Extended Technology Acceptance Model for Multimedia-Based Learning in Higher Education

Rabab Dawoud Alsaffar, Ali Alfayly, and Naser Ali

***Abstract*—The purpose of this research is to fill the gap in the Technology Acceptance Model (TAM) in the context of multimedia-based learning in higher education. An additional variable - namely, subjective norm, has been added to TAM, and one of the main criticisms by the earlier researchers of it was that the model does not account for the human and social aspects of technology acceptance. The model has been empirically tested by the positivist paradigm of research using a sample size of 206 students in higher education in Kuwait, based on the convenience sampling method. A questionnaire survey through Google forms has been adopted to collect the quantitative data required for the study. The data was analyzed using the Structural Equation Modelling (SEM) technique. Nine hypotheses were postulated based on the extended TAM, among which six hypotheses were supported, and accordingly, the model has been fine-tuned. The most important finding of the study is that subjective norm has a significant and positive impact on both perceived ease of use and attitude towards the use of multimedia-based learning systems; however, the subjective norm has no direct significant influence on the intention to use. The hypothesis testing results have led to practical implications in the form of suggestions to technology managers in multimedia-based learning to enhance system use. The research has both theoretical and practical implications, and hence, will be useful to both academicians and practitioners.**

***Index Terms*—Actual system use, attitude towards use, intention to use, multimedia-based learning, perceived ease of use, perceived usefulness, subjective norm, technology acceptance model.**

I. Introduction

Abdurasulovich *et al*., (2020) claim that educational multimedia is a didactic software tool whose modus operandi is essentially interactive audio-visuals with a goal to provide meaningful learning and continuous development for the student [1]. The multimedia-based learning technology is continuously being updated since its inception with modern tools and technologies to support the innovative pedagogy. In a recent study by Zhang-Kennedy and Chiasson (2022) [2], 119 tools have been identified which have been classified under five media categories of digital games, table-top games, short-films, and animations, modules, and comics. In the years to come, multimedia-based learning is sure to grow further by leaps and bounds owing to the rapid growth of science and technology.

The innovative approach to the teaching-learning processes has made multimedia-based education an active area of research for both academicians and practitioners. Two broad streams of research can be observed in the literature on research in multimedia-based learning technologies - namely, technology enhancement and behavioral aspects of technology usage.

The Cognitive Theory of Learning [3] is the basis for the development of the Cognitive Theory of Multimedia Learning [4]. Both these theoretical models focus on the logical, reasoning, rationalizing, intellectual, cognitive, and perceptive components of learning processes. The third theoretical model - namely, Cognitive-Affective Model of Multimedia Learning [4] has the affective component of learning integrated into the dimensions of the earlier two theories. Researches have shown that the teacher's emotional state also has a role to play in the success of multimedia-based learning. For instance, Lawson *et al*., (2021) conducted an empirical research with a sample size of 202 bachelor degree students in the United States and found that the emotional state of the teacher in the content of multimedia-based learning had an important role to play in the achievement of the outcome of learning [5]. While these theories were on behavioral components of users of multimedia-based learning, the acceptance of newer technology in general by the user was theorized much earlier by the popular Technology Acceptance Model (TAM) [6]. This model identified the antecedents of the actual system use that takes place in a newer technology. While this model was widely accepted, there was also criticism of the model that it did not consider the human and social aspects involved in learning [7].

While all these aforementioned theoretical models have value addition, the gap lies in the accounting for the human and social aspects of the TAM. Thus, the integration of the subjective norm (SBN) with the other dimensions of the TAM has been considered in this research. The SBN is theorized under the assumption that a particular behavior is triggered through the belief that most of the people or people who are considered important approve it, and hence, it is inclusive of both the human and social aspects. Or, in simple terms, it refers to the compliance of an individual with the socially acceptable norm/s. So, if the human and social aspects have to be considered in the usage of multimedia-based learning, the SBN will have to be integrated with the TAM as endorsed by earlier researchers (e.g., [8], [9]). SBN was considered to have an impact on the

Manuscript received April 26, 2022; revised July 26, 2022. This work was undertaken by the individual interest of the researchers working in the area of multimedia-based learning in Kuwait.

Rabab Alsaffar and Naser Ali are with Educational Technology Department, Public Authority for Applied Education and Training, Kuwait (e-mail: rd.alsaffar@paaet.edu.kw, ng.ali@paaet.edu.kw).

Ali Alfayly is with the Computer Science Department, Public Authority for Applied Education and Training, Kuwait (e-mail: Ah.alfayly@paaet.edu.kw).

doi: 10.18178/ijiet.2022.12.12.1754

perceived ease of use (PEU) which is an antecedent of the actual system use (ASU) in TAM. There are empirical studies that have proved the impact of SBN on PEU ([10], [11]) and in direct contrast to this, there are also a few studies that have disapproved of the impact (e,g., [12], [13]).

While there are several resources considered as multi-media based learning applications, Table I provides the list which has been considered in the context of this research.

TABLE I: MULTI-MEDIA BASED LEARNING APPLICATIONS

Multi-media tool	Technology	Multi-media Components
1. OpenMath Technology	Technology to communicate mathematics.	Technology to communicate between computers, applications, and users.
2. NearPod	Technology to communicate text, video, sound, graphics, and animation.	Interactive lessons, virtual field trips, and collaborative learning.
3. SoundTrap	Technology to record sounds in all courses.	Integration of Learning Management System with the user
4. GradeCraft	Technology to add games to the learning.	Building games to make the course easy to learn.
5. PiktoChart	Technology to choose graphic images from a library for presentations and assignments.	Retrieving the right graphics that fit into the context of learning.
6. Glogster	Technology to communicate stories and user experiences.	Accessing images, and audio-visuals to share field visit experiences.

While there are several multi-media apps being procured and the obsolete ones are discarded, the rough usages of these apps in the Public Authority in Applied Education and Training, Kuwait are as follows:

1) College of Business Studies: GradeCraft Technology, Glogster – about 20 students use these apps
2) College of Technological studies: OpenMath, SoundTrap, NearPod – about 26 students use these apps
3) College of Health Sciences – NearPod, PiktoCraft – about 16 students use these apps

COVID-19 posed its challenges to education, and online classes were forced on the students. There are empirical research studies that showed that online classes were stressful for the students; however, the technology support was very good and it helped them in understanding the courses much better [14]. It has been observed by the researchers that online education during COVID-19 had several limitations in terms of understanding the concepts, and it was recommended that multi-media could be a very good add-on to online education and be an integral part of it [15]. It is the audio, video, text, color graphics, and animation available in multi-media that makes the learning process not only enjoyable but enhances the retention of the concepts for a longer duration, particularly in higher education [16].

However, all these studies are on different contexts of technology usage such as e-learning, mobile learning, online classes, online purchase, digital marketing, etc. Thus, even though generalization of these findings is difficult, extending the TAM with SBN as an antecedent to ASU would be meaningful in the sense that it fills the gap of missing human and social aspects in TAM. Thus, the following are the objectives of this research:

1) Develop an Extended Technology Acceptance Model (ETAM) for multimedia-based learning in higher education
2) Validate the ETAM in a practical situation
3) Make suggestions for enhancing the effectiveness of learning through multimedia-based learning

II. THE HYPOTHETICAL MODEL

The missing element in TAM is the subjective norm, as discussed in the previous section. So, introducing it as an extended component would be of great significance, particularly in the context of multimedia usage. The hypothetical ETAM is depicted in Fig. 1.

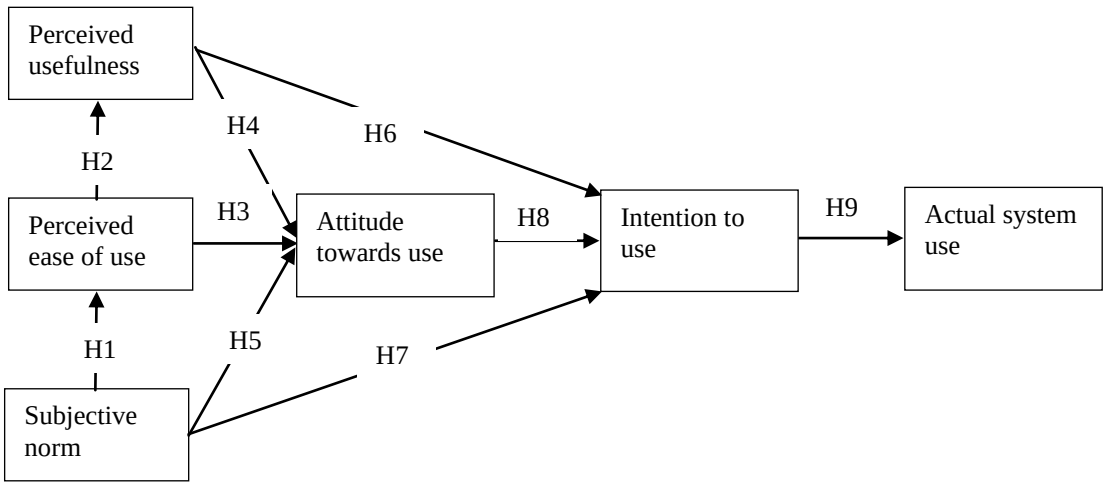

Fig. 1. The hypothetical ETAM.

While subjective norm has been used in TAM as an extended variable in some cases, it has not been studied in the context of multi-media technology. Further, there is no study on this variable in the context of Kuwait, where this study has been carried out. Hence, the incorporation of this variable in the model has been considered in this research. The

following sections deal with some of the earlier research works that have associated the variables of TAM in various contexts.

A. The Linkage between Subjective Norm and Perceived Ease of Use

The personal innovativeness triggered through subjective norm (SBN) had created perceived ease of use (PEU) in the minds of the teachers in primary and secondary school (n = 237) [17]. Teo and Huang (2019) collected data from 502 teachers from Chinese universities and found that SBN was a significant determinant of PEU [18]. Al-Okaily *et al*., (2020) [13] conducted research during the COVID-19 pandemic using 587 records on the use of technology in universities in the context of e-learning and found SBN had a positive relationship with PEU. Wang and Lei (2019) studied teachers' attitudes toward technology usage (n = 1,423 teachers in China) empirically and found that SBN and PEU had a significant correlation [18]. There are several such studies that have linked these two variables (e.g., [19]-[22]). However, not many are in the context of multimedia usage in higher education, and hence, the following hypothesis is postulated.

H1: There is a positive significant impact of subjective norms on perceived ease of use of multimedia in learning.

B. The Linkage between Perceived Ease of Use and Perceived Usefulness

It was found that perceived ease of use (PEU) and perceived usefulness (PRU) had a positive significant correlation in the context of social media in online education using a sample size of 318 students and teachers in four Libyan public universities and found that [23]. It has been conceptualized that in the context of online hotel booking, PEU has the potential to improve the PRU as per the earlier studies [1]. Positive and significant relationship between these two variables has been established using a sample of 92 respondents which included lecturers, students, and employees from AKI University, Indonesia. [24]. In contrast to these studies, there are also studies that do not support the relationship between these two variables. For instance, PEU is not a significant predictor of PRU in the context of e-government systems according to a study (n = 543) in government-run school teachers [25]. In another study with 368 students in the context of internet banking similar result is established [26]. Thus, the decision about the relationship between PEU and PRU is inconclusive, and hence, to test the relationship in the context of the use of multimedia in learning, the following hypothesis is postulated.

H2: There is a positive significant impact of perceived ease of use on perceived usefulness in multimedia-based learning.

C. The Linkage between Perceived Ease of Use and Attitude towards Use

The PEU and attitude towards use (ATU) had a good correlation according to the study undertaken using the students of psychology (n = 1791) [27]. In another study using purposive sampling (n = 70) in Jakarta in the context of online fashion products and found that the ATU of the online purchase was significantly influenced by the PEU [28]. van Deventer *et al*. (2018), applied the Technology Acceptance Model to mobile banking in South Africa and found that PEU and ATU were significantly correlated [29]. There are several such studies that claim a significant relationship between these two variables (e.g., [20], [30]). Thus, it is clear that the relationship between PEU and ATU is yet to be fully established. Moreover, these studies are in different contexts of technology adoption, and thus, cannot be generalized. So, to test this relationship in the context of multimedia usage in learning in higher education, the following hypothesis has been postulated.

H3: There is a positive significant impact of perceived ease of the use on attitude towards use of multimedia in learning.

D. The Linkage between Perceived Usefulness and Attitude towards Use

Al-Emran *et al*., (2020) conducted a questionnaire survey at British University in Dubai in the United Arab of Emirates (UAE) (n = 272 postgraduate students), and found that perceived usefulness (PRU) had a positive significant relationship with attitude towards use (ATU) [9]. Guritno and Siringoringo (2013), using a sample size of 283 customers in the airline industry found that in the context of online air ticket purchase, PRU had an impact on ATU [31]. Saadé and Bahli (2005) using a sample size of 105 students proved that in the online learning context, PRU was a significant predictor of ATU [32]. Jahangir and Begum (2008) using the data from 227 customers of private commercial banks in Bangladesh found that PRU and ATU had a significant and positive association [33]. There are many other similar studies that have claimed that PRU affects ATU in many different contexts (e.g., [34]-[36]); however, in the usage of multimedia, this relationship is yet to be fully explored, and hence, the following hypothesis has been postulated.

H4: There is a positive significant impact of perceived usefulness on attitude towards the use of multimedia in learning.

E. The Linkage between Subjective Norm and Attitude towards Use

Minton *et al*., (2018) studied the behavior and motivation related to sustainable consumption in Japan, France, and the United States of America, and found that SBN has an impact on ATU and indicated that the country's pragmatism and cultural values had roles to play on the SBN [37]. There are several other studies that have linked SBN and ATU in various contexts of technology usage in the workplace (e.g., [14], [16], [38]-[40]). However, much has to be done in the context of use of multimedia in learning, and hence, the following hypothesis is postulated.

H5: There is a positive significant impact of subjective norms on attitude towards the use of multimedia in learning.

F. The Linkage between Perceived Usefulness and Intention to Use

Al-Okaily *et al*. (2020), studied the relationship between PRU and intention to use (INU) in the context of e-learning during the COVID-19 pandemic using 587 records, on the use of technology in universities and found that PRU had a positive relationship with INU [13]. Abdullah *et al*. (2016), collected data from 242 undergraduate students in the UK and tested the TAM for its relevance in the usage of

e-portfolios to improve students' learning [1]. The results indicated that PRU was a significant predictor of INU. There are several such studies with similar results (e.g., [41]-[43]). While these studies establish the relationship between these two variables, there are also studies that have found that these two variables are not significantly associated with each other. For instance, Lee *et al*. (2005), found that there was no significant relationship between PRU and INU in the context of internet-based learning (n = 544) [44]. In another study, Tahar *et al*. (2020), applied regression and path analysis techniques to test the relationship between PRU and INU using a sample size of 126 government employees in Indonesia and found that PRU did not affect INU [45]. Al-Emran *et al*. (2020), also proved that PRU did not have a significant impact on INU using data collected from 273 postgraduate students in a British university in Dubai [9]. Ismail (2016), using a sample of 92 respondents which included lecturers, students, and employees from AKI University, Indonesia, also proved that these two variables do not have a significant association with each other [46]. As the decision on whether these two variables are significantly related or not is inconclusive, the following hypothesis is postulated to test the relationship in the context of multimedia usage for learning in higher education.

H6: There is a positive significant impact of perceived usefulness on intention to the use multimedia in learning.

G. The Linkage between Subjective Norm and Intention to Use

Trafimow and Finlay (1996) studied 30 behaviors of employees and found that SBN had an impact on the INU system [47]. Kashif *et al*. (2016), based their research on psychosocial theory and conducted research with a sample size of 484 managers in Pakistan working in the banks and telecom sectors [48]. The study revealed that SBN had control over the INU. Ursavaş *et al*., (2019), through a sample size of 324 pre-service and 517 in-service teachers proved that INU the computer was influenced by the SBN significantly [49]. Dalila *et al*. (2020), studied environment friendly usage with a sample size of 320 respondents in Malaysia and found that SBN and INU were correlated significantly [26]. There are several other studies that have correlated SBN and INU in various contexts of technology usage in the workplace (e.g., [7], [28], [50], [51]). In contrast to these studies, there are also studies that claim that these two variables are not significantly related. For instance, Teo (2011) using data of 592 teachers from schools in Singapore found that SBN had no impact on INU in the context of teachers' usage of technology in promoting learning. In general, as the decision on whether or not SBN has an impact on INU is inconclusive, the following hypothesis is postulated [52].

H7: There is a positive significant impact of subjective norms on the intention to use multimedia in learning.

H. The Linkage between Attitude towards Use and Intention to Use

Teo (2018) using data of 592 teachers from schools in Singapore in the context of technology usage in education found that ATU had a significant impact on INU [53]. Buabeng-Andoh (2020) in the context of students' intention to use mobile learning found that ATU had a significant impact on ATU through a sample size of 487 university students [21]. Al-Emran *et al*. (2020), using a sample size of 273 postgraduate students from the British University in Dubai proved that ATU was a significant predictor of INU [9]. Gultom (2020) studied the behavior of e-government services in Indonesia (n = 419) and found that ATU significantly influenced INU. Purwanto and Tannady (2020) studied the behavior of students towards online learning using a sample size of 107 students from the University of Jakarta, selected based on simple random sampling [54]. The study revealed that ATU was a significant predictor of INU. While there are several such studies that relate the ATU and INU in e-learning in general (e.g., [21], [33], [34], [46]), not many of them are specified in the context of multimedia-based learning, and hence, the following hypothesis is postulated.

H8: There is a positive significant impact of attitude towards use on intention to use the multimedia in learning.

I. The Linkage between Intention to Use and Actual System Use

While INU may create the need for actual system use (ASU), it need not necessarily end with the system use because there are other barriers to be overcome by the user. The barriers could be in the form of cost-effectiveness, convenience, availability, personal reasons, etc. There are research studies that have a found positive significant relationship between these two variables, and at the same time, there are studies that have found that these two variables are not related significantly. Singh and Sinha (2020) conducted research on the applicability of TAM in the context of mobile wallet technology using a sample size of 315 Indian merchants by an online survey method and found that the mediation effect of trust had a significant role to play in the association of INU and ASU [55]. Purwanto and Loisa (2020) used a sample size of 137 mobile banking users in Indonesia to study the technology adoption of m-banking customers and found that INU and ASU were significantly and positively related [56]. Chang and Cheung (2001), using a sample size of 255 part-time MBA and diploma students from two universities in Hong Kong based on stratified random sampling proved that INU had a positive significant relationship with ASU [23]. In direct contrast to these studies, Nadlifatin *et al*. (2020), performed a comparative study between Indonesia (150) and Taiwan (n = 167) in the context of the use of blended learning systems by university students and found that in both the countries, INU did not significantly impact ASU [57]. In another case, Elbanna (2010) conducted an interpretive case study of earlier research studies and argued that the linear straightforward relationship between INU and ASU is a fundamentally flawed, and complex ramification of system configuration and the business process does not guarantee INU leading to ASU [34]. Thus, to add to the body of knowledge in the study of the association of INU with ASU, the following hypothesis is postulated.

H9: There is a positive significant impact of intention to use on actual system use of the multimedia in learning.

III. Research Methodology

A. Research Design

The positivist paradigm with a quantitative approach forms the basis of the research design. A Questionnaire survey is used for data collection. The respondents to the survey are students from The Public Authority for Applied Education and Training in Kuwait. Ethical permission for data collection has been obtained from the concerned authorities. Voluntary participation in the survey through Google Forms was the mode of participation of the respondents. To meet local requirements, Google Forms were made available both in English and Arabic languages. Convenience sampling has been the sampling method. The structural equation modeling (SEM) technique was the tool used for analysis.

B. Sample Design

Non-probability-based convenience sampling is used in this research on the condition that there are at least five times the manifest variables of study as the sample size [58]. In this research, the sample size of 206 was found to be adequate to meet the standard criterion. The unit of analysis is the student in Public Authority in Applied Education and Training and Kuwait University, both located in Kuwait. Both of these colleges use multi-media-based learning, and hence they were chosen. Students were emailed the link of the Google form having the self-administered questionnaire and 206 usable filled questionnaires were obtained (response rate 56%).

C. Questionnaire Development

The questionnaire development and validation were as per the standard procedure and comprised two parts: the demographic information of the respondents (gender, age, and qualification), and the quantitative data collection items on the Likert 5-point scale (5- strongly agree; 1- Strongly disagree). The item development involved two parts. First, all the standard scales available were used with minor modifications to suit the settings of this research, and missing items were added to the main dimension. Modifications were necessary because the standard scales were used in contexts such as e-learning, educational technology, mobile learning, online purchase, etc. During the selection of these items, only those scales which had proved validity and reliability were chosen. To ensure that these modifications did not affect reliability and validity measures, confirmatory factor analysis (CFA) has been carried out using a pilot sample of 35 students who were not part of the primary data collection. The dimensions, contributing authors, description, and the sample item are given in Table II.

TABLE II: Dimension, References, Description, and Sample item

Dimension	References	Description	Sample item
Perceived ease of use	[6], [8], [43], [48], [49], [52]	It is the degree of effortlessness in the use of the system.	Learning to operate the multimedia used in the education system would be easy for me.
Perceived usefulness	[12], [23], [25], [27], [31], [37]; [59].	It is the degree to which task performance can be improved through the use of technology.	Using multimedia in learning will improve my academic performance.
Subjective norm	[16]; [30], [29], [41], [51], [54], [60], [61]	It is the belief about the approval or disapproval by most people about a particular behavior. It is also related to the approval/disapproval of behavior by the peer group and people of importance.	Most people who are important to me think that the use of multimedia is beneficial to learning.
Attitude towards use	[20], [35], [36] [62], [63], [64], [65], [66]	It is the positive or negative feelings about using a system/technology.	I will be benefitted from the use of multimedia-based education.
Intention to use	[2], [67], [68], [69].	It is the drive to use a system/technology.	I intend to use multimedia in learning.
Actual system use	[26]; [56], [70], [71].	It is the degree to which actually the system/technology is put to use.	I frequently use multimedia in learning.

IV. Analysis and Discussion

A. Measurement Model

The measurement model (Fig. 2) provides the reliability and validity aspects of the model. The Cronbach's alpha (0.7 to 0.8) indicates that the reliability of the data has a moderate level of acceptance value (Table III) (Cut off = 0.6; [4], [72]). The composite reliability (0.8 to 0.9) indicates moderate to high-reliability values [55], [73]. The factor loading confirms the convergent validity and the values above 0.6 indicate an acceptable effect of the factors [15], [60] (Table IV). The discriminant validity (a measure of the validity of the instrument used for measurement) is also in the acceptance range. To ensure discriminant validity, the square root of average variance extracted (AVE) of a construct was compared with the correlation of the construct with the remaining constructs. It was found that the square roots of AVE of all the constructs were greater than the correlation values of each of the construct with the other constructs; hence, ensuring that the instrument has the desired validity (Table V). Further, the R-squared value of the endogenous variable is a measure of the goodness of the model fit. In the present case, the R-squared values range from 0.1 to 0.5, which indicates that the endogenous variables explain 10 to 50% of the variances observed in the analysis. In other words, 10 to 50% of the influences of the independent variables on the dependent variables are explained through the model. The cut-off value of the R-squared value is 0.1 [4], [62], and hence the model fit is adequate.

TABLE III: Reliability and Validity

	Cronbach's Alpha	rho A	Composite Reliability	Average Variance Extracted (AVE)
Actual system use	0.69	0.76	0.82	0.60
Attitude towards use	0.65	0.66	0.81	0.59
Intention to use	0.71	0.73	0.84	0.63
Perceived ease of use	0.82	0.82	0.89	0.74
Perceived	0.79	0.79	0.88	0.70

usefulness				
Subjective norm	0.79	0.81	0.87	0.70

TABLE IV: FACTOR LOADINGS

	ASU	ATU	INU	PEU	PRU	SBN
ASU1	0.85					
ASU2	0.83					
ASU3	0.62					
ATU1		0.82				
ATU3		0.76				
ATU2		0.72				
INU2			0.84			
INU1			0.80			
INU3			0.74			
PEU3				0.87		
PEU1				0.86		
PEU2				0.85		
PRU1					0.85	
PRU3					0.84	
PRU2					0.82	
SBN2						0.85
SBN3						0.83
SBN1						0.82

Legend: ASU = Actual system use; ATU = Attitude towards use; INU = Intention to use; PEU = Perceived ease of use; PRU = Perceived usefulness; SBN = Subjective norm

TABLE V: DISCRIMINANT VALIDITY

	ASU	ATU	INU	PEU	PRU	SBN
ASU	0.78					
ATU	0.62	0.77				
INU	0.69	0.58	0.80			
PEU	0.29	0.32	0.36	0.86		
PRU	0.35	0.42	0.33	0.70	0.84	
SBN	0.36	0.39	0.30	0.36	0.43	0.83

Legend: ASU = Actual system use; ATU = Attitude towards use; INU = Intention to use; PEU = Perceived ease of use; PRU = Perceived usefulness; SBN = Subjective norm

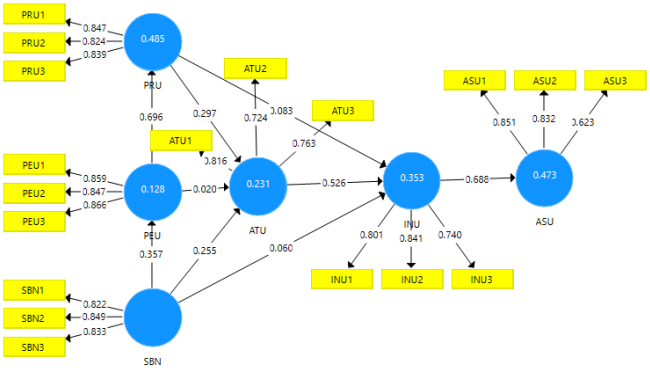

Fig. 2. Measurement model.

B. Structural Model

The structural model and hypothesis testing results are shown in Fig. 3 and Table VI. In this research, there were nine direct hypotheses, which were tested to extend the TAM with respect to the multi-media technology acceptance in higher education. Among the nine hypotheses being tested, six were supported and the rest were rejected. Thus, the following is the Extended Technology Acceptance Model (Fig. 4) in multimedia-based learning.

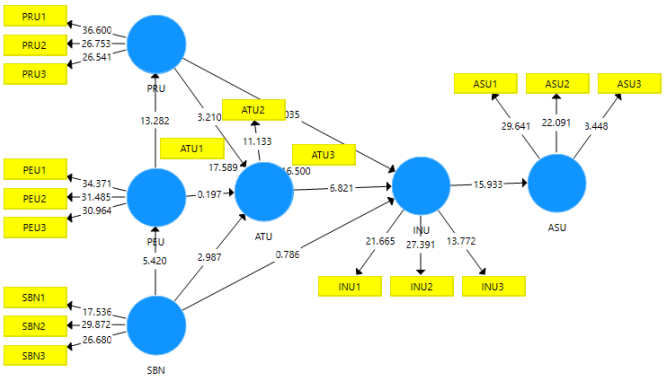

Fig. 3. The structural model.

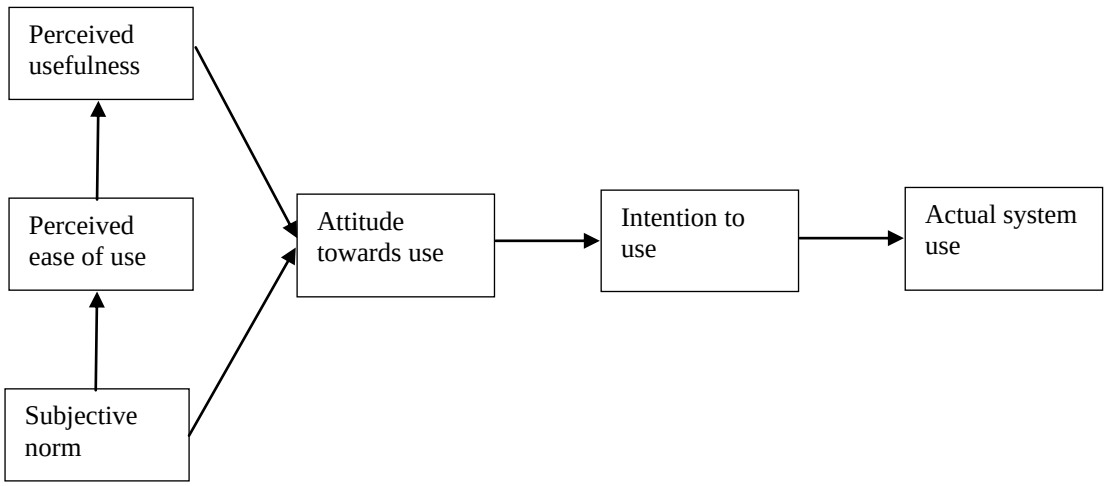

Fig. 4. The hypothetical model.

TABLE VI: HYPOTHESIS TESTING

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Hypothesis
H1: SBN -> PEU	0.36	0.37	0.07	5.42	0.00	Supported

H2: PEU -> PRU	0.70	0.70	0.05	13.28	0.00	Supported
H3: PEU -> ATU	0.02	0.02	0.10	0.20	0.84	Not supported
H4: PRU -> ATU	0.30	0.30	0.09	3.21	0.00	Supported
H5: SBN -> ATU	0.26	0.26	0.09	2.99	0.00	Supported
H6: PRU -> INU	0.08	0.08	0.08	1.04	0.30	Not supported
H7: SBN -> INU	0.06	0.07	0.08	0.79	0.43	Not supported
H8: ATU -> INU	0.53	0.52	0.08	6.82	0.00	Supported
H9: INU -> ASU	0.69	0.70	0.04	15.93	0.00	Supported

V. Findings and Suggestions to Technology Managers

ETAM is the result of this research, and the findings have led to implications in the form of suggestions to the technology managers of Higher Education in general, and the technology managers of Higher Education in Kuwait in particular.

1) This research has mainly focused on the missing element of TAM in the context of multimedia technology adoption in higher education. The literature review clearly indicated that one of the important missing elements in TAM was SBN. SBN becomes a significant dimension in the acceptance of technology, say multimedia in learning, by the students as they are subject to learning in an environment where their decisions on technology acceptance are subject to the influence of their surroundings. The influencing factors could be triggered through their interaction with teachers, fellow students, or any individual or group whom they consider important to them. In fact, their whole behavioral response to a situation could be governed by their opinion about how society may feel about their choice of a particular type of behavior. Student behavior has a cultural aspect associated with it and it can vary from country to country. In a country like Kuwait which has a culture of collectivism, it has been proved by several researchers (e.g., [9], [10], [67], [70], [74], [75]), that their decisions are strongly influenced by their surroundings.

Hypothesis testing has revealed that the SBN has direct influences on both PEU and ATU. This outcome is in alignment with the findings of a group of researchers (e.g., [6], [16], [50], [59], [60], [76]). This revelation makes the point imperative that to promote multimedia-based learning, measures are required to influence the first layer of the educated community, and those who are at the helm of affairs in the social, political, and cultural domains about the role multimedia-based educational technology can play in transforming the lives of the students and make them realize how it can make the learner self-dependent, reduce the teacher control in learning, and shift the role of teachers only as the facilitators to learning. Among the students, SBN is operative at both its dimensional level. The first is the descriptive norm, which is connected directly to the activities in which the group that can influence them is involved. So, the higher the involvement of the teachers and the administrators with multimedia-based learning, the higher will be the inclination of the students towards it. The second is the social norm, which refers to the perceptions about the opinions of other people. For instance, if there are story-telling sessions by the senior students about how they could easily learn a complicated subject through multimedia technology, it could instantly motivate a novice to follow the senior's path. It is clear through this research that the success of multimedia technology in learning is to a great extent based on the extent to which the SBN of the students could be influenced by the managers of the educational technology in higher education.

2) The PEU has a positive significant relationship with PRU of the multimedia learning; however, PEU has no significant impact on the ATU. At the same time, the PRU has a significant positive relationship with ATU. These findings are in alignment with that of a group of earlier researchers (e.g., [20], [62], [71], [77], [78]), but are in contradiction to the findings of another group of researchers [23], [31]. One of the reasons for this could be that these studies were in different contexts of technology usage as well as in different geographic locations. The outcome implies that PRU holds the key to the development of a student ATU in the same way as the SBN. The managers of multimedia technology should thus focus on the usefulness of multimedia in learning. The students must perceive that learning through multimedia would be useful to them in several ways, such as - saving time, longer retention of knowledge gained, easy recall of the knowledge, and mainly promoting innovativeness and creativity of the students, and preparing them to apply the knowledge gained in real-life situations. If this can be achieved by the technology managers, then the students would develop a positive attitude towards the usage of multimedia technology in learning.

Going by the very well proven Theory of Planned Behavior [5], belief forms the antecedent of attitude, according to which the students should believe that multimedia technology would benefit them and only then they develop a positive attitude towards using it. Alsabawy *et al*. (2016) [14], have found that in the context of the e-learning systems, there are four major dimensions that can have a significant influence on the PRU of the system - namely, system quality, IT infrastructure, information quality, and service delivery quality. It is worthwhile to pay attention to all these four antecedents of PRU so that the students develop the positive ATU in multimedia usage. System quality is perceived by the user in terms of parameters such as response time, accessibility of the information, reliability of the information retrieved, flexibility that can be provided to the learner, and the comfort the learner feels during the usage of the multimedia. IT infrastructure refers to the base foundation that the system can provide for learning through multimedia technology. The IT infrastructure that supports

multimedia should be very handy to the students in receiving, sharing, and exchanging it with their peer group. Information quality refers to the objectivity, reliability, accuracy, and ability to remain state-of-the-art. Finally, service delivery forms the central issue in multimedia-based learning, as it has to share part of the load of the teacher and make the student capable of being an independent learner. The true measures of service delivery are in terms of timeliness, receptiveness, fairness, and readiness to serve when it comes to multimedia-based learning. These four antecedents of PRU should remain the focus of the technology managers of multimedia-based learning to make it effective.

3) The third revelation of this research is the confirmation of the positive and significant relationship of the ATU with INU, which is in agreement with the findings of earlier researchers in many different contexts as mentioned before (e.g., [7], [17], [74]; [63], [79], [80]). As ATU is a significant contributor to the formation of the INU, the multimedia-based learning, technology managers need to consider the motivators as well as barriers towards the positive attitude building seriously to make multimedia-based learning effective. Research studies have shown that some powerful motivators of system use are - personal interest to use technology, the ability of the students to take on intellectual challenge, standardized content, flexibility in timings, ease of use, comprehensive content, high quality of knowledge resources, reliable information, real-life case studies, application-oriented learning material, interactive mode of learning, and supportive infrastructure; whereas, the barriers include poor accessibility, lack of ability to create interest in the course, poor instructional design, outdated material, and poor quality of audio-visuals [64], [72], [81], [82]. The technology managers may take appropriate measures to strengthen the motivating factors and alleviate the barriers to the extent possible to make multimedia-based learning more effective.
4) Finally, the research has also confirmed the positive and significant linkage between the INU and ASU, and the result is in alignment with earlier studies in other contexts (e.g., [70], [71], [83], [84]), but it also contradicts the earlier findings of researchers (e.g., [26], [56], [58], [85]). The general perception is that INU may lead to ASU, which need not necessarily be true, because other constraints may prevent the students to use multimedia despite the best intentions to use it, e.g., poor connectivity and hence loss of interest, cost ineffectiveness, cultural barriers, lack of time, lack of support from parents, lack of training, personal issues, behavioral issues, etc. However, in this research, it is revealed that intention to use has an impact on actual system use. So, the students who have developed an intention to use multimedia-based learning technology have in most cases ended up using it. The implication to the technology managers of multimedia-based learning is thus clear that they need to create an environment that would develop an INU in the minds of the students by considering its antecedents, which include - subjective norm, perceived ease of use, perceived usefulness, and attitude towards use. If the education providers create an environment congenial to foster the antecedents of intention to use it is more likely that the students may make multimedia-based learning an inseparable part of their learning process.

VI. Theoretical Implications

The TAM has been severely criticized for its over-emphasis on cognitive aspects and lack of consideration of the emotional, social, human, and psychological aspects of behavior [42], [61], [65], [68]. This research has integrated the human and social aspects of behavior in the acceptance of newer technology and contributed to the Extended Technology Acceptance Model (ETAM) for use in the context of multimedia-based learning. The TAM can move towards its completeness when it addresses the aforementioned criticism, and this research is a contribution in that direction. Identification of subjective norm as an antecedent to both the perceived ease of use and attitude towards use has been through a well-grounded theory. Peer group is the major influential factor among the students, and it is an inherent component of the subjective norm, which has been also established by earlier researchers (e.g., [66], [68], [69], [86]). Further, teachers are the main sources of references to the students, and they are considered as important as they not only introduce the students to the courses but also, prepare them to delve deep into the course even to the extent of performing independent research in the subject area. So, the subjective norm added as an antecedent to the TAM gives a sense of completeness to the model in the context of multi-media-based learning. Thus, the ETAM makes justice to some extent in finding the factors which decide the system use.

VII. Practical Implications

Identification of the antecedents of actual system use in the context of multimedia-based learning in higher education is a significant contribution in the sense that it provides clear-cut implications to the technology managers on the specific factors, which need to be fine-tuned to make the technology used more effective. In this research, empirically tested hypotheses provide concrete evidence for the establishment of linkages between the two factors under consideration. The managerial implications drawn in this research are significant because they are evidence-based. It has been identified that subjective norm is one of the most critical factors which may lead to the actual system use because it has an impact on both the perceived ease of use and the attitude towards use. Further, it was revealed that the perceived ease of use also has an impact on attitude towards use which provides support for earlier research (e.g., [87]-[91]). Thus, the subjective norm not only impacts attitude towards use directly but also produces an indirect impact through perceived ease of use and perceived usefulness. Practical implications can be tried by the technology managers of multimedia-based learning, as they are based on the proven success stories in other contexts of technology acceptance and their relevance to the current situation has also been explored.

VIII. Conclusion

This research is very timely as multimedia-based learning is making an impact in the educational scenario around the globe. There is a need to elicit information about the acceptance of this mode of learning so those policy decisions may be made by the technology managers to enhance its effectiveness. Kuwait is one among the many GCC countries that have invested a huge amount of money and human resources in multimedia-based learning at higher educational level [40]. So, all the stakeholders in higher education are keen on the effectiveness of multimedia-based education.

In this research, an attempt has been made to extend the TAM by considering the impact of the subjective norms which was the missing element of the model. The proposed model was tested using a sample obtained from the students of higher education in Kuwait for the testing of nine hypotheses. The result was the Extended Technology Acceptance Model which has empirically proved that subjective norm has an impact on both the perceived ease of use as well as attitude towards use and this has been the basis for drawing the practical implications. ETAM can act as the basic model to test the effectiveness of multimedia-based learning and identify the critical dimensions which are responsible for the effectiveness of multimedia-based learning in terms of actual system use.

The data collection for this research was through convenience sampling, and hence, the generalization has its limitations. Nevertheless, the systematic research methodology adopted in this research and the effective use of bootstrapping to extrapolate the data has taken the measure to compensate for this limitation to the extent possible. Future researchers may adopt probability-based sampling methods to make this research more robust. The ETAM can be tested further, and newer variables may be added if they are relevant. This research is purely quantitative as it is basically an empirical study and there is scope to extend the research further by adopting a mixed-methods approach. Finally, all the generalizations are based on the data collected in Kuwait, and the model may have to be tested across the different countries to make it more robust.

"The final proof of the pudding is in the eating", and the final test of multimedia-based learning is in the form of actual use of the system. If the students make productive use of the multimedia-based learning system, the purpose stands fulfilled. ETAM provides the linkages of the system used with its antecedents, and while theoretical implications add to the body of knowledge the practical implications can be made use of by the technology managers of multimedia-based learning. In a country like Kuwait, the use of multimedia-based learning is relatively new in comparison to western countries, and research of this nature may pave the way to the success of innovative pedagogies.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Dr. Alsaffar conducted the research; Dr. Alfayly has analyzed the data; Dr. Ali wrote the paper.

References

[1] K. Abdurasulovich, K. Yangiboevich, A. Alimov, and G. Xolmurodovich, "Opportunities and results to increase the effectiveness of multimedia teaching in higher education," *Journal of Critical Reviews*, vol. 7, no. 14, pp. 89-93, 2020.

[2] L. Zhang-Kennedy and S. Chiasson, "A systematic review of multimedia tools for cybersecurity awareness and education," *ACM Computing Surveys*, vol. 54, no. 1, pp. 1-39, 2022.

[3] D. Abdullah, K. Jayaaraman, D. N. Shariff, K. A. Bahari, and N. M. Nor, "The effects of perceived interactivity, perceived ease of use and perceived usefulness on online hotel booking intention: A conceptual framework article information," *International Academic Research Journal of Social Science*, vol. 3, no. 1, pp. 16-23, 2020.

[4] F. Abdullah, R. Ward, and E. Ahmed, "Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios," *Computers in Human Behavior*, vol. 63, pp. 75-90, 2016.

[5] S. Ahmad, N. Zulkurnain, and F. Khairushalimi, "Assessing the validity and reliability of a measurement model in Structural Equation Modeling (SEM)," *British Journal of Mathematics & Computer Science*, vol. 15, no. 3, pp. 1-8, 2016.

[6] A. Lawson, R. Mayer, N. Adamo-Villani, B. Benes, X. Lei, and J. Cheng, "Recognizing the emotional state of human and virtual instructors," *Computers in Human Behavior*, vol. 114, p. 106554, 2021.

[7] I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179-211, 1991.

[8] S. M. Akar, "Does it matter being innovative: Teachers' technology acceptance," *Education and Information Technologies*, vol. 24, no. 6, pp. 3415-3432, 2019.

[9] M. Al-Emran, I. Arpaci, and S. Salloum, "An empirical examination of continuous intention to use m-learning: An integrated model," *Education and Information Technologies*, vol. 25, no. 4, pp. 1-20, 2020.

[10] N. Al-Ajmi and Z. Aljazzaf, "Factors influencing the use of multimedia technologies in teaching English language in Kuwait," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, no. 05, pp. 212-234, 2020.

[11] A. Al-Kandari, T. Gaither, M. Alfahad, A. Dashti, and A. Alsaber, "An Arab perspective on social media: How banks in Kuwait use instagram for public relations," *Public Relations Review*, vol. 45, no. 3, pp. 12-34, 2019.

[12] O. Alkhadher, T. Beehr, and L. Meng, "Individualism-collectivism and nation as moderators of the job satisfaction-organisational citizenship behavior relationship in the United States, China, and Kuwait," *Asian Journal of Social Psychology*, vol. 23, no. 4, pp. 469-482, 2020.

[13] M. Al-Okaily, H. Alqudah, A. Matar, A. Lutfi, and A. Taamneh, "Dataset on the acceptance of e-learning system among universities students' under the COVID-19 pandemic conditions," *Data in Brief*, vol. 32, no. 1, pp. 1-5, 2020.

[14] Alsabawy, A. Cater-Steel, and J. Soar, "Determinants of perceived usefulness of e-learning systems," *Computers in Human Behavior*, vol. 64, pp. 843-858, 2016.

[15] N. Ameen, R. Willis, M. Abdullah, and M. Shah, "Towards the successful integration of e-learning systems in higher education in Iraq: A student perspective," *British Journal of Educational Technology*, vol. 50, no. 3, pp. 1434-1446, 2018.

[16] S. Binyamin, M. Rutter, and S. Smith, "The influence of computer self-efficacy and subjective norms on the students' use of learning management systems at King Abdulaziz University," *International Journal of Information and Education Technology*, vol. 8, no. 10, pp. 693-699, 2018.

[17] J. Hair, C. Ringle, and M. Sarstedt, "Partial least squares: The better approach to structural equation modeling?" *Long Range Planning*, vol. 45, no. 5-6, pp. 312-319, 2012.

[18] Y. Li, Q. Wang, and J. Lei, "Modeling Chinese teachers' attitudes toward using technology for teaching with a SEM approach," *Computers in the Schools*, vol. 36, no. 2, pp. 122-141, 2019.

[19] T. Teo and F. Huang, "Investigating the influence of individually espoused cultural values on teachers' intentions to use educational technologies in Chinese universities," *Interactive Learning Environments*, vol. 27, no. 5-6, pp. 813-829, 2018.

[20] R. Brännström, H. Ullén, and Y. Brandberg, "Attitudes, subjective norms and perception of behavioral control as predictors of sun-related behavior in Swedish adults," *Preventive Medicine*, vol. 39, no. 5, pp. 992-999, 2004.

[21] C. Buabeng-Andoh, "Exploring university students' intention to use mobile learning: A research model approach," *Education and Information Technologies*, pp. 1-16, 2020.

[22] L. Can and N. Kaya, "Social networking sites addiction and the effect of attitude towards social network advertising," *Procedia - Social and Behavioral Sciences*, vol. 235, pp. 484-492, 2016.

[23] M. Chang and W. Cheung, "Determinants of the intention to use Internet/WWW at work: A confirmatory study," *Information & Management*, vol. 39, no. 1, pp. 1-14, 2001.

[24] S. Chen and C. Lu, "A model of green acceptance and intentions to use bike-sharing: YouBike users in Taiwan," *Networks and Spatial Economics*, vol. 16, no. 4, pp. 1103-1124, 2015.

[25] W. Cidral, T. Oliveira, M. Di Felice, and M. Aparicio, "E-learning success determinants: Brazilian empirical study," *Computers & Education*, vol. 122, pp. 273-290, 2018.

[26] D. Dalila, H. Latif, N. Jaafar, I. Aziz, and A. Afthanorhan, "The mediating effect of personal values on the relationships between attitudes, subjective norms, perceived behavioral control and intention to use," *Management Science Letters*, vol. 10, no. 1, pp. 153-162, 2020.

[27] K. Danurdoro and D. Wulandari, "The impact of perceived usefulness, perceived ease of use, subjective norm, and experience toward student's intention to use internet banking," *Jurnal Ekonomi dan Ekonomi Studi Pembangunan*, vol. 8, no. 1, pp. 17-22, 2016.

[28] F. Davis, R. Bagozzi, and P. Warshaw, "User acceptance of computer technology: A Comparison of two theoretical models," *Management Science*, vol. 35, no. 8, pp. 982-1003, 1989.

[29] M. van Deventer, N. Klerk, and A. Bevan-Dye, "Influence of perceived ease of use and perceived relative advantage on Generation Y students' attitudes towards and usage behaviour of mobile banking in South Africa," *International Journal of eBusiness and eGovernment Studies*, vol. 10, no. 1, pp. 18-33, 2018.

[30] M. Dobricki, K. Kim, A. Coppi, P. Dillenbourg, and A. Cattaneo, "Perceived educational usefulness of a virtual-reality work situation depends on the spatial human-environment relation," *Research in Learning Technology*, vol. 29, no. 1, pp. 1-11, 2021.

[31] Renny, S. Guritno and H. Siringoringo, "Perceived usefulness, ease of use, and attitude towards online shopping usefulness towards online airlines ticket purchase," *Procedia - Social and Behavioral Sciences*, vol. 81, pp. 212-216, 2013.

[32] R. Saadé, "Dimensions of perceived usefulness: Toward enhanced assessment," *Decision Sciences Journal of Innovative Education*, vol. 5, no. 2, pp. 289-310, 2007.

[33] N. Jahangir and N. Nahar Begum, "The role of perceived usefulness, perceived ease of use, security and privacy, and customer attitude to engender customer adaptation in the context of electronic banking," *African Journal of Business Management*, vol. 2, no. 2, pp. 032-040, 2008.

[34] A. Elbanna, "From intention to use to actual rejection: The journey of an e-procurement system," *Journal of Enterprise Information Management*, vol. 23, no. 1, pp. 81-99, 2010.

[35] A. Elkaseh, K. Wong, and C. Fung, "Perceived ease of use and perceived usefulness of social media for e-learning in Libyan higher education: A Structural equation modeling analysis," *International Journal of Information and Education Technology*, vol. 6, no. 3, pp. 192-199, 2016.

[36] L. Eriksson and S. Forward, "Is the intention to travel in a pro-environmental manner and the intention to use the car determined by different factors?" *Transportation Research Part D: Transport and Environment*, vol. 16, no. 5, pp. 372-376, 2011.

[37] E. Minton, N. Spielmann, L. Kahle, and C. Kim, "The subjective norms of sustainable consumption: A cross-cultural exploration," *Journal of Business Research*, vol. 82, pp. 400-408, 2018.

[38] Y. Gvili and S. Levy, "Consumer engagement in sharing brand-related information on social commerce: The roles of culture and experience," *Journal of Marketing Communications*, vol. 27, no. 1, pp. 53-68, 2019.

[39] A. Hamid, F. Razak, A. Bakar, and W. Abdullah, "The effects of perceived usefulness and perceived ease of use on continuance intention to use e-government," *Procedia Economics and Finance*, vol. 35, pp. 644-649, 2016.

[40] S. Hammad, T. Graham, C. Dimitriadis, and A. Taylor, "Effects of a successful mathematics classroom framework on students' mathematics self-efficacy, motivation, and achievement: A case study with freshmen students at a university foundation programme in Kuwait," *International Journal of Mathematical Education in Science and Technology*, vol. 1, no. 1, pp. 1-26, 2020.

[41] A. Hanif, F. Jamal, and M. Imran, "Extending the technology acceptance model for use of e-learning systems by digital learners," *IEEE Access*, vol. 6, pp. 73395-73404, 2018.

[42] Z. Hussein, "Leading to intention: The role of attitude in relation to technology acceptance model in e-learning," *Procedia Computer Science*, vol. 105, pp. 159-164, 2017.

[43] M. Igbaria, S. Schiffman, and T. Wieckowski, "The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology," *Behavior & Information Technology*, vol. 13, no. 6, pp. 349-361, 1994.

[44] M. Lee, C. Cheung, and Z. Chen, "Acceptance of internet-based learning medium: the role of extrinsic and intrinsic motivation," *Information & Management*, vol. 42, no. 8, pp. 1095-1104, 2005.

[45] A. Tahar, H. Riyadh, H. Sofyani, and W. Purnomo, "Perceived ease of use, perceived usefulness, perceived security and intention to use e-filing: The role of technology readiness," *The Journal of Asian Finance, Economics and Business*, vol. 7, no. 9, pp. 537-547, 2020.

[46] H. Ismail, "Intention to use smartphone through perceived compatibility, perceived usefulness, and perceived ease of use," *Jurnal Dinamika Manajemen*, vol. 7, no. 1, pp. 1-10, 2016.

[47] D. Trafimow and K. Finlay, "The importance of subjective norms for a minority of people: between subjects and within-subjects analyses," *Personality and Social Psychology Bulletin*, vol. 22, no. 8, pp. 820-828, 1996.

[48] M. Kashif, A. Zarkada, and T. Ramayah, "The impact of attitude, subjective norms, and perceived behavioral control on managers' intentions to behave ethically," *Total Quality Management & Business Excellence*, vol. 29, no. 5-6, pp. 481-501, 2016.

[49] Ö. Ursavaş, Y. Yalçın, and E. Bakır, "The effect of subjective norms on preservice and in-service teachers' behavioural intentions to use technology: A multigroup multi-model study," *British Journal of Educational Technology*, vol. 50, no. 5, pp. 2501-2519, 2019.

[50] T. Indarsin and H. Ali, "Attitude toward using m-commerce: The analysis of perceived usefulness, perceived ease of use, and perceived trust: case study in Ikens Wholesale Trade, Jakarta – Indonesia," *Saudi Journal of Business and Management Studies*, vol. 2, no. 11, pp. 995-1007, 2017.

[51] L. Korn, D. Haynie, J. Luk, K. Sita, and B. Simons-Morton, "Attitudes, subjective norms, and perceived behavioral control associated with age of first use of cannabis among adolescents," *Journal of School Health*, vol. 91, no. 1, pp. 50-58, 2020.

[52] T. Teo, "Factors influencing teachers' intention to use technology: Model development and test," *Computers & Education*, vol. 57, no. 4, pp. 2432-2440, 2011.

[53] T. Teo, S. Kim, and L. Jiang, "E-learning implementation in South Korea: Integrating effectiveness and legitimacy perspectives," *Information Systems Frontiers*, vol. 22, no. 2, pp. 511-528, 2018.

[54] E. Purwanto and J. Loisa, "The intention and use behavior of the mobile banking system in Indonesia: UTAUT model," *Technology Reports of Kansai University*, vol. 62, no. 06, pp. 2757-2767, 2020.

[55] N. Singh and N. Sinha, "How perceived trust mediates merchant's intention to use a mobile wallet technology," *Journal of Retailing and Consumer Services*, vol. 52, p. 101894, 2020.

[56] E. Purwanto and H. Tannady, "The factors affecting intention to use google meet amid online meeting platforms competition in Indonesia," *Technology Reports of Kansai University*, vol. 62, no. 06, pp. 2829-2838, 2020.

[57] R. Nadlifatin, B. Miraja, S. Persada, P. Belgiawan, A. Redi, and S. Lin, "The measurement of university students' intention to use blended learning system through technology acceptance model (TAM) and theory of planned behavior (TPB) at developed and developing regions: Lessons learned from Taiwan and Indonesia," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, no. 09, pp. 219-230, 2020.

[58] F. Rejón-Guardia, A. Polo-Peña, and G. Maraver-Tarifa, "The acceptance of a personal learning environment based on Google apps: the role of subjective norms and social image," *Journal of Computing in Higher Education*, vol. 32, no. 2, pp. 203-233, 2019.

[59] S. Kulviwat, G. Bruner II, A. Kumar, S. Nasco, and T. Clark, "Toward a unified theory of consumer acceptance technology," *Psychology and Marketing*, vol. 24, no. 12, pp. 1059-1084, 2007.

[60] C. Lee and G. Wan, "Including subjective norm and technology trust in the technology acceptance model," *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, vol. 41, no. 4, pp. 40-51, 2010.

[61] J. Schepers and M. Wetzels, "A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects," *Information & Management*, vol. 44, no. 1, pp. 90-103, 2007.

[62] D. Taqi, "The impact of culture on third-line leaders in the Kuwait oil sector," *International Journal of Business and Social Science*, vol. 11, no. 8, pp. 17-26, 2020.

[63] C. Liang and W. Shiau, "Moderating effect of privacy concerns and subjective norms between satisfaction and repurchase of airline e-ticket through airline-ticket vendors," *Asia Pacific Journal of Tourism Research*, vol. 23, no. 12, pp. 1142-1159, 2018.

[64] S. Park, "An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning," *Journal of Educational Technology & Society*, vol. 12, no. 3, pp. 150-162, 2009.

[65] D. Shen, J. Laffey, Y. Lin, and X. Huang, "Social influence for perceived usefulness and ease-of-use of course delivery systems," *Journal of Interactive Online Learning*, vol. 5, no. 3, pp. 270-282, 2006.

[66] M. Tjiu and E. Purwanto, "Guanxi and the leader-member exchange in the Chinese supervisor and subordinate relationship," *Journal of Applied Economic Sciences*, vol. 12, no. 22182232, 2017.

[67] M. Lee, "Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model," *Computers & Education*, vol. 54, no. 2, pp. 506-516, 2010.

[68] A. Shuhaiber and I. Mashal, "Understanding users' acceptance of smart homes," *Technology in Society*, vol. 58, no. 1, p. 101110, 2019.

[69] F. Weng, R. Yang, H. Ho, and H. Su, "A TAM-based study of the attitude towards use intention of multimedia among school teachers," *Applied System Innovation*, vol. 1, no. 3, p. 36, 2018.

[70] M. Petrescu, J. Gironda, and P. Korgaonkar, "Online piracy in the context of routine activities and subjective norms," *Journal of Marketing Management*, vol. 34, no. 3-4, pp. 314-346, 2018.

[71] P. Legris, J. Ingham, and P. Collerette, "Why do people use information technology? A critical review of the technology acceptance model," *Information & Management*, vol. 40, pp. 191-204, 2003.

[72] D. Suleman and I. Zuniarti, "Consumer decisions toward fashion product shopping in Indonesia: The effects of Attitude, perception of ease of use, usefulness, and trust," *Management Dynamics in the Knowledge Economy*, vol. 7, no. 2, pp. 133-146, 2013.

[73] F. Munir, "Reliability and validity analysis on the relationship between learning space, students satisfaction and perceived performance using SMART-PLS," *International Journal of Academic Research in Business and Social Sciences*, vol. 8, no. 1, pp. 775-783, 2018.

[74] S. Ruggieri, R. Bonfanti, A. Passanisi, U. Pace, and A. Schimmenti, "Electronic surveillance in the couple: The role of self-efficacy and commitment," *Computers in Human Behavior*, vol. 114, p. 106577, 2021.

[75] N. Thongsri, L. Shen, and Y. Bao, "Investigating academic major differences in perception of computer self-efficacy and intention toward e-learning adoption in China," *Innovations in Education and Teaching International*, vol. 57, no. 5, pp. 577-589, 2019.

[76] Ö. Ursavaş, Y. Yalçın, and E. Bakır, "The effect of subjective norms on preservice and in-service teachers' behavioural intentions to use technology: A multigroup multi-model study," *British Journal of Educational Technology*, vol. 50, no. 5, pp. 2501-2519, 2019.

[77] K. Lavidas, A. Achriani, S. Athanassopoulos, I. Messinis, and S. Kotsiantis, "University students' intention to use search engines for research purposes: A structural equation modeling approach," *Education and Information Technologies*, pp. 1-17, 2019.

[78] S. Lee and B. Kim, "Factors affecting the usage of intranet: A confirmatory study," *Computers in Human Behavior*, vol. 25, no. 1, pp. 191-201, 2009.

[79] H. Lin, "Understanding behavioral intention to participate in virtual communities," *CyberPsychology & Behavior*, vol. 9, no. 5, pp. 540-547, 2006.

[80] R. E. Mayer, "Principles based on social cues in multimedia learning: Personalization, voice, image, and embodiment principles," *The Cambridge Handbook of Multimedia Learning*, 2nd ed., R. E. Mayer, Ed. Cambridge: Cambridge University Press, 2014, pp. 345–368.

[81] F. Paas and J. Sweller, "Implications of cognitive load theory for multimedia learning," in *The Cambridge Handbook of Multimedia Learning*, 2nd ed., R. E. Mayer, Ed. Cambridge: Cambridge University Press, 2014, pp. 27–42.

[82] S. Panda and S. Mishra, "E-learning in a mega open university: Faculty attitude, barriers and motivators," *Educational Media International*, vol. 44, no. 4, pp. 323-338, 2007. Available: 10.1080/09523980701680854

[83] B. Pierce, P. Perrin, and S. McDonald, "Path analytic modeling of psychologists' openness to performing clinical work with telepsychology: A national study," *Journal of Clinical Psychology*, vol. 76, no. 6, pp. 1135-1150, 2019.

[84] I. Pozón-López, Z. Kalinic, E. Higueras-Castillo, and F. Liébana-Cabanillas, "A multi-analytical approach to modeling of customer satisfaction and intention to use in massive open online courses (MOOC)," *Interactive Learning Environments*, vol. 28, no. 8, pp. 1003-1021, 2019.

[85] R. Rezaei, L. Safa, C. Damalas, and M. Ganjkhanloo, "Drivers of farmers' intention to use integrated pest management: Integrating theory of planned behavior and norm activation model," *Journal of Environmental Management*, vol. 236, pp. 328-339, 2019.

[86] C. Wan and G. Shen, "Encouraging the use of urban green space: The mediating role of attitude, perceived usefulness and perceived behavioral control," *Habitat International*, vol. 50, pp. 130-139, 2015.

[87] C. White and K. Alkandari, "The influence of culture and infrastructure on CSR and country image: The case of Kuwait," *Public Relations Review*, vol. 45, no. 3, p. 101783, 2019.

[88] A. Wicaksono and A. Maharani, "The effect of perceived usefulness and perceived ease of use on the technology acceptance model to use online travel agency," *Journal of Business Management Review*, vol. 1, no. 5, pp. 313-328, 2020.

[89] P. Chakraborty, P. Mittal, M. S. Gupta, S. Yadav, and A. Arora, "Opinion of students on online education during the COVID-19 pandemic," *Human Behavior and Emerging Technologies*, vol. 3, no. 3, pp. 357-365, 2021..

[90] I. Doyumgaç, A., Tanhan, and M. S. Kiymaz, "Understanding the most important facilitators and barriers for online education during COVID-19 through online photovoice methodology," *International Journal of Higher Education*, vol. 10, no. 1, pp. 166-190, 2021,

[91] R. Malhotra and N. Verma, "An impact of using multimedia presentations on engineering education," *Procedia Computer Science*, vol. 172, no. 1, pp. 71-76, 2020.

Copyright © 2022 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (CC BY 4.0).

Rabab Alsaffar was born in Kuwait City in 1983. She obtained the PhD in education from University of York, United Kingdom.

She is an associate professor at the Public Authority for Applied Education and Training, Educational Technology Department.

Her research interests include green and lean aspects in supply chain and logistics, and multimedia on education.

Ali Alfayly was born in Kuwait City in 1982. He obtained the PhD in education from University of Exeter, United Kingdom.

He is an assistant professor at the Public Authority for Applied Education and Training, Computer Science Department.

His research interests involve writing, discourse analysis, computer assisted language learning and developing students research skills.

Naser Ali was born in Kuwait City in 1970. He obtained the PhD in education from University of Exeter. United Kingdom.

He is an assistant professor at the Public Authority for Applied Education and Training, Educational Technology Department.

His research work is mainly on education.