


Behavioral Intention of Women to Use E-Learning

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ABSTRACT

Behavioral intention research suggests that it can effectively predicts intention to adopt information technology and emphasizes the importance of examining antecedents of such use. However, the literature also highlights that individual behavioral intentions can be affected by external factors and social influences. Current study examines the impacts of different factors (quality, social, behavioral, and innovative) on behavioral intention to use e-learning system. We designed special instruments to examine female students' behavioral intention to adopt e-learning system by extending the TPB as foundational framework. An extension of TPB is used with McLean & Delone and Innovative Theory to enhance the overall theoretical framework. Survey data collected from 699 female e-learning participants to test the study hypotheses. Findings suggested that subjective norms, self-efficacy, environment quality, and perceived innovativeness presented significant associations to behavioral intention of e-learning. Research implications and limitations are also examined and discussed.

KEYWORDS

Information Quality, Innovation Diffusion Theory, IS Success Model, Service Quality, Theory of Planned Behavior (TPB), User Satisfaction

INTRODUCTION

Research in psychology has found that predicting and describing human actions are difficult tasks. The difficulty comes from different causes that trigger human attitudes, such as physiological and environmental reasons, as well as many other factors, including political and social institutions around us. Many studies have pointed to a noticeable gap between the technical experience and background acquired by women compared to men in the field of information technology (Goswami & Dutta, 2015; Heilala et al., 2023; Yau & Cheng, 2012). According to these studies, men are more technologically tolerant and competent due to their dominance in professions. These studies and their statistics indicate that providing educational programs to overcome this issue is a challenge.

Furthermore, many theoretical frameworks have been developed to study human behavior. These frameworks are all designed to predict behavior based on different beliefs, such as the theory of reasoned action (TRA) and the theory of planned behavior (TPB) in psychology; the health belief model and the transtheoretical model (TTM) in health care; innovation resistance theory (D.

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Chakraborty, 2023) in e-commerce; and, in the field of information technology, theories such as the technology acceptance model (TAM) and the information systems (IS) success model in 1992 of DeLone and McLean (D&M). However, it is rare in the Middle Eastern literature to find behavioral models to examine female behavioral intention to use e-learning systems. Thus, our objective is to adopt a behavioral model through which we can examine female students' behavioral intention to use e-learning systems. The behavioral literature has shown that one of the most influential theories in the field is the TPB (Ajzen, 1991). Since its introduction, a massive number of studies in many fields and contexts have confirmed the significance of the association between intention and behavior. For this purpose, we adopted the TPB as our theoretical background.

Concepts such as personality traits and social gatherings play core roles in defining human behavior. However, the general dispositions of such factors tend to be poor predictors of behavior in specific situations (Ajzen, 2002). Accordingly, the TPB performs relatively well in those situations. However, in specific situations it is clear that extensions of the theory are needed to modify the framework to fit the application. In this study, we use the TPB because of its confirmed successes in predicting behavior in many fields. At the same time, we modify the theory to be more appropriate in the context of the adoption of e-learning by women where information technology is the foundational component of the process. The motivation to use information technology is more common in people with innovative personalities compared to those who lack this trait. According to Rogers and Shoemaker (1971), innovation is the "degree to which an individual is relatively more ready to adopt an innovation than other members of their system." Based on this statement, many studies have examined the importance of innovation to the intention of adopting information technology (Abbas et al., 2019).

Another fact that affects the motivation to use or not to use information technology is the quality standards of the system. The success model of DeLone and McLean (1992, 2003) for IS is one of the better-known theories in the field that have helped researchers to establish constructs that influence the behavior of IS users in general.

Based on this discussion, disagreement exists in the literature on which model is better for examining the behavior of women in the e-learning context. In other words, the adoption of e-learning systems by women does not get enough attention, especially in the Arab region, even though a clear gap in professional positions still exists according to workforce figures. According to a systematic literature review made by Bond et al. (2020), the research has been undertaken predominantly in the United States and the United Kingdom. This is due to many factors, but most importantly it is because less information technology (IT) is taught, and no incentives exist for women to enroll in IT fields. E-learning systems are an important turning point in women's future professional opportunities, and measuring the adoption opens the door widely to understanding their technical abilities. Our research question is what the factors are that affect behavioral intention of Arabian female students to use the e-learning systems. Therefore, our goal in this research is to develop a theoretical model of behavior to predict female students' intention to use e-learning systems.

THEORETICAL BACKGROUND

The COVID-19 pandemic presented an opportunity to educational organizations to gain enormous experience on how to adopt e-learning systems and to integrate information systems into their pedagogical environments (Abdelfattah et al., 2023; Rapanta et al., 2021). E-learning is an educational tool that aims to connect teachers with learners and to transfer teaching materials through electronic means. Wu et al. (2012) defined e-learning as "making use of technology as a mediating tool for learning through electronic devices which enable users to readily access information and interact with others online," which is similar to the definition of O'Neill (2023). These systems combine many dimensions into one, such as curriculum, instructor, learner, human-machine interaction, system quality, service quality, and information quality (Koay & Poon, 2023). For this reason, behavioral

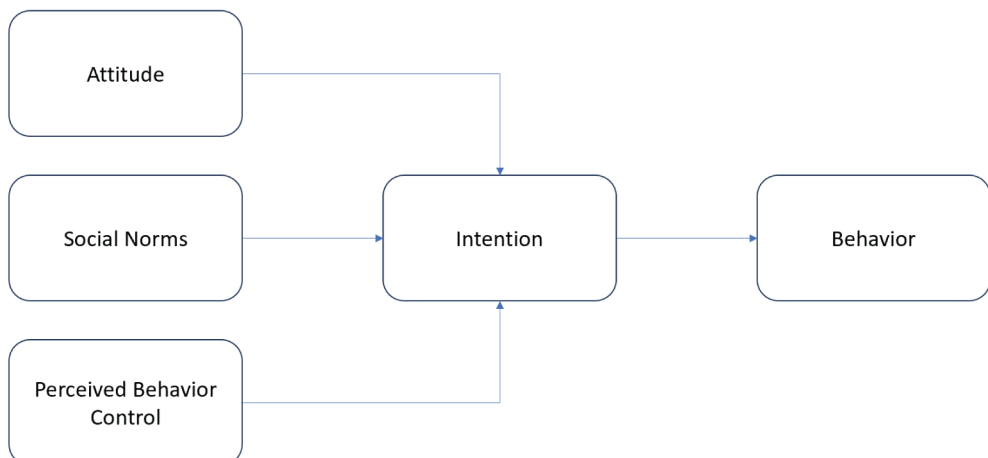
models alone do not have enough power to explain them unless other factors related to the context of the application are considered as well. In other words, in e-learning systems there is a core component, that is, information technology. Thus, many models and theoretical frameworks exist that address factors related to the context of information technology such as the IS success model. The technical systems are more dynamic, and their users should acquire specific traits to master the features and abilities of such systems. Also, these systems differ in their degree of quality, which makes them more attractive; users of systems with lower levels of quality become dissatisfied.

It is true that, while some studies have focused on teachers' improved quality of research and their self-development in teaching (D. Chakraborty & Biswas, 2020), still the literature fails to highlight the students' perspective and especially the behavioral intention of women to use information technology. For example, Mashroofa et al. (2023) claimed that their study tried to fill the gap found in the literature, but they do not pay enough attention to women's behavioral intention to adopt information technology. In addition, few studies have tackled women's intention to use different types of technologies, for example, mobile applications (Zhu et al., 2023), digital entrepreneurship (U. Chakraborty & Biswal, 2023), and tourism (B. Zhang et al., 2023). However, although e-learning is the new trend in teaching, especially after the COVID-19 pandemic, not much about it has been published in the Arab region (Dash et al., 2022) compared to in western societies. This lack of attention is noticeable given the adoption of e-learning by women and even more so in the Arab region where the majority of the technical workforce is occupied by men compared to women.

Therefore, to predict human behavior in the e-learning context, we need three theoretical bases: behavioral, innovative, and technical. Related to these issues and in addition to the TPB, we implement two theories and integrate them into our discussion: the IS success model and the innovation diffusion theory (Agarwal & Prasad, 1998). The following sections discuss these three different theories of the proposed conceptual model and its factors.

TPB: One of the most influential theoretical works to predict behavior is the TPB (Ajzen, 1991). According to this theory, the immediate antecedent of behavior is the intention to act out that behavior. Since then, a great number of studies have confirmed the significance and powerful effect of intention on behavior. The behavioral intention is also a function of three main determinants: attitudes toward behavior, social norms toward behavior, and perceived control of behavior. The literature is thoroughly saturated with these three determinants and reveals that they have significant effects on behavior through intention. The following figure depicts the abstract model of TPB.

Figure 1. TPB Model



The TPB postulates further that attitude, social norms, and perceived behavioral control are functions of three different beliefs: behavioral, normative, and control, respectively. These beliefs determine the shape and strength of the effect of each construct on behavior through intention. Thus, the set of beliefs that an individual carries regarding the outcome of a behavior should determine the influence and degree of positiveness of that behavior.

The TPB also postulates that the association among attitude, social norms, and perceived behavioral control can only effect behavior through intention (Ajzen, 1991; Ajzen & Fishbein, 1973). However, scholars in the field have empirically confirmed that this association is still under debate (Hossain et al., 2023; Manning, 2009; Songkram et al., 2023). For example, Manning (2009) found that the association between social norms¹ and behavior is indirectly (through behavioral intention) and directly significant.

Behavioral intention (BI): Intention relates to the plans that an individual consciously has (or does not have) to perform some behavior in the future. According to Warshaw and Davis (1985, pp. 213-228), the definition of behavioral intention did not exist for some time due to its being supposedly self-evident (Miniard & Cohen, 1981). However, since the first appearance of the TRA, researchers have tried to establish a well-known definition; for example, “Our theory views a person’s intention to perform (or not perform) a behavior as the immediate determinant of the action” and “A measure of the likelihood that a person will engage in a given behavior may be termed behavioral intention” (Ajzen, 1980). Similar to the TRA, other theories have attempted to define behavioral intention, such as the TPB (Ajzen, 1985, 1991; Ajzen & Madden, 1986) and the model of interpersonal behavior (Triandis, 1979).

However, Warshaw and Davis (1985) differentiated between behavioral intention and behavioral expectation. Although they confirm that both factors are determinants of behavior, they argue that behavioral expectation better identifies the behavior than behavioral intention. In line with their findings, we have updated the items used in our study to incorporate both concepts of “intention” and “expectation.”

One final comment we need to make at this stage is that the significant and powerful association between intention and behavior is well-established and verified in the TPB literature (Acikgoz et al., 2023; Habibi et al., 2023; Ma et al., 2023). That literature has empirically studied and supported this finding. Hence, we focus our model on studying the effect of other factors on behavioral intention to save time for participants to focus on the external factors and reduce their participation time.

Social norms (SN): A substantial body of research has confirmed the fact that people do not always follow their own ideas and thoughts, but sometimes they surrender and conform to the opinions, behaviors, and judgments of others. Scholars have been studying this type of group effect on individuals since half a century ago (Asch, 1951, 1955, 1956). We as social beings are under massive pressure from others, and accordingly social norms influence our behavioral decisions. Many life decisions, from the most mundane like when to go to bed or what movie to see, to the most sophisticated such as teaching or working, are socially driven in most cases. Additionally, Arab countries are more socially driven and are categorized as “collectivist” compared to western societies, according to the society dimensions of Hofstede (2009). Thus, Kuwaiti individuals will more readily comply with their societal norms and behaviors, which means social factors play a role in their behaviors.

In the literature, some claim social norms are a multifaceted factor that can be divided into descriptive norms and injunctive norms (Manning, 2009). Injunctive norms are the pressure and conformity of behavior to social norms that come from what other people expect you to do. However, descriptive norms are different in that they reflect the pressure that an individual comes under after observing the behaviors of others. Although this differentiation has been studied and empirically supported, still others think they are different types of motivations and should not belong in the same norms (Deutsch & Gerard, 1955). However, most scholars in the literature treat social norms as one dimension (Tran et al., 2023), which is our approach in this research as well. We consider social norms as one factor and, based on the previous discussion, we hypothesize the following:

H₀₁: Social norms positively affect behavioral intention.

Self-efficacy (SelfEff): Social cognitive theory is based on the hypothesis that self-efficacy influences behaviors and environments and, in turn, is affected by them (Bandura, 1986; Locke, 1997). It is defined as “people’s beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives” (Bandura, 1991).

According to Ajzen (2002), the TPB is derived from the TRA that presumes an individual’s behavior is totally under volitional control, and it proposes that intentions can fully predict behavior. Later researchers identified such control as a limitation to the theory, which induced developers to introduce the new construct of perceived behavioral control (PBC) (Ajzen, 2002). The PBC applies to cases where people are not totally under volitional control but instead may be affected by other factors.

In the theoretical discussion of TPB, studies have also shown that self-efficacy is a PBC (Ajzen, 2002). Ajzen (2002) argued against this definition (and also its naming) of PBC and concluded in his discussion that the two terms are similar. According to Ajzen (2002), “It can be seen that perceived behavioral control and self-efficacy are quite similar: Both are concerned with perceived ability to perform a behavior” (p. 668).

In a learning context, students who feel more efficacious about learning should be more apt to engage in self-regulation (e.g., set goals, use effective learning strategies, monitor their comprehension, and evaluate their goal progress) and to create effective environments for learning (e.g., eliminate or minimize distractions, find effective study partners) (Schunk, 2023; Schunk & DiBenedetto, 2016). In turn, self-efficacy can be influenced by the outcomes of behaviors (e.g., goal progress, achievement) and by input from the environment (e.g., feedback from teachers, social comparisons with peers). According to this discussion, we hypothesize the following:

H₀₂: Self-efficacy is positively associated with behavioral intention.

Although the TPB is applied to many fields with overall success, it still has faced vexing problems and limitations. One problem was raised by one of its core developers, who criticized the limitations in the set of beliefs (Ajzen, 2002). We know the theory assumes social behavior is solely dependent on one’s volitional control. However, researchers figured out later that this assumption was not true, and therefore the PBC was introduced to overcome this problem and for cases when people might lack complete control over the behavior of interest (Ajzen, 2002). Accordingly, the TPB performs more efficiently if extended and equipped with more factors to measure the behavior relative to the context of the application. In relation to technology, we assume that the personal innovation and quality factors established in the IS success model are related to the context of information technology in general (Holman & Perreault, 2023; Rouibah & Abbas, 2012) and more precisely have significant effects on TPB factors (social norms, self-efficacy, and intentions) in the e-learning context. And, hence, we assume the modified framework will be solidier and have greater explanatory power for the variance in behavioral intentions.

Perceived innovativeness (PI): Many schools worldwide have adopted e-learning systems due to the huge progress and development in the field of IT. PI originated from the innovation diffusion theory (Agarwal & Prasad, 1998). Agarwal and Prasad (1998) adopted this construct in the domain of IT and defined it as the “willingness of an individual to try out any new IT.” Since then, many studies have examined its direct effect on behavior.

Innovativeness is often regarded as an essential factor in using new technology (Ayub et al., 2017; Holman & Perreault, 2023; Maisha & Shetu, 2023; Rouibah & Abbas, 2012). But female students differ in their degree of enthusiasm for using e-learning systems based on their experience with technology use and their willingness to try new technologies (J. Chen et al., 2023; Goswami & Dutta, 2015; Heilala et al., 2023; Yau & Cheng, 2012). For this reason and to measure the tendency

to use technology, Agarwal and Prasad (1998) proposed PI that reflects the risk-taking propensity that is higher in people with a higher degree of innovativeness.

The literature on innovation has shown that IT in general and e-learning systems in particular are considered as innovative. Both have significant effects on the way students can learn, communicate with others, and teach themselves (Ali & Warraich, 2023; Gunness et al., 2023; Vidergor, 2023). Based on these facts, we introduce PI in the modified version of the TPB as an innovative factor that affects students' behavioral intention directly through e-learning systems.

H₀₃: Perceived innovativeness is positively associated with social norms.

H₀₄: Perceived innovativeness is positively associated with self-efficacy.

H₀₅: Perceived innovativeness is positively associated with behavioral intention.

Psychology has found that no *one* factor is responsible or has total power to explain attitude. According to Ajzen (1991), "One proposed remedy for the poor predictive validity of attitudes and traits is the *aggregation* of specific behaviors across occasions, situations, and forms of actions." The context we are researching in this study is IT, and behavioral models alone cannot explain the attitude. Therefore, we integrate the TPB into the IS success model to enhance the ability to predict behavior.

Crosby (1979) defined quality as the "conformance to requirements." In the same vein, Garvin (1983) concentrated on finding the quality of a product through measuring the "internal" and "external" failures. The "internal" failures are those observed before the product leaves the assembly line or the factory, while "external" failures measure those products that suffer from failures that occurred after being used in the field.

The success of IS was introduced into the literature to overcome a complicated matter related to the behavior of using IT. DeLone and McLean (1992) developed a multifaceted framework, the D&M model, to define the success in using information systems. Mainly, in 1992 they published their first IS success model, as shown in Figure 2. Furthermore, 10 years later they modified their original model to include six components: system quality, information quality, service quality, intention to use, user satisfaction, and net benefits (DeLone & McLean, 2003), as shown in Figure 3.

According to the D&M success model, the use of the system is important and should precede satisfaction. In this process, the positive experience gathered from the use leads to a higher level of satisfaction, which in turn leads to a greater intention to use the system. The quality factors in this model are multifaceted, and different studies have adopted a variety of factors to study their effects on satisfaction and intention. In the literature, the D&M model has gone through different modifications over the years.

Figure 2. IS Success Model–D&M Model (1992)

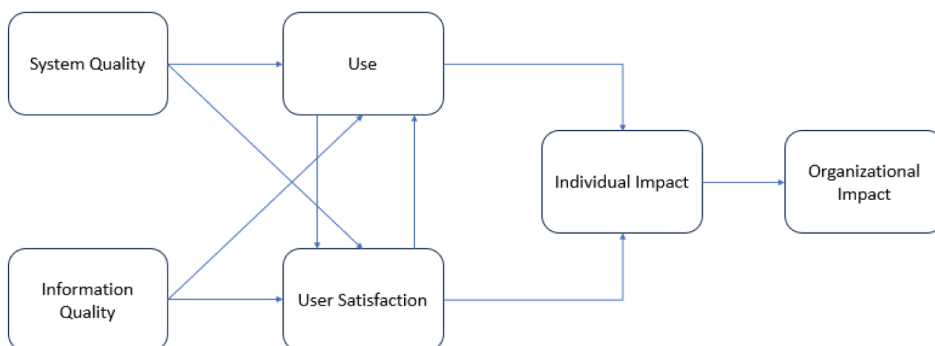
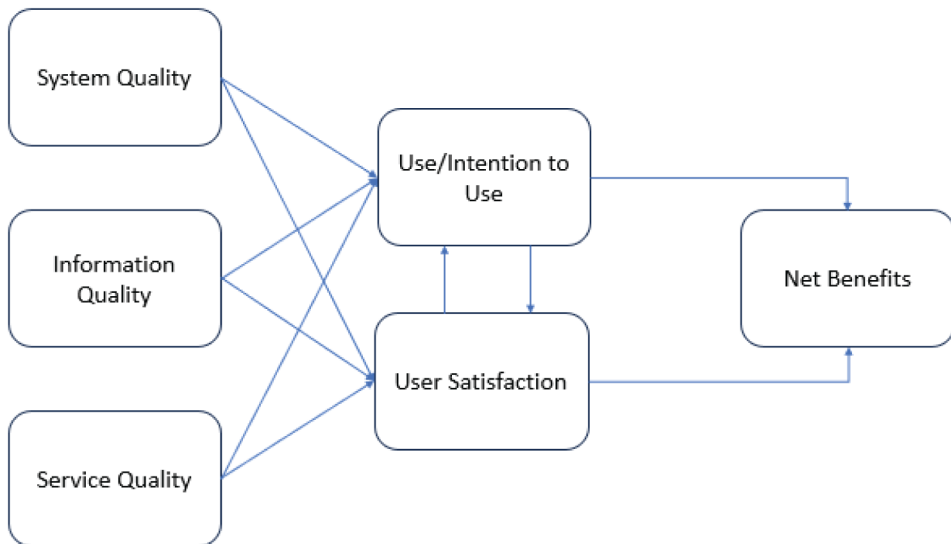


Figure 3. IS Success Model–D&M Model (2003)



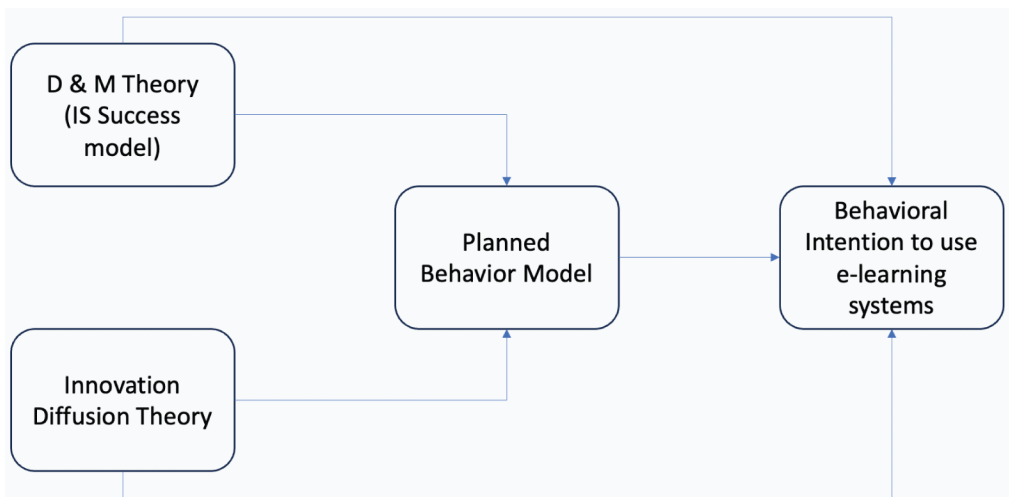
After some years, the modified IS success model (DeLone & McLean, 2003) developed into the following:

Therefore, Figure 4 displays our new overall conceptual model.

Our model uses the following quality factors: technical system, service, system, interaction, and environment. We assume that the technical aspects of the e-learning system are important and should have a significant effect on students' decisions and intentions to use it.

Technical system quality (TechSys): In the modified version of the D&M model (DeLone & McLean, 2003), the technical system quality refers to desirable features and characteristics of an IS that relates to the presence and absence of bugs in the system (Rabaai, 2009) and its importance

Figure 4. Overall Conceptual Model in This Study



to and effectiveness on students' learning performance and engagement (R. Yang, Wibowo et al., 2023). We assume the technical system quality affects the self-efficacy, social norms, and behavioral intention of women to use e-learning systems. Thus, we predict the following:

H₀₆: Technical system quality is positively associated with social norms.

H₀₇: Technical system quality is positively associated with self-efficacy.

H₀₈: Technical system quality is positively associated with behavioral intention.

System support quality (SupSysQ): According to the literature, many other issues are related to the significance of the atmosphere for e-learning. For example, policies, ethics, rules, regulations, guidelines, prohibitions, data protection, plagiarism warnings, and many other issues are all related and influence the e-learners' educational status (Ozkan & Koseler, 2009). Another key issue that has been gaining importance with the development of Web 2.0 technologies in education is to customize the software to become more personalized to the user's needs (Weller, 2006). According to Weller (2006), one e-learner stated that “. . . when I log in, I feel more organized seeing an opening page with my personal details . . . it is nice when it warns me which announcements, I have not read . . .” The interviews with the focus group reflect that one of the most important requirements of e-learners is being able to control their learning progress. Their habits also affect the overall LMS success. Easy navigation, ease in finding the required information, and available help options are all important aspects for creating these habits. Another outcome of Web 2.0 technology applications in education is interactivity (Mason & Rennie, 2007). Even with information technology, in previous decades (before Web 2.0) students often felt isolated due to distance learning and were unable to interact with either the instructor or other students (Ozkan & Koseler, 2009). Based on this discussion, we think enabling learning technology with support features such as communications, clear ethics and regulations, guidelines, and plagiarism tools will enhance the e-learning in general and, thus, we predict the following:

H₀₉: System support quality is positively associated with social norms.

H₁₀: System support quality is positively associated with self-efficacy.

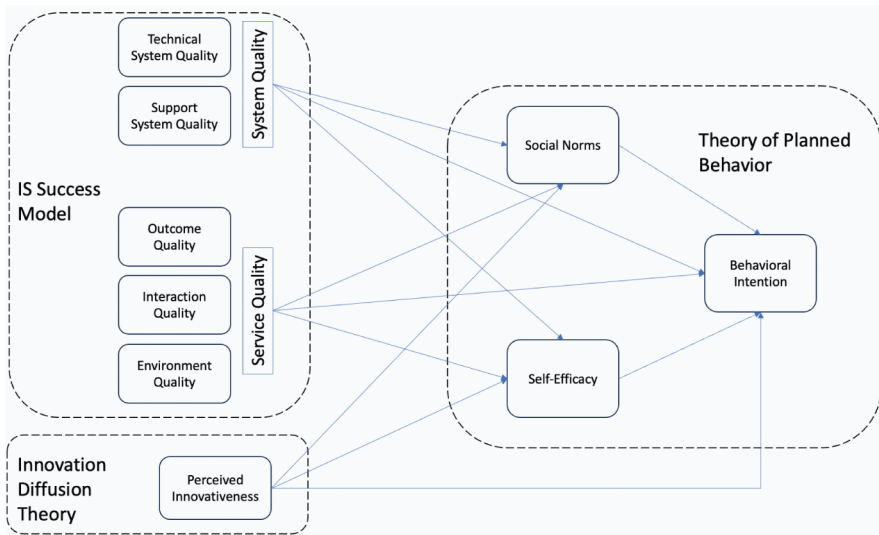
H₁₁: System support quality is positively associated with behavioral intention.

Service quality (SQ): Other issues when delivering courses via e-learning systems can be grouped under service quality. Service quality refers to the “subjective comparison of consumers between the expected quality of service and the actual service quality they receive” (Parasuraman et al., 1985). Parasuraman et al. (1985) referred to service quality as “a measure of how well the service level delivered matches customer expectations. Delivering quality service means conforming to customer expectations on a consistent basis.” Furthermore, service quality includes “administrative affairs such as, student tracking, course/instruction authorization, providing e-learning systems design tools, course management, budgeting, institutional funding, and resources for delivering and maintenance” (Ozkan & Koseler, 2009).

Although scholars admit it is hard to find one exact agreed upon definition of service quality, a majority of them agree that it is a multidimensional construct (Zhang et al., 2023). Based on this discussion, an important line of research empirically validates that it can be further decomposed into outcome quality, interaction quality, and environmental quality (Abbas & Hamdy, 2015).

Outcome quality (OutQ): Based on the general definition of service quality, Grönroos (1984) referred to outcome quality as “what the customer is left with when the production process is finished” (p. 38). Thus, we predict the following:

Figure 5. The Study's Conceptual Model in Detailed Form



- H₁₂: Outcome quality is positively associated with social norms.
- H₁₃: Outcome quality is positively associated with self-efficacy.
- H₁₄: Outcome quality is positively associated with behavioral intention.

Interaction quality (InterQ): Lu et al. (2009) referred to interaction quality as the “quality of customer’s interaction with the e-learning systems’ service provider during the service of delivery” (p. 232). Such an experience gives the user trustful expertise that enables them to overcome problems and provides richness of information (Abbas & Hamdy, 2015). Thus, we predict the following:

- H₁₅: Interaction quality is positively associated with social norms.
- H₁₆: Interaction quality is positively associated with self-efficacy.
- H₁₇: Interaction quality is positively associated with behavioral intention.

Environmental quality (EnvQ): Environmental quality refers to “the consumer’s evaluation of the quality of equipment that is used, the extent to which the interface is well designed, and the extent to which the service is delivered under proper contexts” (Abbas & Hamdy, 2015). Thus, we state the following hypotheses:

- H₁₈: Environmental quality is positively associated with social norms.
- H₁₉: Environmental quality is positively associated with self-efficacy.
- H₂₀: Environmental quality is positively associated with behavioral intention.

Based on the previous discussions and hypotheses, the following figure shows the conceptual model of the study.

RESEARCH METHOD, POPULATION SAMPLING, AND DATA

We designed and built a customized instrument specifically for this study. The questionnaire asked students to give their opinions regarding their experience with using Microsoft Teams integrated with an e-learning system. However, before we moved to that step, our design of the instrument went through many pre-stages. The first stage was to double check the English-Arabic translation since the survey was written for Arab students. During this process, we got help from two instructors in the IS field and one professional translator for a smooth and solid scientific translation between the two languages and to keep the meanings as similar as they could be. Second, to make sure no ambiguities were embedded in the questions, we asked pilot students to look at the instrument and give answers. In this stage, we confirmed that questions meant what we intended them to mean, and that no vagueness existed anywhere. Finally, we distributed the questionnaire among Kuwait University students at different locations (many campuses). Choosing students to participate in our study was random since all students were eligible to participate as they all had the same experience with distance learning due to the COVID-19 pandemic.

The questionnaire was divided into two parts: The first part asked for demographical and personal data while the second part asked for opinions concerning research factors that in turn were divided into three major subparts: behavioral, innovation, and quality. The questions on research factors were assessed by using a 5-point Likert scale (1="Strongly agree" to 5="Strongly disagree").

The pilot study went through four cycles; in each one, we found small shortcomings in the statistical analysis, which were fixed, and we redid the pilot. After the pilot study stage and instrument modification, the research group did the final editing of the questionnaire and distributed it. We received a random size sample of 742 female students that were representative of all female students who attended Kuwait University. Further filtering was carried out to double check that all answers were valid. We examined responses using a standard deviation test for all answers of the 742 participants. In cases where the standard deviation was near zero, the deviation indicated that the participant was not engaged in the study and chose one answer throughout without reading or concentrating on the questions. Thus, all participations with a standard deviation less than 0.5 were removed. The total number of verified answers was 699 participations.

As mentioned, the three main dimensions of the study were the quality, innovation, and behavioral factors. The quality factors were service quality (interaction quality, environmental quality, and outcome quality), system quality (system support quality, and technical system quality), perceived innovativeness, social norms, self-efficacy, and behavioral intention. Six items were adopted from Abbas and Hamdy (2015) and reflected interaction quality; five items from Hassanzadeh et al. (2010) and Mak et al. (2011) reflected outcome quality; four items from Khan (2005) and Ozkan and Koseler (2009) reflected environmental quality and support system quality; five items from Agarwal and Prasad (1998) reflected perceived innovativeness; four items from Rouibah (2008) and Taylor and Todd (1995) reflected social norms; six items from Bandura (1999) reflected self-efficacy; and three items from Udo et al. (2010) reflected behavioral intention.

STATISTICAL ANALYSIS

We used different statistical tools to examine the validity and dependency of the instrument as well as the data collection procedures and the robustness of the research model and other findings. The first procedure was factorization where we reduced the data through a factor analysis test. We normally begin by using a factor analysis to validate the data as it removes redundancy that might exist between and within dimensions. Table 2 shows the loadings of the study measurements in the factor analysis.

As Table 2 shows, many questions were removed from further analysis due to a lack of reliability and a lack of explanation for reasonable variance. Hence, we kept the questions that passed the

Table 1. Demographics Distribution of Study Sample

Item	Category	Frequency	Percentage	Cumulative Per.
Total	Female Students	699	100%	100%
Colleges				
	0. Undeclared	4	00.6%	00.6%
	1. Arts	29	04.1%	04.7%
	2. Education	84	12.0%	16.7%
	3. Law	35	05.0%	21.7%
	4. Graduate Studies	2	00.3%	22.0%
	5. Sharia & Islamic Studies	16	02.3%	24.3%
	6. Public Health	--	--	24.3%
	7. Pharmacy	9	01.3%	25.6%
	8. Medicine	16	02.3%	27.9%
	9. Sciences	23	03.3%	31.2%
	10. Social Sciences	20	02.8%	34.0%
	11. Life Sciences	18	02.6%	36.6%
	12. Business Administration	355	50.8%	87.4%
	13. Allied Health Sciences	08	01.1%	88.6%
	14. Architecture	11	01.6%	90.1%
	15. Engineering & Petroleum	65	09.3%	99.4%
	16. Dentistry	14	00.6%	100%
Academic Year				
	0. Undeclared	05	00.7%	00.7%
	1. 1 st Year	52	07.4%	08.2%
	2. 2 nd Year	177	25.3%	33.5%
	3. 3 rd Year	234	32.0%	65.5%
	4. 4 th Year	160	22.9%	88.4%
	5. 5 th Year	52	07.4%	95.9%
	6. 6 th Year	15	02.1%	98.0%
	7. 7 th Year	14	02.0%	100%
Social Status				
	1. Non married	609	87.1%	87.1%
	2. Married	86	12.3%	99.4
	3. Divorced	4	00.6%	100.0%
	4. Widow	--	--	100%

reliability tests. The principal component analysis with varimax rotation was used, that is, eigenvalue greater than one and factor loadings greater than 0.5 (Kaiser, 1958).

A coefficient of less than 0.40 for the corrected item-total correlation was adopted to delete the nonrelevant items. These deletions should significantly enhance and improve the total reliability of

Table 2. Loadings of Study Measurements in the Factor Analysis

	Rotated Component Matrix ^a								
	Component								
	1	2	3	4	5	6	7	8	9
TechSysQ1					.852				
TechSysQ2					.846				
TechSysQ6					.776				
SupSysQ1									.772
SupSysQ2									.777
SupSysQ3									.715
OutQ3				.843					
OutQ4				.823					
OutQ5				.854					
InterQ1						.830			
InterQ2						.853			
InterQ4						.757			
EnvQ1		.715							
EnvQ2		.703							
EnvQ3		.790							
EnvQ4		.776							
PI1								.837	
PI2								.722	
PI5								.780	
SN4	.796								
SN5	.754								
SN6	.814								
SN7	.804								
SelfEff4							.849		
SelfEff5							.805		
SelfEff6							.813		
BI1			.839						
BI2			.845						
BI3			.852						

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 7 iterations.

the instrument. This process was followed until it reached an acceptable and optimal result. According to the results we collected from the EFA (Table 2), 22 items were removed.

As shown in Table 3, all variances in the measurements are 60% (variance threshold), the reliabilities are either 70% (reliability threshold) or above, and both percentages are scientifically and statistically acceptable according to Hair (2009).

Table 3. Reliabilities and Variances of Study Measurements

	Model/Factors	Items	Variance	Reliability (Cronbach's Alpha)
	Overall Research Model of Women		79%	94%
1.	Technical System Quality	1, 2, 6	79%	86%
2.	Support System Quality	1, 2, 3	70%	78%
3.	Outcome Quality	3, 4, 5	83%	90%
4.	Interaction Quality	1, 2, 4	82%	89%
5.	Environment Quality	1, 2, 3, 4	74%	88%
6.	Personal Innovativeness	1, 2, 5	73%	82%
7.	Subjective Norm	4, 5, 6, 7	80%	92%
8.	Self-efficacy	4, 5, 6	78%	86%
9.	Behavioral Intention	1, 2, 3	85%	91%

Table 4. Research Model Goodness of Fit Statistics

Index	Statistics
Normed fit index (NFI)	0.97
Non-normed fit index (NNFI)	0.97
Parsimony Normed fit index (PNFI)	0.82
Comparative fit index (CFI)	0.98
Incremental fit index (IFI)	0.98
Relative fit index (RFI)	0.97
Critical N (CN)	192.19
Root mean square residual (RMR)	0.041
Standardized RMR	0.041
Goodness of fit index (GFI)	0.87
Adjusted goodness of fit index (AGFI)	0.84
Parsimony goodness of fit index (PGFI)	0.69

Fitness of Conceptual Model and Validation of Latent Constructs

We used Lisrel 8.54 software to run the SEM modeling. Table 4 shows the fitness results for the conceptual model. According to the results in Table 4, we can scientifically and statistically confirm that the research model is satisfied and verified, particularly the RMR=0.048 (recommended ≤ 0.05), GFI=0.87 (recommended > 0.80), and the AGFI=0.83 (recommended > 0.80) (Hair, 2009).

The chi-square faced severe limitations (Bentler & Bonett, 1980; McIntosh, 2007). Therefore, the relative fit indices were also used. The relative fit indices did not use the chi-square in the computations. The first of these indices was the normed fit index (NFI) of Bentler and Bonett (1980). The recommended value for the NFI, according to Hu and Bentler (1999), is greater than or equal to 0.95 (and NNFI ≥ 0.95). Additionally, one of the most used and highly important indices is the comparative fit index (CFI), which is a revised form of the NFI. The CFI performs well even when the sample size is small (Tabachnick et al., 2013). The closer the CFI is to one, the more it indicates good fit (recommended CFI ≥ 0.95). Since some complex models are dependent on the sample data and size, the parsimony goodness-of-fit index (PGFI) and the parsimonious normed-fit index (PNFI) were developed (Mulaik et al., 1989). While no threshold levels are recommended, Mulaik et al. (1989) commented that within 0.50 is an acceptable threshold while other goodness-of-fit indices use more than 0.90. Based on this discussion, the indices in our model had good values.

Although previous findings were solid and confirmed the fitness of the research model, other testing was needed. The next step in the statistical analysis was to verify the reliability and validity of the latent constructs. According to Hair (2009), Cronbach's alpha reliability test presumes the one-dimensionality of the constructs, which is not always true. We needed to further test the latent constructs through two statistical tests: construct composite reliability and average variance extracted.

Furthermore, another important test was required at this stage to validate and emphasize the importance of our research model: the discriminant validity (DV) test. This test is to ensure there is no chance of overlapping among study measurements. The DV test is acceptable as long as the result between the two latent constructs is less than or equal to 0.85. Table 6 shows the DV results in which no overlapping exists between the constructs and, thus, each group of questions explains its relative latent construct.

Table 5. Results for Construct Composite Reliability (CCR) and Average Variance Extracted (AVE)

Latent Construct	Construct Composite Reliability	Average Extracted Variance
Technical System Quality	0.92698	0.810493
Support System Quality	0.813914	0.593996
Outcome Quality	0.925794	0.806156
Interaction Quality	0.924611	0.804019
Environment Quality	0.912391	0.724421
Perceived Innovativeness	0.851476	0.660791
Social Norms	0.954201	0.838321
Self-Efficacy	0.891963	0.733555
Behavioral Intention	0.939563	0.835559

Path Analysis and Verification of Proposed Research Model

After verifying the goodness of fit of the proposed model, we needed to test the significance of the paths among the study factors in the model. Table 7 shows the path coefficients. The table shows that among the 20 paths, only 13 are significant.

Figure 6 shows the path analysis of the research model.

Table 8 sorts the significant paths according to their power. It shows that the most powerful effect on behavioral intention comes from social norms (SN=0.38) followed by environmental quality (EQ=0.16).

DISCUSSION

It is important at this point to mention that it is rare to find well-written papers that discuss the effect of outcome quality on the adoption and intention to use e-learning systems during the period from 2019-2023. This is why we think the findings in this research reflect its importance. Thus, there are many points to make in this section. First is that the outcome quality has no significant paths with any behavioral construct. On the contrary, the only quality factor that has a significant path to the

Table 6. Results of Discriminant Validity Test (1=TechSysQ; 2=SupSysQ; 3=OutQ; 4=InterQ; 5=EnvQ; 6=PI; 7=SN; 8=SE; 9=BI)

	1	2	3	4	5	6	7	8	9
1	1								
2	0.51793	1							
3	0.474835	0.714242	1						
4	0.507535	0.472623	0.410721	1					
5	0.510721	0.707585	0.630825	0.652995	1				
6	0.53942	0.551833	0.393686	0.540257	0.634256	1			
7	0.595347	0.533388	0.414994	0.628213	0.642871	0.65377	1		
8	0.483756	0.516404	0.374152	0.44046	0.487548	0.572974	0.455313	1	
9	0.428758	0.469137	0.33259	0.493836	0.561754	0.547444	0.634148	0.448141	1

Table 7. Path Coefficients and Significance of Each Path

Path	Hypotheses	Coefficient (gamma)	Standard error	t-value	Significant
SN->BI	H ₀₁	0.38	0.05	7.72	S
SE->BI	H ₀₂	0.11	0.04	2.74	S
PI->SN	H ₀₃	0.25	0.04	6.04	S
PI->SE	H ₀₄	0.26	0.05	5.13	S
PI->BI	H ₀₅	0.09	0.05	1.91	S
TechSysQ->SN	H ₀₆	0.22	0.04	6.03	S
TechSysQ ->SE	H ₀₇	0.17	0.04	6.03	S
TechSysQ ->BI	H ₀₈	-0.01	0.04	-0.23	NS
SysSupQ->SN	H ₀₉	0.05	0.05	1.16	NS
SysSupQ ->SE	H ₁₀	0.18	0.06	3.06	S
SysSupQ ->BI	H ₁₁	0.06	0.05	1.12	NS
OutQ->SN	H ₁₂	-0.03	0.04	-0.77	NS
OutQ ->SE	H ₁₃	-0.01	0.05	-0.14	NS
OutQ ->BI	H ₁₄	-0.05	0.05	-1.04	NS
InterQ->SN	H ₁₅	0.23	0.04	4.13	S
InterQ ->SE	H ₁₆	0.08	0.05	1.75	S
InterQ ->BI	H ₁₇	0.05	0.04	1.21	NS
EnvQ->SN	H ₁₈	0.20	0.05	4.13	S
EnvQ ->SE	H ₁₉	0.07	0.06	1.11	S
EnvQ ->BI	H ₂₀	0.16	0.05	2.94	S

Figure 6. Path Coefficients of the Study's Research Model

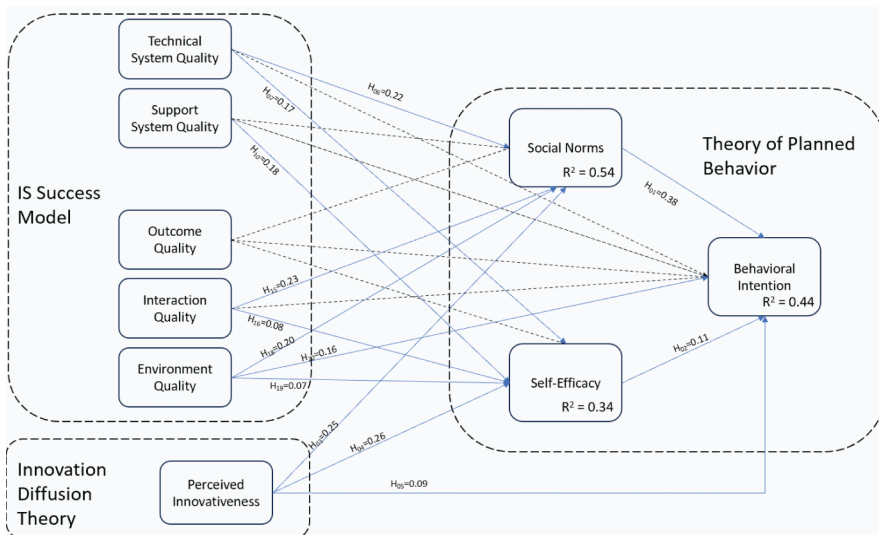


Table 8. Sorted Path Coefficients According to Their Power

Construct		Path coefficient (gamma γ)	R ²
Social Norm (SN)			0.54
	PI	0.25	
	InterQ	0.23	
	TechSysQ	0.22	
	EnvQ	0.20	
Self-efficacy (SelfEff)			0.34
	PI	0.26	
	SysSupQ	0.18	
	TechSysQ	0.17	
	InterQ	0.08	
	EnvQ	0.07	
Behavioral Intention (BI)			0.44
	SN	0.38	
	EnvQ	0.16	
	SelfEff	0.11	
	PI	0.09	

behavioral constructs in the TPB is the environmental quality. Environmental quality refers to “the consumer’s evaluation of the quality of equipment that is used, the extent to which the interface is well-designed, and the extent to which the service is delivered under proposed context” (Fullerton, 2005; Z. Yang et al., 2005). This factor has a significant effect on the TPB constructs since it measures the quality of the surrounding service provided by the application. Although environmental quality is adopted and measured in its impact on social norms in many fields, such as tourism (Liu et al., 2019), it has limited applications in e-learning. According to Shanshan and Wenfei (2022), the quality is a general concept, and the comprehensive role of its dimensions on intention is not clear in the literature. In general, the environment is an important factor in the e-learning context (Zhao et al., 2021), and environmental quality is one dimension that needs to be emphasized, according to our findings. The most significant effect on the behavioral intention to use the e-learning systems is social norms. This is similar to the findings of other studies (Songkram et al., 2023). However, there are some studies that have found no significance between social norms and behavioral intention (Shanmugavel & Balakrishnan, 2023). This finding shows that although social norms are a significant construct in the behavioral models such as TPB, they may have limited or no effect on behavioral intention due to the context of the applications.

Based on the findings, we see that 13 hypotheses among the 20 are significant. The most important point to make about the findings is that the behavioral model is affected by external quality factors. In other words, the TPB was originally designed to predict human behavior, which is an extremely hard task. Ajzen (1991, 2001) claimed that his model lacked external factors and recommended that scholars modify and add more explanatory power by extending the model of behavioral intention to these factors.

Among the quality factors, interaction quality affects the TPB the most in general, but especially social norms. Interaction quality affects social norms with a path coefficient gamma (γ) of 0.23 followed by the effect of technical system quality ($\gamma = 0.22$). The importance of interaction quality is

also confirmed in other studies such as Cheng (2023), which found it to have significant impacts on behavioral continuance intention of e-learning in the medical schools in Taiwan. All factors (exogenous factors) represent a 54% variance in social norms and a 34% variance in self-efficacy. Finally, our study factors were responsible for a sizable amount of variance ($R^2 = 0.44$) in behavioral intention.

In general, we can confirm that the TPB is a more generic type of model to describe human behaviors. However, such models can be more advantageous if they are extended to a more comprehensive model that is more customized and directed toward the context of the application. In our case, we used the IS success model (quality factors) and the innovation diffusion theory to examine users' behavioral intention to use e-learning systems. We find that our research model enhances the overall prediction of students' behavioral intention ($R^2 = 0.44$). Other studies that followed the same approach of building a more customized TPB model have produced fruitful results in different fields, such as e-learning (Chu & Chen, 2016), social networking sites (SNSs) (Jafarkarimi et al., 2016), e-commerce (Hamid & Azhar, 2023), traveling websites (Chen et al., 2023), and social identity to microblog (Jiang et al., 2016).

CONCLUSION, IMPLICATIONS, AND STUDY LIMITATIONS

The literature has verified the TPB and applied it to many fields. This study confirmed that the constructs of social norms and self-efficacy have significant effects on the intention to use e-learning systems. Furthermore, our study is rare because it integrates the IS success model and the innovation diffusion theory with the TPB to enhance the model's performance.

The important finding of this study is that women's behavioral intention to adopt e-learning systems can be affected by three dimensions: behavior, environmental quality, and innovation. These results can help researchers to focus more on factors that belong to these three dimensions. Another finding helps the developers of e-learning systems. There are important differences between the adoptions of e-learning by women compared to those of such systems by men. Researchers should notice that social norms have the most important influence on behavioral intention. This influence means social media and other social tools can improve such adoptions by female users.

Accordingly, there are many theoretical and practical implications. This study is the first to extend the TPB with two other theories to predict the behavioral intention to use the e-learning systems. This study has shown that perceived intention has the most powerful effect on the TPB as shown by the largest path coefficients for social norms and self-efficacy. Also, the findings show that environmental quality is the most effective of the quality factors for the TPB. By contrast, outcome quality has no significant effect at all on the TPB as all three of its paths were not significant. Thus, the theoretical implications of these findings are that the TPB has a generic power to explain behavioral intention (and behavior). However, the theory needs to be extended with other theories that match the application platform to enhance the intentional output. Therefore, researchers should study their application platform before applying the TPB.

Another theoretical implication is that IT has its own uniqueness. Quality factors and innovation are not all features related to the new technology. There are other factors that play an important role in human behavior toward the use of IT. For example, other factors that can be included in the behavioral analysis are self-regulation (Chou et al., 2023; Lai & Hwang, 2023), hedonic (Tseng et al., 2023), feeling of belonging (Abbas, 2020), and trust (Abbas & Rouibah, 2022). Such factors are important variables that may encourage the researcher to modify the conceptual model of TPB and to extend it by adopting other theories.

Our study also has practical implications. Based on the results, perceived intention has a significant effect on TPB factors and on behavioral intention. This effect means female students should be encouraged to teach themselves hidden tricks and to take more IT courses in their degree program to enable them to be more competitive in using the e-learning systems. This is similar to the recommendations provided by a literature review under the guidance of Abu Talib et al. (2021).

Our study has many limitations. First, it focuses on behavioral intention and does not include attitude as found in the TPB. We only adopted a few TPB factors because we added two other theories; adding more factors might have made the overall study instrument too long where students might not seriously participate. Therefore, our study could be improved to explore the total effects (direct and indirect) between the success model's factors and the behavioral intention by adding attitude and behavior.

Another limitation of our study is that we did not adopt all factors found in the theories for the previous reason. For example, we added two constructs (system quality and service quality) to the success model but excluded information quality. We thought the instrument would be too long where users would not participate seriously. The third limitation is that our study focused on female students and excluded males due to the requirements of the project. However, we think adding males would add more meaningful findings and give the ability to compare the types of usages among the two genders.

CONFLICT OF INTEREST

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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ENDNOTE

¹ Social norms in the study of Manning (2009) is a multifaceted variable.

APPENDIX

Table 9. Constructs

Construct	Items	Reference
Technical System Quality (TechSysQ)	TechSysQ1: It is easy to use Microsoft Teams.	(Al-Fraihat, Joy, & Sinclair, 2020)
	TechSysQ2: It is easy to understand the structure of Teams and how to use it.	(DeLone & McLean, 2003)
	TechSysQ6: Teams is flexible to interact with.	(Sedera, Gable, & Chan, 2004)
Outcome Quality (OutQ)	OutQ3: The staff at IT services is available and cooperative when facing problems with Teams.	(Holsapple & Lee-Post, 2006)
	OutQ4: The staff at IT services understands the specific needs of students.	(DeLone & McLean, 2003; Holsapple & Lee-Post, 2006)
	OutQ5: I have received a satisfactory and timely response from the staff at IT services.	(DeLone & McLean, 2003)
Support System Quality (SupSysQ)	SupSysQ1: Teams provides appropriate information about plagiarism issues when submitting assignments through the system.	(Ozkan & Koseler, 2009)
	SupSysQ2: Teams provides information about behavioral considerations when communicating with students or with instructors.	(Ozkan & Koseler, 2009)
	SupSysQ3: Teams provides information about the accessibility of content, permission for viewing course materials, and any other personal data in the system.	(Ozkan & Koseler, 2009)
Interaction Quality (InterQ)	InterQ1: I feel safe and have no fear of my privacy and personal information being violated when using Teams.	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
	InterQ2: I feel my personal information is secure.	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
	InterQ4: This Microsoft is trustworthy.	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
Environment Quality (EnvQ)	EnvQ1: Microsoft Teams answers all my questions	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
	EnvQ2: Microsoft Teams has all the information I need.	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
	EnvQ3: Microsoft Teams provides timely information to my questions and requests.	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
	EnvQ4: Microsoft Teams provides correct information to my requests and questions.	(Abbas & Hamdy, 2015; Brady & Cronin Jr, 2001)
Subjective Norms (SN)	SN4: The most significant people in my life think it is important to use Teams.	(Rouibah, Abbas, & Rouibah, 2011; Rouibah & Abbas, 2012; Taylor & Todd, 1995)
	SN5: Most of the people whose opinions influence me agree to use Teams.	(Rouibah et al., 2011; Rouibah & Abbas, 2012; Taylor & Todd, 1995)
	SN6: People who influence me think it is important to use Microsoft Teams.	(Rouibah et al., 2011; Rouibah & Abbas, 2012; Taylor & Todd, 1995)
	SN7: People important to me think it is critical to use Microsoft Teams.	(Rouibah et al., 2011; Rouibah & Abbas, 2012; Taylor & Todd, 1995)

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Table 9. Continued

Construct	Items	Reference
Personal Innovativeness (PI)	PI1: Amongst my friends, I am usually the first to have explores the features in Teams.	(Agarwal & Prasad, 1998)
	PI2: I like to experiment with new features in Teams.	(Agarwal & Prasad, 1998)
	PI5: If I heard about a new information technology like Teams, I would look for ways to experiment with it.	(Agarwal & Prasad, 1998)
Self-efficacy (SelfEff)	SelfEff4: I organize my study time to accomplish my goals to the best of my ability.	(Bandura, 1999)
	SelfEff5: I set personal standards for performance in my learning.	(Bandura, 1999)
	SelfEff6: When planning my learning, I use and adapt strategies that have worked in the past.	(Bandura, 1999)
Behavioral Intention (BI)	BI1: I intend to continue to use Microsoft Teams for learning in the future.	(Udo et al., 2010; Wixom & Todd, 2005)
	BI2: I plan to use Microsoft Teams for learning in the future.	(Udo et al., 2010; Wixom & Todd, 2005)
	BI3: I will insist on using Microsoft Teams to study for my future courses.	(Udo et al., 2010; Wixom & Todd, 2005)

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