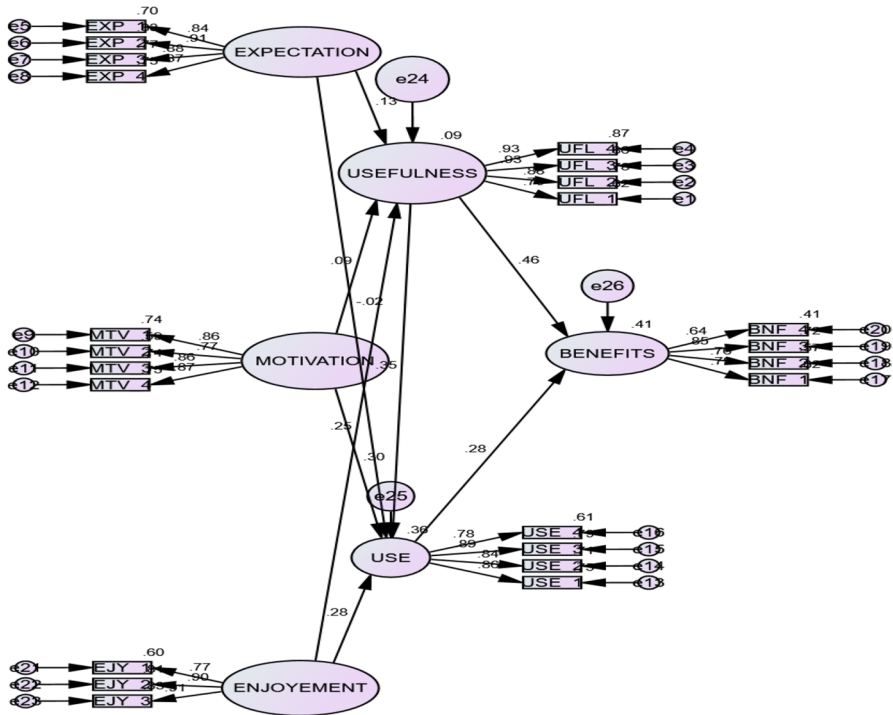


Fig. 7 Research Model Estimation

Table 11 Model Hypothesis Validation

Hypothesis	Path	Path Coefficient β	absolute t-values	Results
H1a	EXP \rightarrow * UFL	0.091	2.539	Supported
H1b	EXP \rightarrow USE	-0.017	0.388	NOT Supported
H2a	MTV \rightarrow UFL	0.063	1.752**	Supported
H2b	MTV \rightarrow USE	0.289	6.241	Supported
H3a	EJY \rightarrow UFL	0.197	4.484	Supported
H3b	EJY \rightarrow USE	0.317	5.594	Supported
H4	UFL \rightarrow USE	0.491	6.812	Supported
H5	UFL \rightarrow BNF	0.452	7.876	Supported
H6	USE \rightarrow BNF	0.196	5.109	Supported

Note: *; <—: covariance between factors; **: significant at 0.01 level.

factors play in enhancing students’ adoption of the e-learning system, allowing them to have confidence in the added value it brings to their educational experience.

The present study’s findings gained empirical support for all model hypotheses except H1b, which explains the significant effect of the *Aspiration* factors on the

Adoption factors and thereafter the effect on the *Success* factor. However, as an exception, the hypothesis of the influence of the *Expectation* factor on *Intention to Use* was not statistically supported. This means that the students' intent to use the e-learning system cannot be explained directly by what they expect to achieve from that system.

However, another path starting from *Expectation* leading to *Benefit* through *Perceived Usefulness* was found to be significant. In fact, the results showed that for a student with high expectations, the perceived usefulness of e-learning is positively affected (H1a with path coefficient $\beta=0.091$) and he is subsequently confident of the benefit of such a learning experience (H5 with path coefficient $\beta=0.452$). Another relevant significant path is manifested in the *Motivation* factor (H2b with path coefficient $\beta=0.289$), explaining that students with great motivation will have a positive impact on the perceived usefulness of the e-learning system that makes them more conscious about the benefit procured from such a learning experience.

Moreover, the most relevant and important path is particularly devoted to the *Enjoyment* factor (H3b with path coefficient $\beta=0.317$), which gives an idea about the power of ownership of the e-learning system taken by the student; this directly leads to good confidence in the *Benefit* (H6 with path coefficient $\beta=0.196$), which an educational experience gives the student.

The apprehension of students' aspirations, resumed in the *Expectation*, *Motivation* and *Enjoyment* constructs, as shown in the study findings, has a dominant influence on the factors' adoption and success of the e-learning system. Confirming student expectations will maximize their satisfaction, which will strengthen their intention to continue using the e-learning system (Cheng, 2020). Improving the motivation of students in the teaching and learning process using the fourth industrial revolution technology will allow them to better master the subject and have access to more information (Marlina et al., 2021). In higher education, students who enjoy using the e-learning system are willing to put extra effort into this learning system, which after the COVID-19 pandemic will be the only way to continue their academic activities (Humida et al., 2021).

The results of the study provide a valuable understanding of the place occupied by the student's aspiration in the success of the e-learning system. The more a student aspires to see a promising future education, the more he realizes the benefits of this e-learning experience. These findings contribute not only to decision-making when choosing the major factors for ensuring a sustainable success of the e-learning system but also for researchers to investigate deeply and closely to better understand what reinforces students' aspirations. By understanding the students' aspirations, we hope to help move towards student-centered learning as a major e-learning goal.

In conclusion, students' aspirations will be realized once their expectations are fulfilled, their motivations are satisfied and will do all that with enjoyment. That certainly leads to redefining the "e" in e-learning by "enjoying" learning rather than simply "electronic" learning and then guaranteeing the success of such e-learning experiences.

7 Limitation and future work

The study sample was limited to Saudi universities, and in the future, we might expand the study sample to reach all golf areas due to the presence of great cultural similarities. The research model of the study did not integrate the moderator variables. In future work, we could analyze the impact of variables, such as gender or student specialty, on the findings. The essential role of students' aspirations, as distinguished by this quantitative study, in ensuring the adoption and success of the e-learning system could be explored more closely with the primary partner, which is the students themselves. In future work, the focus will be on how to get a direct measure of students' aspirations in their use of the e-learning system using mixed-method analysis, such as the qualitative focus group method, which can play an important role in accurately revealing such a metric.

Appendix

Questionnaire: We briefly describe some people here. Please read each description and give your opinion on how this description matches you.

Intention to Use	(USE)
	He intends to continue using e-learning in the future
	He will always try to use e-learning in his day life
	He is intending to visit the e-learning system portal frequently to check news or course information
	He plans to continue to use e-learning frequently
Perceived Usefulness	(UFL)
	Using e-learning allows him to accomplish his tasks more quickly
	He believes that using e-learning improves his learning performance
	Using e-learning helps him learn effectively
	He believes e-learning in general is useful to him
Aspiration	
Motivation	(MTV)
	He thinks the flexibility in time and space makes using e-learning system very pleasant
	He uses e-learning system to be similar to other students at prestigious universities
	The use of e-learning system makes him feel that he belongs to a part of the technology revolution
Expectation	(EXP)
	He believes that the use of e-learning system will make him more competitive in the local job market
	He believes that using e-learning system will improve his diploma
	He believes that using e-learning system will enhance his skills
Enjoyment	(EJY)

Intention to Use	(USE)
Benefits	For him, e-learning system is a stress-free process due to reduced learning tasks as the task is accomplished immediately
	He prefers to do course tasks through the e-learning system than manually
	He finds it entertaining to learn through e-learning system
	He enjoys using the e-learning system to learn
	(BNF)
	He is confident that using the e-learning system increases his knowledge and helps him achieve success in the course
	E-learning helped him in understanding the educational objectives of the course
	He is confident that e-learning makes communication easier with the teacher and with other colleagues
	He is certain that e-learning saves his time and reduces expenses such as the cost of paper and mobility
	He is betting that the e-learning system is a very effective learning tool and this system has helped him improve his learning process

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Declarations

Disclosure of potential conflicts of interest The author declares that he has no potential conflicts of interests.

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