An Empirical Investigation into Factors Influencing the Intention to Use E-learning System: An Extended Technology Acceptance Model

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Author's contribution

This whole work was carried out by the author HA.

ABSTRACT

Aims: The aim of this research is to investigate the factors affecting the intention towards using e-learning in a Jordanian university, through an extension of the technology acceptance model (TAM).
Place and Duration of Study: Amman University College between May and July 2013.
Study Design: Adapted theoretical framework. This study incorporates perceived system quality and perceived self-efficacy into the TAM model in order to investigate the role of perceived system quality and perceived self-efficacy in educators' intention towards using e-learning.
Methodology: The adapted model was applied to Amman University College; the study used primary data that was collected through self-administered questionnaires; Partial least squares analysis was used to observe the associations of proposed constructs.
Results: The results of the study confirm the original technology acceptance model findings. The research results show that all the hypotheses are supported, which indicates that the extended variables can effectively predict whether users will adopt an e-learning system.
Conclusion: This research advances theory and contributes to the foundation for future research aimed at improving our understanding of students' adoption behavior of the e-learning system. This study will help to determine what are the factors that are significant in explaining the intention towards e-learning.

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1. INTRODUCTION

The importance of information and communications technologies (ICT) is increasing day after day and becomes a fundamental requirement for providing ease in the integration of technology in all fields, especially in the field of education. E-learning is one of the new methods which might provide opportunities to create well-designed, learner-centered, meaningful distributed learning and facilitated the interaction and the exchange of views and experiences [1]. E-learning refers to the acquisition and use of knowledge distributed and facilitated primarily by electronic means. This form of learning currently depends on networks and computers, but will likely evolve into systems consisting of a variety of channels (e.g., wireless), and technologies (e.g., cellular phones) as they are developed and adopted [2].

The issue of ICT uses in higher education and the factors influencing the adoption of e-learning in Jordan have not been extensively investigated before. Despite the fact that, universities in the Middle East countries are facing stakeholder pressures to adopt many of the educational practices found in western university systems [3], including e-learning. Yet, successful implementations of e-learning in these countries are rather rare [4]. The educator's attitude towards e-learning adoption varied in these countries. In Turkey there was a generally positive attitude towards e-learning [5]. In contrast, the rates of adoption of e-learning in Jordan have been slow [6].

It is necessary to conduct research that deals more intensively with the learners' perception of, attitude towards, and intention to use e-learning. In information systems research, the user's attitude toward using and the actual usage of a technology are addressed in the technology acceptance model (TAM) [7,8]. TAM is an intention-based model developed specifically for explaining user acceptance of computer technology [9]. It has been used as the theoretical basis for many studies of user technology acceptance [10]. Furthermore, knowing the students' intentions and understanding the factors that influence students' beliefs about e-learning can help academic administrators and managers to create mechanisms for attracting more students to adopt this learning environment. Thus, the aim of this study is to investigate the effect of educators' attitudes on the adoption of e-learning in universities in Jordan.

The research presented here is motivated and guided by two main questions. First, what are the factors that are significant in explaining the intention towards using e-learning? Second, do the attitudinal beliefs such as perceived ease of use and perceived usefulness have relationship towards the e-learning adoption? In other words, this study examined TAM in an academic setting, investigating the factors affecting students' acceptance of e-learning technology.

2. THEORETICAL FRAMEWORK AND CONCEPTS

In order to understand what motivates individuals to accept and use information systems (IS) a variety of theoretical models have been developed. Among these models, it appears that the TAM is the most influential and commonly employed theory in IS [11,10].

The TAM model is based on principles derived from psychology [12]. The TAM model was developed with the argument that the success of a system can be determined by user acceptance of the system, measured by three factors: perceived usefulness (PU), perceived ease of use (PEOU) and attitudes towards usage (ATU) of the system [7], a user's perception about the system's usefulness and ease of use result in a behavioral intention to use [or not to use] the system [7,13]. Intention to use was defined as the degree to which users intend to adopt the technology or to increase their usage. Additionally, according to the model both attitudes toward an action and subjective norms have an impact on behavioral intention which in turn affects how people perform the action [12]. Therefore, we can apply this model to provide insight into the specific variables which influence the decision of individuals to engage in technology use. Hence, to successfully put into practice e-learning, it definitely depends on how frequently the system is used and adapted by users and why the users are motivated to successfully implement such system [11].

The causality of the four components of the TAM can be explained theoretically and empirically. Reversely speaking IS research bases the success of actual system use on the frequency and intensity of the target system use [15]. Attitude measures the tendency toward actual system use [e.g., 14,15]. According to Davis [7], when the causal relationship between attitude and usage is established, then antecedents or determinants of end user attitude toward the target system are not as difficult to investigate. The antecedents mentioned referred to end-user perception about the easiness and usefulness of the IS [7].

Despite its popularity, the TAM model provides only limited guidance on how to influence usage via design and implementation. Wixom and Todd argued that to increase practical relevance for the IS designers, design and implementation attributes must be included in the TAM. They further elaborated that as PU and PEOU are abstract concepts and provide general information to the designers. Hence, designers are unable to receive actionable feedback about the important aspects of the IS artifacts itself. They identified information and system quality significant constructs which can affect IS usage [10]. Following this, Alshibly recommends that such design attributes should be tested as antecedents of the constructs of interest. He further argued that adoption research reflecting only surrogate variables like PU cannot generate any specific design advice for practitioners. For example, practitioners receive feedback regarding usefulness in a general sense, but they do not receive actionable feedback about the important aspects of system's characteristics. Such feedback would be very important, especially for organizations, as online and distance courses using e-learning systems are still evolving [16]. Thus, an extended TAM model using factors related to system characteristics may provide more guidance for e-learning system designers and managers.

Furthermore, DeLone and McLean advised that the success of IS depends on the system quality in which directly affect perceived usefulness and system usage [17]. Therefore, TAM can play a major role in providing such important insights into the development of decision making on whether accepting or rejecting such technology. Additionally, Davis suggested that technology acceptance research needs to address how external variables affect PU, PEOU, and ATU [7]. Hence, the basic constructs of TAM, PU and PEOU, may not fully determine users' acceptance of e-learning, which therefore brings in the need to search for additional factors that may better predict and enhance the user acceptance of e-learning.

PU and PEOU could be affected by the external variables considered in the original TAM model. In this paper, we explore which external variables directly or indirectly affect learners' intentions to use an e-learning. From a human perspective, the learner's self-efficacy with

computers and networks has a great influence on participation in an online learning curriculum [18]. Thus, we take self-efficacy as one of our external variables and discuss whether there it affects the other factors related to the use of an online learning community.

Furthermore, it is widely recognized that, for students, the design of an online course is the most important determinant of learning effectiveness [19,20]. Therefore, it is critical that instructors adopt the proper system quality since the good design helps users overcome technical problems that may arise when using a system [19]. The system interfaces will not facilitate better learning outcomes if it is not comprehensive or it does not fulfill users' needs [21]. Based on the above observations, the proposed model considers the influence of the following two external variables of intention to use e-learning.

In TAM, PU and PEOU are considered distinct factors influencing the user's attitude towards using the technology; PU and PEOU are also hypothesized to influence attitudes towards using the technology. Finally, such attitude towards using the technology determines the behavioral intention to use that technology. Consistent with the previous discussion, we constructed the following model (Fig. 1).
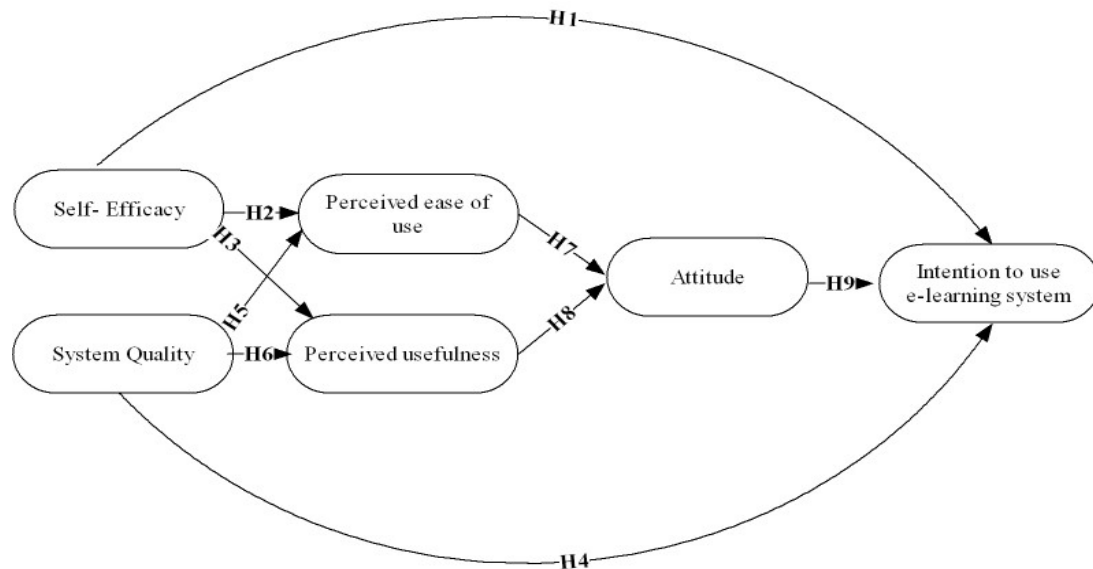

Fig. 1. The extended model

2.1 Self-efficacy

Self-efficacy is an individual's belief/judgments/perceptions of his or her ability to execute and accomplish designated levels of performance with the skills /artifacts he or she has to attain goals [22,23]. Self-efficacy beliefs determine how people motivate themselves and behave [24]. Paraskeva et.al found the degree of self-efficacy which individuals assign to themselves constitute a valid predictor of the expected behavior that the individuals will demonstrate in performing a task. Furthermore, self-efficacy influenced people's decisions, goals, their amount of effort in conducting a task and the length of time they would persevere through obstacles and difficulties [25].

In IS research, self-efficacy is an important research construct, Compeau and Higgins defined computer self-efficacy as a judgment of one's capability to use a computer in the accomplishments of a task. Persons' computer self-efficacy influences their perception of ability to successfully use a computer [26]. Furthermore, such awareness may influence future computer behavioral decisions, resulting in crucial influences on personal feelings and actions [18].

Compeau and Higgins observed that computer self-efficacy influences an individual's expectation regarding both effectiveness of use and emotional reactions. Furthermore, such self-efficacy influences the person's practical use [26]. Thus, individuals with high computer self-efficacy have more fun and less anxiety when using a computer, thereby, significantly influencing their self-expectations and job performance [27].

In e-learning, self-efficacy is one of the 30 indexes constructed by Womble for evaluating e-learning systems [28]. Moreover, various researchers have observed that a person with high computer self-efficacy may attain better learning effectiveness [18]. Computer self-efficacy was positively linked to e-learning outcomes; Johnson et al. [29] suggested that computer self-efficacy is important to improve educator interaction mediated via computing technology. For example, highly efficacious educators should be more likely to successfully interact with learning materials and instructors.

Self-efficacy plays a critical role in terms of its effect on PEOU and PU [30], because individuals' confidence in their computer-related knowledge and abilities can influence their judgment of the ease or difficulty of carrying out a specific task using a new IS, and how useful that new IS will be. Venkatesh and Davis reported that users' perceived ease of use is strongly regressed on computer self-efficacy in the early stage of technology acceptance [30]. Studies have reported significant positive relationships that were found between self-efficacy and e-learning system use intention [31]. Significant positive correlations were found among the three e-learning variables [self-efficacy, e-learner satisfaction and perceived usefulness [28]. Therefore, we hypothesize the following:

H1: Educators' perceived self-efficacy positively affects their intention to use the e-learning system.
H2: Educators' perceived self-efficacy positively affects the e-learning system's perceived ease of use.
H3: Educators' perceived self-efficacy positively affects the e-learning system perceived usefulness.

2.2 Perceived System Quality

System quality is a measure of an IS from the technical and design perspectives [17]. Thus, perceived system quality can be defined as the users' evaluation of an IS from the technical and design perspectives.

Perceived system quality has been operationalized in many different ways in the IS literature. For example, DeLone and McLean used convenience of access, flexibility of the system, integration of the system, and response time. Depending on the target technologies, the variables related to system quality may vary [32].

The role of perceived system quality in the success literature has been investigated extensively [17]. According to the IS success model, system quality is a critical success

factor that influences user satisfaction and the intention to use [17]. Petter and McLean performed a meta-analysis of studies that have used the IS success model to investigate the strengths of different relationships in the model. They found perceived system quality-intention to use relationships were strong [33]. The system quality has also been studied with regard to individuals' IS acceptance research. According to TAM, system quality can be viewed as an external variable that affects behavioral beliefs [7].

Davis did not include system characteristics in TAM model, but he suggested including judicious system characteristics [7]. According to DeLone and McLean technology characteristics singularly or jointly affect subsequent use and user satisfaction [32].

Few studies have examined the role of users' perceived system quality in relation to intention to use the e-learning system [34]. Freeze et al. [35] utilized the IS success model and found that perceived system quality significantly affects both satisfaction and e-learning system usage. Hence, it is assumed that system quality positively effects affects users' intention to use the e-learning system. Thus, this study postulates the following hypotheses:

> H4: Educators' perceived system quality of an e-learning system positively affects their intention to use the e-learning system.
> H5: Educators' perceived system quality of an e-learning system positively affects the e-learning system's perceived ease of use.
> H6: Educators' perceived system quality of an e-learning system positively affects the e-learning system perceived usefulness.

2.3 Perceived Ease of Use, Perceived Usefulness and Attitudes

PU, PEOU and attitudes use are three main TAM variables developed by Davis [7]. According to TAM, perceived usefulness refers to the degree to which the user believes that using the technology will improve his or her work performance, while perceived ease of use refers to how effortless he or she perceives using the technology will be. Both are considered distinct factors influencing the user's attitude towards using the technology [11]. Finally, such attitude towards using the technology determines the behavioral intention to use that technology.

PU and PEOU have been settled from previous researches to be considered as important factors determining user acceptance and usage behavior of information technologies [9]. Venkatesh reported, PEOU 'describes the individual's perception of how easy the innovation is to learn and to use'. Given that some fraction of a user's total job content is devoted to physically using the system alone, if a greater ease of use offered more productivity in each job fraction as a result, the user becomes more productive in that fraction of his or her job. This leads him or her to become more productive in general [36]. Moreover, Davis states that because some of the users' job content includes use of a computer per se, if a user becomes more productive via ease of use enhancements, then he or she should become more productive overall. Perceived usefulness is not hypothesized to have an impact on perceived ease of use. Moreover; Davis, states that "making a system easier to use, all else held constant, and should make the system more useful" [9].

Although users believe that a given application may be successful, but they may, at the same time, believe that the technology is too hard to use and that the performance benefits of usage are outweighed by the effort of application [11].

Attitudes are the beliefs of an individual that predisposes him to act in a certain manner, with effect, behavior and cognition as constituent components of attitude [7]. Attitudes are composed of the positive and negative feelings of the individual about a contemplated action [4]. With respect to e-learning adoption, attitude is a critical factor for the intent to use the computer as a tool for learning and the translation of the intent into the action of using the computer. Attitude is also an important factor underlying student self-efficacy in e-learning, with a positive or favorable attitude supporting a perception of greater self-efficacy [37].

Previous studies examining attitude towards e-learning among students have found that attitude was primarily influenced by perceived usefulness, although previous use and the degree of support also accounted for some of the variance in student attitudes [38]. The contribution to attitude effect from previous use may also involve the two dimensions, namely, previous use of computers, which creates greater facility with employing computer applications, and previous experience specifically with the use of computers for e-learning [38].

Research conducted by Teo et.al determined that the attitude of teachers and administrators in an educational institution was a critical variable for the adoption of e-learning. If the teachers have a negative attitude towards computer-assisted learning and online learning, they will influence the institution against accepting e-learning and resist adopting the technology if it is mandated [39]. The attitude of the teachers and administrators towards e-learning also influences the attitudes of students because the instructors are major actors in the learning process [38]. There may also be a difference in attitude towards e-learning between administrators and teachers. If administrators promote the use of technology for e-learning, it may nonetheless meet with resistance from teachers if they do not have a positive attitude towards e-learning [40].

The attitude of students towards e-learning may not be static, and may be modified over time in response to changes in the factors contributing to the attitude [38]. Based upon the discussion above, the following hypotheses are proposed:

H7: Educators' perceived ease of use of an e-learning system positively affects their attitudes toward the e-learning system.
H8: Educators' perceived Usefulness of an e-learning system positively affects their attitudes toward the e-learning system.
H9: Educators' attitudes toward the e-learning system positively affect their intention to use the e-learning system.

3. METHODS

3.1 Measures

Data for the research was collected simultaneously using the dissemination of a survey questionnaire to students at Amman University College in Al-Balaqa Applied University, Jordan. As shown in Table 1, the survey instruments consisted of 23 items to evaluate six constructs of the proposed model. To ensure the content validity of a scale, the items selected must represent the concept about which generalizations are to be made. Therefore, previously scales which have proven to be valid were employed to measure all constructs of the research proposed model (Table 1). Some items of the scale were modified in the context of an e - learning system. Two items to measure the perceived usefulness and four items to measure perceived ease of use were adapted from Davis [7] and Lee [41]. Intention

to use was measured using four items adopted from Davis et al. [8] and Venkatesh & Davis [30]. Three items to measure attitudes toward the e-learning system were adopted from Davis [7]. Perceived self-efficacy constructs were measured using four items from Lee, [41]. Finally, perceived system quality was measured using 6 items adopted from Freeze et al [35]. All items were reviewed by e-learning experts and researchers in the field. Items related to independent variables were modified and reviewed by experts to ensure their relevance to the e-learning system context of the present study. Table 1 presents the research constructs and related survey items used for measurement of each of these constructs.

Table 1. Research constructs and related survey items

Construct	Operational definition	Items	Statement	References
Attitudes	Positive or negative evaluations of the e-learning system	ATT1	I like the idea of using this system to help me learn the course.	Davis [14]
		ATT2	I have a generally favorable attitude toward using this system	
		ATT3	I believe it is a good idea to use this system for learning the course	
Intention to use	The degree to which Educators intend to reuse the e-learning system or increase their use of it in the future.	INT1	If I need to study for advanced degrees [programs], I would expect to use the online learning system	Davis et. al [16] Venkatesh and Davis [38]
		INT2	If asked, I would likely recommend the online learning system as an ideal learning platform.	
		INT3	For future advanced degrees programs/certificates], I would probably use the online learning system	
		INT4	If available, I intend to use e-learning tools whenever possible for my coursework.	
Perceived self-efficacy	Confidence in one's ability to perform certain learning tasks using an e-learning system	PCE1	I am able to operate the e-learning system with less support and assistance.	Lee, [45]
		PCE2	I am confident that I can overcome any obstacles when using the e-learning system.	
		PCE3	I believe that I can use different e-learning software and systems to receive education.	

Construct	Operational definition	Items	Statement	References
		PCE4	I have the skills necessary to use the online learning system.	
Perceived ease of use	The educators' perception of ease of use of the system related to accomplishing the e-learning tasks.	PEOU1	Interacting with the e-learning system does not require a lot of my mental effort.	Davis [14] Lee, [45]
		PEOU2	I find the e-learning system to be easy to use.	
		PEOU3	My interaction with the e-learning system is clear and understandable.	
		PEOU4	I find it easy to get the e-learning system to do what I want it to do.	
Perceived usefulness	The educators' perceptions on the e-learning system effectiveness of improving academic performance	PU1	Using the e-learning system improves my learning performance.	Davis [14] Lee, [45]
		PU2	I find the e-learning system to be useful in my learning	
Perceived system quality	The educators' perceptions of the degree to which the technical components of the -learning system provides the required quality of information.	SQ1	The system is always available.	Freeze et al [20]
		SQ2	The system is user-friendly	
		SQ3	The system provides interaction between users and the system	
		SQ4	The system has attractive features that appeal to users	
		SQ5	The system provides high-speed information access.	
		SQ6	The system operates reliably	

All items were measured by the respondent's level of agreements or disagreements with the statements on a 5-point Likert scale [from 1—strongly disagree to 5—strongly agree].

Survey participants need to indicate their level of agreement or disagreement with the statements on the 5-point Likert scale. In addition to the model measurement items, the survey also collects information on the respondents' demographics.

3.2 Sampling and Survey Procedures

Data was collected from 450 students at Amman University College in Al-Balaqa Applied University, Jordan. Founded in 1952, Amman University College is one of the oldest institutions of higher education in Jordan. The college offers 5 baccalaureate majors

[business administration, management information systems, accounting, accounting information systems, and financial management] and 6 MBA degree programs. The college has 2671 students enrolled in all of its programs. Of this group, 52% of students are male and 48% are female. The size of the study population as well as the diversity of the student population supports the ability to generalize the findings.

The survey questionnaire was in Arabic because all respondents were native Arabic speakers. The questionnaire was reviewed and tested with 30 students from another e-learning program and was refined and revised based on the feedback of pilot tests.

When potential participants were first contacted, they were provided with an information sheet which described the project aims and what would be expected from them. It also assured voluntary participation and confidentiality and stated that participants were able to withdraw from the study at any point without penalty. Participants were informed that the return of a completed survey would be taken as consent. However, as returned surveys would be anonymous, the information sheet advised that withdrawal of data after the return of the survey would not be possible.

With the assistance of course managers, 380 questionnaires were distributed in paper for students and 209 validated responses were collected by instructors.

4. DATA ANALYSIS

The measurement and research models were tested using partial least squares (PLS) technique and utilized the tool smartPLS v2 [42]. PLS is a second generation regression method that combines confirmatory factor analysis with linear regression, and this makes it possible to run the measurement and structural models simultaneously [42]. PLS has enjoyed increasing popularity in IS research for its ability to model latent constructs under the condition of non-normality [43]. PLS is a component-based structural equation modelling technique that has minimal demands on measurement scales, sample size, and residual distributions [43].We chose PLS because of its minimal requirements regarding sample size and prediction capability. A rule of thumb for the required sample size in PLS is that the sample should be at least ten times the number of independent variables in the most complicated multiple regression in the model [44]. The sample size in this study meets the minimum sample size requirement.

4.1 Analysis of Measurement Model

Table 2 shows the Average Variance Extracted (AVE) and other measures of reliability. Reliability refers to the degree to which data collection method or methods will yield consistent findings, similar observations would be made or conclusions reached by other researchers or there is transparency in how sense was made from the raw data [44]. The reliability of the instrument was established using Cronbach's alpha, which is a measure of the internal consistency of the instrument. Cronbach's alpha estimates the true score variance captured by the items in the scale by comparing the sum of the item variance with the variance of the sum of the scale [43,44]. A Cronbach's alpha result of 0.70 or higher is generally considered to show adequate reliability of instruments used to gather psychometric data [44]. The analysis of the data with Cronbach's alpha indicated that the instrument was reliable.

Considering the present study as a whole, Cronbach's alpha varied from 0.70 to 0.88, which is considered acceptable for this type of research (Table-2). Composite reliability (CR) and AVE are other measures of reliability. The CR estimates the extent to which a set of latent constructs indicators share in their measurement of a construct, while the AVE is the amount of common variance among latent construct indicators [43].

As noted by Hair et al. [44] CR value should be equal to or greater than 0.60. Based on these assessments, measures used within this study were within the acceptable levels, thus supporting the reliability of the constructs, as presented in Table 2.

Table 2. AVE, composite reliability and internal consistencies

	AVE	Composite Reliability	Cronbach's Alpha
Attitudes	0.71	0.88	0.79
Intention to use	0.55	0.83	0.75
Perceived Self-efficacy	0.70	0.90	0.86
Perceived System Quality	0.54	0.88	0.83
Perceived ease of use	0.67	0.89	0.83
Perceived usefulness	0.76	0.86	0.69

Validity is a measure of the extents that the measures obtained actually measure the hypothesized constructs [44]. The measure has wide applicability because it can be computed for the construct (s) in a model regardless of whether the researcher is estimating the measurement model, undertaking confirmatory factor analysis [43]. The amount of shared variance between the indicators of a particular construct is a measure of validity. In this study the measurement model of a good observed indicator variable was tested using confirmatory factor analysis should be at least 0.5 or higher, although a value of 0.7 is preferred [44].

Testing for discriminant validity involves determining whether the items measure the construct in question or other [related] constructs. Discriminant validity was verified with both a correlation analysis and a factor analysis as recommended by Hair et al. [44]. The inspection of discriminant validity among the variables is based on the correlation between the variables and the square root of their respective average variance extracted [19]. According to the Fornell-Larcker criterion, the AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct. This notion is identical to comparing the square root of the AVE with the correlations between the latent constructs. In the table, the square root of the AVE is indicated by the values in bold type along the diagonal, the square roots of the AVEs for the reflective constructs are all exceeded the off-diagonal correlations between the constructs (Table 3), offering further evidence of discriminant validity. Furthermore, the AVE was assessed to evaluate discriminant validity, which indicates the extent to which a given construct is dissimilar to other constructs. The AVE measures the variance captured by indicators relative to the measurement error, which should exceed 0.5 to validate a construct [43].

Table 3. Correlation among variables and square root of average variance extracted

		1	2	3	4	5	6
1.	Attitudes	**0.84**					
2.	Intention to use e-learning system	0.77	**0.74**				
3.	Perceived Self-efficacy	0.70	0.72	**0.84**			
4.	Perceived System Quality	0.58	0.58	0.62	**0.74**		
5.	Perceived ease of use	0.65	0.65	0.79	0.62	**0.82**	
6.	Perceived usefulness	0.67	0.69	0.69	0.61	0.70	**0.87**

Note: The bold elements on the diagonal represent the square roots of the average variance extracted, and off-diagonal elements are the correlation estimates

As shown in Table 3, all of the measurement variance was captured by the construct for all values exceeding 0.5. For each construct, the assessment of convergent validity or internal consistency is also included. Convergent validity indicates the extent to which the items of a scale that are theoretically related are also related in reality. As shown in Table 4, all items have path loadings exceeding the threshold value of 0.5 recommended by Fornell and Larcker [45].

Overall, these tests of validity and reliability provide us with a high degree of confidence about the scale items used in testing our research model.

4.2 Structural Model Results

The test of the structural model using PLS includes estimates of the path coefficients, which indicate the strengths of the relationships between the dependent and independent variables, and the R-square values, which represent the amount of variance explained by the independent variables. We used the bootstrapping method to determine the significance of the paths among the constructs. As recommended by Hair et.al we used the number of valid observations (n = 209) as the number of bootstrap cases, and 5,000 bootstrap samples [44]. Therefore, we derived significance for item loadings and path coefficients by using the t-statistic.

The structural equation model results are illustrated in Fig. 2 and Table 5 . As expected, Educators' perceived self-efficacy [β=0.36, t = 5.6648, *P*<0.001], Educators' perceived system quality [β=0.09, t = 1.9611, *P*<0.001], and Educators' attitudes toward the e-learning system [β=0.47, t = 8.2531, *P*<0.001] had a significant effect on intention to use the e-learning system, accounting for 68% of the variance in that measure.

Educators' perceived self-efficacy [β=0.66, t = 13.8583, *P*<0.001] and educators' perceived system quality [β=0.21, t = 3.7073, *P* < 0.001] significantly influenced the e-learning system's perceived ease of use, accounting for 66% of its variance. While perceived self-efficacy had a stronger effect on perceived ease of use (with a path coefficient of 0.66] compared to system quality [with a path coefficient of 0.21), educators' perceived self-efficacy [β=0.51, t = 9.4384, *P*<0.001] and educators' perceived system quality [β=0.29, t = 5.0815, *P*<0.001] had a significant influence on the e-learning system, perceived usefulness, accounting for 53% of its variance. Educators' perceived ease of use of an e-learning system [β=0.35, t = 6.0501, *P*<0.001] and educators' perceived usefulness of an e-learning system [β=0.42, t = 6.8078, *P*<0.001] significantly influenced their attitudes toward the e-learning system, accounting for 51% of its variance.

Table 4. Factor analysis results

	Attitudes	Intention to use e-learning system	Perceived Self-efficacy	Perceived ease of use	Perceived usefulness	Perceived System Quality
ATT1	0.8117					
ATT2	0.8566					
ATT3	0.8567					
INT1		0.8364				
INT2		0.8622				
INT3		0.5855				
INT4		0.6515				
PCE1			0.8492			
PCE2			0.8583			
PCE3			0.8065			
PCE4			0.8344			
PEOU1				0.7641		
PEOU2				0.8469		
PEOU3				0.8352		
PEOU4				0.8245		
PU1					0.9015	
PU2					0.8407	
SQ1						0.7331
SQ2						0.712
SQ3						0.756
SQ4						0.6112
SQ5						0.8283
SQ6						0.7543

Table 5. Standardized coefficients (β), R² and t-statistic

Hypotheses		*β*	R²	T Statistics	Result
H1	self-efficacy -> intention to use	0.36	0.68	5.6648***	Supported
H4	System quality -> intention to use	0.09		1.9611***	Supported
H9	Attitudes -> intention to use	0.47		8.2531***	Supported
H2	Self-efficacy -> ease of use.	0.66	0.66	13.8583***	Supported
H5	System quality -> ease of use.	0.21		3.7073***	Supported
H3	Self-efficacy -> usefulness	051	0.53	9.4384***	Supported
H6	System quality -> usefulness	0.29		5.0815***	Supported
H7	Ease of use -> attitudes	0.35	0.51	6.0501***	Supported
H8	Usefulness -> attitudes	042		6.8078***	Supported

*** p< .001, ** p<.05, * p<.01, based on two-tailed test; t [p< 1%] = 2.58; t [p< 5%] =1.96; t [p< 10%] = 1.65
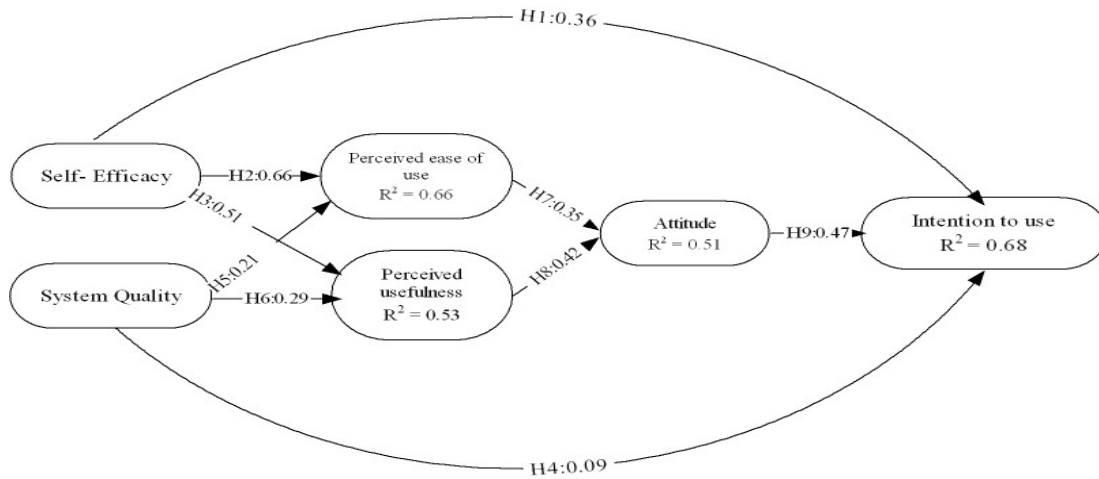
Fig. 2. PLS analysis results

5. DISCUSSION AND CONCLUSION

The proposed model expands our understanding of the intention to use e-learning by virtue of the inclusion of perceived self-efficacy and perceived system quality in the research model. We found support for the nine proposed hypotheses in our e-learning system model.

We found perceived self-efficacy, perceived system quality, and attitudes to be the significant determinants of educators' on intention to use the e-learning system. Especially, attitude was the most dominant factor in shaping educators' intention to use the e-learning system. Attitude indicates in a certain degree the possibility of adopting certain behaviors. Talking about an e-learning system, a favorable and positive attitude of students towards it suggests a greater probability that they will accept it.

Both the positive effect of perceived system quality and that of perceived self-efficacy on intention to use e-learning systems were supported. However, the former was not as strong as the latter. Our study found perceived self-efficacy to be the second most dominant predictor of intention to use after attitudes. This finding shows the importance of perceived self-efficacy in relation to the IS post-adoption, similarly perceived system quality on intention to use the e-learning system in their previous studies [34].

The study identifies that perceived self-efficacy is also related to the perceived ease of Use and Perceived usefulness. This finding is consistent with prior e-learning studies. For example, computer efficacy is examined with a significant positive effect on perceived ease of use of e-learning [40] and with significant positive effects on perceived usefulness, ease of use.

The study finding showed that perceived system quality is significantly related to educators' intention to use the e-learning system. Researchers in the area of conventional IS are generally regard system quality to be a highly important characteristic of all interactive computer systems [33], independent of the specific application the system was designed to support. In turn, the finding of this research suggests that the greater the perceived system quality of an e-learning system, the higher is an educators' intention to use the e-learning

system, agreeing with the literature noted above. However, there were few past studies about the impact of system quality of the e-learning system with user intention to use. Therefore, this research contributes to some extent to the current knowledge about the impact of system quality on intention to use.

As revealed from the findings, it can be seen that there is a relationship between perceived ease of use and attitude. The respondents agreed that they found e-learning tools easy to use; they also agreed that it would be easy to use these tools to find information. This means perceived ease of use has a positive effect on attitude. This suggests that it is important to develop easy to use and user-friendly e-learning systems. Findings from this study show that there is a relationship between the perceived usefulness and attitude of educators towards using e-learning system. The educators agreed that using e-learning tools would enhance their effectiveness in learning; they also agreed that using e-learning tools would increase their productivity in course work. This means that the perceived usefulness has a positive influence on the attitude of educators towards using e-learning system. This position is congruent with the findings of Davis, who suggest that the most critical belief underlying an individual's attitude towards the behavior of adopting a new technology depends on the person's perceptions about the usefulness of the technology to such a person [7].

Our finding regarding the association between perceived system quality and perceived usefulness is supported by both IS success [e.g., 33] and IS acceptance [e.g.,7] studies.

In terms of a theoretical contribution, the results of this research lend support to the TAM research findings that perceived usefulness and perceived ease of use is important variables affecting intention to use. The current research also represents an important contribution to TAM with the suggestion of a model for addressing two antecedents of perceived usefulness and perceived ease-of-use constructs.

The main limitation of this research is due to the fact that students included in this study didn't actually use an e-learning system in their college. So the attitudes were measured only through students' knowledge about e-learning that might be obtained from different sources, mostly from the media or their institution Web sites. Secondly, the study is limited to the students from one faculty. Increasing the students in numbers and including them from different departments and faculties might change the results. Finally, results may vary; in case, some additional variables, including TAM are added to the future studies that significantly affect the findings.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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