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Measuring Students' Readiness to Accept the Use of e-Learning Systems during Corona Pandemic in Higher Education, Kuwait

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ABSTRACT

Readiness for e-learning represents a major concern for the Ministry of Education in Kuwait during the current COVID-19 pandemic because such readiness plays an important role in the success or failure of e-learning systems. The purpose of this study is to assess the most important factors affecting students' readiness for e-learning. A quantitative methodology is adopted, with a questionnaire distributed to students in higher education in Kuwait and 760 responses were collected. The study revealed that during the pandemic, students were ready in terms of having positive perceptions of the innovation, optimism, usefulness, and ease use of e-learning. They are found, however, not relating to feelings of security and discomfort. The positive attitude and resultant behavior reflect intention to use e-learning.

Keywords: e-Learning, Technology Readiness, Technology Acceptance Model (TAM).

Introduction

Since the beginning of 2020, the world has faced exceptional and extreme changes in every aspect of life due to the spread of the COVID-19 pandemic. One of the most vital sectors affected by COVID-19 is education. Students and teachers were asked to stay at home (locked in) in order to protect and safeguard their lives. UNESCO highlights the

negative influence of COVID-19 on education, citing closure of schools and universities all over the world. It has been reported that 73 countries have been affected. A total of 516.6 million children and youths in 56 countries are affected and monitored by UNESCO and a further 17 countries have implemented localized closures, and millions are facing educational disruption. Moreover, UNESCO is providing support for countries to minimize the impact of such disruption. In Kuwait, mostly all students (n = 632,988) have been affected by school closures, from pre-primary to upper-secondary education.

In response to school closures caused by COVID-19, UNESCO recommended the use of distance learning programmers to limit the disruption of education (UNESCO, 2020). Accordingly, the Ministry of Education in the State of Kuwait approved the continuation of higher education by universities, using distance learning technologies. Moreover, the choice of e-learning is the safest choice to protect teachers and students.

Hence, the private universities, followed by public universities, turned to using e-learning tools in order to deliver the educational process to the highest level possible to their students, and used its resources to implement a stable e-learning environment. The conversion to e-learning was not a planned process as it was a response to the need to continue education safely during COVID-19. As a result, there were challenges for those students willing to embrace the e-learning experience, depending on their readiness to use these tools in this short period of time. Researchers (Abas et al., 2004) have highlighted that e-learning readiness assessment is important in designing comprehensive e-learning strategies for any organization and effectively implementing information and communication technology goals. Therefore, before e-learning is adopted, there is a need to identify whether the students in higher education are ready to adopt that e-learning successfully.

Based on these arguments, the research questions are developed as follows:

1 - To what extent do students perceive technology readiness (TR), attitudes, human interaction preference, and behavioral intentions to adopt e-learning technologies?

2 - What is the impact of students' technology readiness on their attitudes and behavioral intentions towards e-learning technologies?

Literature review

e-learning: Electronic learning (e-learning) is a key innovation in the delivery of education in the 21st century, since it "utilizes web-based communication, collaboration, multimedia, knowledge transfer, and training to support active learning without time and space barriers" (Motaghian et al., 2013: 159). This research adopted Farajoun's (2017) definition of e-learning as an applied scientific construction based on research and theories of psychology, education, management, information and computer sciences for planning, preparation, implementation, evaluation and continuous development of the entire educational process, including educational environments and resources, human resources, teaching equipment and strategies, learning resources, and support for innovative solutions to create an integrated entity that combines a realistic electronic learning environment to achieve interesting and effective learning.

Distance education or e-learning does not require the simultaneous presence of the student with the teacher in the same location. Consequently, both the student and the teacher lose the experience of direct interaction with each other. Therefore, the need arises for some form of mediation between the student and the teacher, and this mediation has technological, human and organizational-aspects (Farajoun, 2017).

E-learning provides several advantages, such as cost reduction due to the cost of travelling, increased employee retention, rapid development of courses, provision of effective training, staying competitive, its 'anytime anywhere' availability, enhanced motivation, development of strategic initiatives (Krishnan & Hussin, 2017), flexibility regarding time and location, general accessibility, and automated assessments (Al-Busaidi, 2013).

In spite of the benefits gained from e-learning, there are challenges, such as the cost required for establishing the IT infrastructure along with the human resources and their skills, and course establishment. Additionally, there are the factors of technical support, including

continuous updates and maintenance (Krishnan & Hussin, 2017). Furthermore, learners should have certain skills in order to utilize the learning resources, the Internet, the computer, and the required software. Some of the difficulties that have been highlighted by Al-Busaidi (2013) include how to measure the effectiveness of e-learning, strategic planning and direction deficiency, as well as lack of e-learning awareness and management support.

For e-learning to be effective in education, attention must be paid to knowledge, skills and aptitude, where knowledge is any information related to electronic transactions, and skill is the ability to use an electronic learning system. As for aptitude, it is what affects the success and effectiveness of e-learning (Mahdi et al., 2019). Undoubtedly, the introduction of innovation and data in education technology without taking into account the performance side of the users reduces the chances of the success of the educational process (Ibrahim et al., 2018). If well designed and managed, e-learning can overcome many barriers associated with traditional learning (Hijazi et al., 2003). The challenges posed by e-learning are better understood and addressed when there is an understanding about its stakeholders' readiness towards it; (Kaur & Zoraini Wati, 2004).

E-learning readiness: E-learning readiness is the level of mental and physical preparedness of an organization in terms of technological skills, online learning style, equipment/ infrastructure, attitude, human resources, financial and others (Mutiaradevi, 2009; Parlakkiliç, 2015). However, the nature of specialization controls the nature of e-learning in terms of content, study and application. For example, there are many e-learning considerations for industrial education graduates (Farajoun, 2019) which probably will be different from the needs of humanities students.

There has been an increased emphasis on e-learning in Kuwait (Al-Hunaiyyan et al., 2012; Toumi, 2010). The Ministry of Education has announced that it aims to introduce this form of learning into all schools in the country, suggesting that the nation is at the height of an e-learning movement. This indicates that Kuwait has acknowledged the value of e-learning and is about to take action to ensure that Kuwaiti students obtain a large part of their schooling (Eissa, 2010). The Kuwaiti experience in introducing computers and other related technol-

ogies into schools showed that teachers were satisfied with the technology, but that it is not utilized for instructional purposes as much as it could be (Alharbi, 2012). This shows that the country is already experimenting with electronic learning.

The Middle East comprises diverse communities, so each nation has its own e-readiness factors. The proposals for information technology and improvements across national boundaries are fairly alike (Al-Solbi & Mayhew, 2005). For example, Tubaishat and Lansari (2011) conducted a study in UAE to examine students readiness to adopt e-learning. The findings of the study suggest that e-learning is strongly appropriate to students. Results also reveal that a reasonably large proportion of students think that e-learning will have a meaningful impact on their learning experience.

In terms of student readiness, Cicco is quite right in stating that most young people around the world today are more adept at using smart technology than adults (Farajoun, 2019). In Kuwait, the observed development of technology has brought forth a generation capable of using that technology, especially the Internet. The university student in Kuwait today uses social media professionally in modern matters (Alenzi et al., 2017).

Research model and hypotheses development

The technology acceptance model (TAM) is the most popular model used to examine the acceptance of technology (Krishnan & Hussin, 2017). The model demonstrates user behavior as end-users of technologies where perceived usefulness and perceived ease of use specify the person's intention for using the system. The literature on TAM covers many aspects of readiness, including the pattern of preparation, and this concerns human faculties, scientific readiness, and others. To achieve abstraction and generalizability, this research used a unified notion of readiness.

Research model

The research model for this study is adapted from Krishnan & Hussin (2017) who examined the e-learning readiness factors as external variables in the technology acceptance model (TAM). The variables that have been chosen for this study are represented in figure 1.

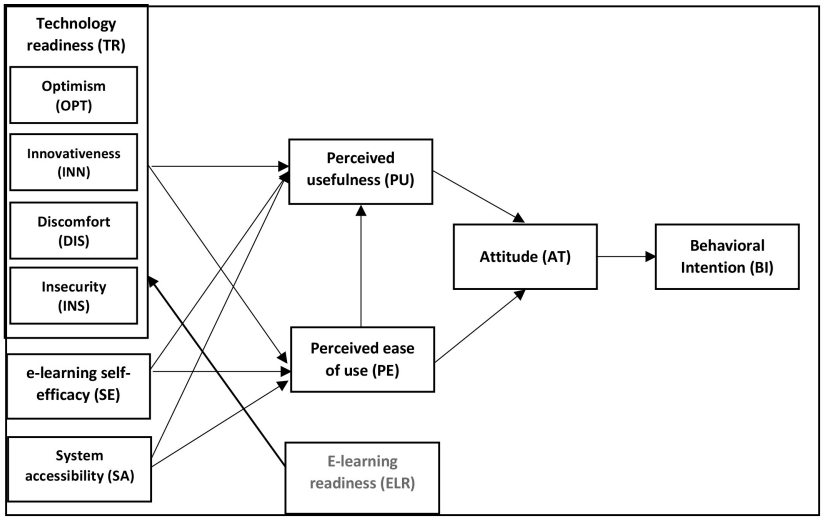

Figure 1: E-learning Readiness

The model tries to evaluate the relationships of how technology readiness causes a corresponding attitude and behavioral intention of use with mediation of perceived usefulness and perceived ease of use. There is a specific focus upon how these relationships vary across various types of university. It can, however, be expected that adoption may vary according to discipline, with the humanities, sciences, and others providing different contexts to technology adoption.

Technology readiness (TR): In the proposed model, technology readiness (TR) refers to a condition or state in which the user is prepared to try new technology. TR encompasses four contributing factors where the first two factors, optimism and innovativeness, establish and support technology readiness. The other two factors, namely discomfort, and insecurity, inhibit TR in the individual. The four factors work together to form the individual's view of technology. Parasuraman (2000) defines optimism as holding a positive belief that technology provides more control, flexibility, and efficiency. Innovativeness is defined as the person's belief in themselves as a technology pioneer, whereas discomfort is an inhibitor of technology in which a person perceives lack of control over technology, and insecurity is defined as being distrustful of technology to work properly.

Self-efficacy: Self-efficacy is defined as "people's beliefs about their

capabilities to produce designated levels of performance that exercise influence over events that affect their lives'' (Bandura, 1994:1). The beliefs of self-efficacy ascertain peoples' feeling, thinking, acting, and motivation (Bandura, 1994). In an online learning environment, Hodges (2008) emphasizes its relationship with self-efficacy. In this research, self-efficacy will be examined to identify its relationship with the acceptance and adoption of technology using the TAM model.

System accessibility: The accessibility of e-learning environment, such as multimedia, discussion boards, or digital storage, is important to ensure students are able to access the technologies required (Seale & Cooper, 2009). In Park's (2009) research, system accessibility is examined for the student's usage of e-leaning towards technology acceptance model and found that it affects only perceived ease of use in Korea. In this study, it will be examined to explore its influence on technology acceptance for Kuwait's students.

Hypotheses development

The TAM is recognized as effective in explaining user behavior relating to information technologies, which includes online learning. The TAM explains why users would accept or reject information technology by providing a basis for examining the impact of external variables on internal beliefs, attitudes, and intentions (Davis et al., 1989). It suggests that perceived ease of use and perceived usefulness are the two most important factors in explaining system use, as discussed in the TAM literature. The TAM suggests that users formulate a positive attitude towards technology when they perceive it to be useful and easy to use (Lee et al., 2003). Based on the TAM, higher levels of perceived usefulness and perceived ease of use predict favorable attitudes which, in turn, predict intention to use. Besides, the TAM also proposes that user's acceptance of technology is determined by his/her behavioral intention (Cronbach, 1977). Thus, individual actual use of a technology system is influenced directly or indirectly by the user's behavioral intentions, attitude, perceived usefulness of the system, and the perceived ease of use of the system (Park, 2009). Specifically, it indicates the relationships among perceived usefulness, perceived ease of use, attitude towards use, and behavioral intention to use technology. Behavioral intention is posited to be affected by attitude towards use and both perceived usefulness and perceived ease of use jointly affect attitude towards use. Davis and associates (1989) also

hypothesized that perceived ease of use will have an effect on perceived usefulness. This is because perceived usefulness concerns the overall impact of technology use on job performance (process and outcome); whereas perceived ease of use affects the process of using the technology (Davis et al., 1989; Teo, 2011). Thus, based on the results of previous studies, the following hypotheses were developed:

H1: Technology readiness has positive relationships with its usefulness as perceived by students.

H2: Technology readiness has positive relationships with student's perceived ease of use.

H3: Students' perceived usefulness has a positive relationship on attitudes towards online learning.

H4: Students' ease of use has a positive relationship on attitudes towards online learning

H5: Students' perceived ease of use has a positive relationship on their perceived usefulness.

H6: Students' attitudes towards online learning have a positive relationship with their behavioral intentions to use online learning.

Research methodology

The study adopts the quantitative approach in order to answer the research questions, and test the study hypotheses. The study uses a questionnaire and a survey strategy. The questionnaire for this research was published via a link to a website open to students of public and private colleges and universities in Kuwait, without specifying the type of college or speciality, as the Ministry decision came to allow college and university students in various disciplines to study remotely and electronically in the month of May 2020. Initially, some private universities started remote learning, and in August 2020, the public universities started e-learning. The questionnaire was distributed from April until the end of May 2020.

Sample size and data collection:

The population under consideration comprise of students in public and private universities and colleges in the state of Kuwait. Detailed specifications of the universities and colleges are provided in the demographics section of the analysis. According to statistics provided from the Kuwait Central Statistics Bureau, the approximate total number of registered students in private and public universities and

colleges in the state of Kuwait is 180,387 (CSB, n.d.). To calculate the required sample size for this study with a margin error of 5%, the sample required is (n = 383). This study has, however, managed to collect data from 760 respondents. As of the sample classification, it is reported in the analysis section.

Results

In this study, the respondents were students who are registered in higher education at public and private universities, including colleges, in Kuwait. An online survey was distributed, and 760 responded.

Table 1

Demographic details of the study participants (n = 760)

		Count	Column N %
Gender	Male	293	38.6%
	Female	467	61.4%
Type of Institution of student	Public	389	51.2%
	Private	371	48.8%
Institution Name	Kuwait University	199	26.2%
	PAAET	176	23.2%
	GUST	12	1.6%
	K-TECH	216	28.4%
	AUM	49	6.4%
	ACM	9	1.2%
	ACK	9	1.2%
	AUK	23	3.0%
	KCST	3	0.4%
	BoxHill	3	0.4%
	KiLaw	39	5.1%
	Others	22	2.9%

Cont. Table 1

Demographic details of the study participants (n = 760)

		Count	Column N %
Age	18 - 22	487	64.1%
	23 - 30	229	30.1%
	31 - 35	29	3.8%
	+ 36	15	2.0%
Educational level	Freshman	182	23.9%
	Sophomore	187	24.6%
	Junior	165	21.7%
	Senior	226	29.7%
Total		760	100.0%

As shown in table 1, data were collected from 760 respondents; 467 61.4.6% were female and the rest of 293 38.6% were male respondents. 389 51.2% of these students were from public universities and the remaining 371 48.8% students were from private universities. The table shows that: 216 28.4% of the respondents were from K-Tech, followed by 199 26.2% participants from Kuwait University, and 176 23.2% from PAAET. The rest n = 169 were from other universities and colleges; including GUST, AUM, ACM, ACK, AUK, AIC, KCST, BoxHill, KiLaw, and others.

Majority of the respondents, 487 64.1% were between 18-22 years old, followed by 229 30.1% between 23-30 years, and a small number of respondents, 29 3.8% and 15 2.0% were between 31-35 years and 36 and more, respectively. As of the educational level, 226 29.7% respondents were seniors, 187 24.6% were sophomores, 182 23.9% were freshmen and 165 21.7% were juniors.

Internal consistency reliability test: To secure the internal consistency and establish reliability of measurement, reliability tests are run, table 2. The test is based on Cronbach alpha coefficients (Cronbach,

1977). Cronbach alpha reliability coefficient normally ranges between 0 and 1. The closer Cronbach alpha coefficient is to 1.0, the greater the internal consistency of the items on the scale (Santos, 1999).

Table 2

Internal consistency values

Estimate	Cronbach's α	Average interitem correlation	mean	sd
Point estimate	0.956	0.468	2.503	0.261
95% CI lower bound	0.952	0.433		
95% CI upper bound	0.960	0.502		

Note. Of the observations, pairwise complete cases were used.

Table 2 summarizes the results of internal consistency reliability tests with regard to constructs used in current research (Cronbach alpha values). Generally, Cronbach alpha of 0.70 and above are acceptable (Akter et al., 2010). Cronbach alpha values in this study are very close to 1 and therefore the results produced are highly dependable and trustworthy.

Table 3.

Individual Item Reliability Statistics If item dropped

Item	Cronbach's α	Item-rest correlation	Mean	SD
Q9_1	0.954	0.704	1.949	1.065
Q9_2	0.956	0.562	2.520	1.111
Q9_3	0.956	0.518	2.255	1.130
Q9_4	0.956	0.570	1.927	1.064
Q9_5	0.953	0.828	2.752	1.447
Q9_6	0.953	0.834	2.665	1.413
Q9_7	0.953	0.825	2.612	1.498
Q9_8	0.954	0.751	2.624	1.270

Cont. Table 3.

Individual Item Reliability Statistics If item dropped

Item	Cronbach's α	Item-rest correlation	Mean	SD
Q9_9	0.953	0.821	2.514	1.340
Q9_10	0.953	0.810	2.516	1.406
Q9_11	0.953	0.814	2.453	1.357
Q9_12	0.953	0.846	2.713	1.369
Q9_13	0.952	0.858	2.522	1.419
Q9_14	0.953	0.840	2.319	1.313
Q9_15	0.953	0.819	2.627	1.420
Q9_16	0.958	0.293	2.750	1.224
Q9_17	0.958	0.288	2.803	1.178
Q9_18	0.954	0.694	2.749	1.260
Q9_19	0.954	0.781	2.234	1.177
Q9_20	0.954	0.727	2.257	1.214
Q9_21	0.954	0.722	2.266	1.174
Q9_22	0.959	0.262	2.954	1.242
Q9_23	0.960	0.171	2.390	1.269
Q9_24	0.953	0.783	2.691	1.513

Table 4 shows that the values of AVE are ranged between 0.504 to 1.0, greater than the critical value of 0.50 (Al-Emran et al., 2020), indicating a higher convergent validity (Hair et al., 2017). Whereas, the values for composite reliability are ranging from 0.745 to 1.0, greater than the critical value of 0.7 (Akter et al., 2010).

Table 4.

Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
AT	0.925	0.925	0.964	0.930
BI	0.818	0.835	0.916	0.845
DIS	0.595	0.834	0.745	0.504
INN	0.755	0.771	0.859	0.671
OPT	0.841	0.844	0.905	0.761
PE	0.888	0.889	0.947	0.900
PU	0.921	0.922	0.950	0.864
SA	1.000	1.000	1.000	1.000
SE	0.828	0.828	0.921	0.853
Criteria	> 0.7	> 0.7	> 0.7	> 0.5

Table 5 shows the confirmatory factor analysis, used to test how well the measured variables represent the number of constructs provided. Table 5 shows the results of (CFA) through path coefficients, t-values, and p values for each hypothesis. All paths are supported in terms of representing these constructs, because the p-values are less than the critical P-value of 0.05.

Table 5.

Confirmatory factor analysis results (Outer Loadings: Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P- Values
AT1 ← AT	0.963	0.964	0.004	272.275	0.000
AT2 ← AT	0.965	0.965	0.003	323.927	0.000
BI1 ← BI	0.905	0.905	0.009	95.628	0.000

Cont. Table 5.

Confirmatory factor analysis results (Outer Loadings: Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P- Values
BI2 ← BI	0.933	0.933	0.004	207.648	0.000
DIS1 ← DIS	0.903	0.904	0.029	31.177	0.000
DIS2 ← DIS	0.607	0.596	0.069	8.816	0.000
DIS3 ← DIS	0.575	0.567	0.066	8.698	0.000
INN1 ← INN	0.756	0.754	0.026	28.751	0.000
INN2 ← INN	0.847	0.847	0.012	68.653	0.000
INN3 ← INN	0.850	0.850	0.013	65.606	0.000
OPT1 ← OPT	0.817	0.815	0.017	47.276	0.000
OPT2 ← OPT	0.905	0.905	0.008	106.610	0.000
OPT3 ← OPT	0.892	0.892	0.010	86.564	0.000
PE1 ← PE	0.950	0.950	0.004	262.093	0.000
PE2 ← PE	0.947	0.947	0.004	225.306	0.000
PU1 ← PU	0.930	0.930	0.007	142.383	0.000
PU2 ← PU	0.939	0.939	0.006	164.243	0.000
PU3 ← PU	0.920	0.920	0.008	117.946	0.000
SA1 ← SA	1.000	1.000	0.000		
SE1 ← SE	0.923	0.923	0.007	136.203	0.000
SE2 ← SE	0.924	0.924	0.006	152.781	0.000

To get the discriminant validity, the research has utilized a three point criteria, namely: 1 - Fornell-Larker criterion, cross-loadings, and the most recent one of Heterotrait-Monotrait ratio (HTMT). The

overall aim of discriminant validity assessment is to ensure that the reflective constructs have the strongest relationships with its own indicators compared to any other constructs (Hair et al., 2017).

First, table 6 shows values for Fornell-Larcker criterion for discriminant validity. These values are derived by taking square roots of all AVEs. These square rooted values are found to be greater than the correlation of each construct with other constructs, establishing discriminant validity based on the mostly used Fornell-Larcker criterion.

Table 6.

Fornell-Larcker Criterion

	AT	BI	DIS	INN	OPT	PE	PU	SA	SE
AT	**0.964**								
BI	0.861	**0.919**							
DIS	0.356	0.421	**0.710**						
INN	0.655	0.697	0.523	**0.819**					
OPT	0.723	0.726	0.513	0.767	**0.872**				
PE	0.862	0.827	0.362	0.718	0.750	**0.948**			
PU	0.910	0.850	0.398	0.660	0.738	0.826	**0.930**		
SA	0.786	0.763	0.307	0.657	0.700	0.847	0.748	**1.000**	
SE	0.849	0.843	0.398	0.733	0.757	0.875	0.823	0.850	**0.924**

Secondly, table 7 indicates the cross loading results, suggesting that the indicator loadings of the constructs (in bold) are greater than the corresponding constructs, thus fulfilling the second criteria cross-loading establishing the discriminant validity.

Table 7.

Cross Loadings results

	AT	BI	DIS	INN	OPT	PE	PU	SA	SE
AT1	**0.963**	0.815	0.320	0.611	0.682	0.819	0.873	0.750	0.810
AT2	**0.965**	0.845	0.367	0.653	0.712	0.844	0.882	0.766	0.827

Cont. Table 7.

Cross Loadings results

	AT	BI	DIS	INN	OPT	PE	PU	SA	SE
BI1	0.721	**0.905**	0.382	0.596	0.625	0.705	0.714	0.645	0.727
BI2	0.853	**0.933**	0.391	0.679	0.706	0.809	0.841	0.752	0.817
DIS1	0.382	0.436	**0.903**	0.489	0.522	0.380	0.422	0.322	0.407
DIS2	0.132	0.191	**0.607**	0.294	0.222	0.150	0.142	0.149	0.187
DIS3	0.117	0.145	**0.575**	0.273	0.218	0.124	0.149	0.087	0.145
INN1	0.444	0.483	0.420	**0.756**	0.530	0.482	0.448	0.421	0.506
INN2	0.573	0.603	0.444	**0.847**	0.623	0.609	0.592	0.559	0.612
INN3	0.579	0.613	0.424	**0.850**	0.716	0.656	0.567	0.614	0.669
OPT1	0.624	0.607	0.447	0.625	**0.817**	0.637	0.628	0.591	0.634
OPT2	0.655	0.668	0.446	0.733	**0.905**	0.693	0.668	0.652	0.707
OPT3	0.610	0.623	0.450	0.644	**0.892**	0.629	0.634	0.585	0.636
PE1	0.842	0.797	0.326	0.659	0.684	**0.950**	0.812	0.794	0.828
PE2	0.793	0.771	0.360	0.703	0.740	**0.947**	0.753	0.813	0.833
PU1	0.851	0.802	0.397	0.642	0.705	0.785	**0.930**	0.696	0.790
PU2	0.859	0.807	0.363	0.603	0.693	0.773	**0.939**	0.711	0.770
PU3	0.826	0.762	0.349	0.595	0.660	0.745	**0.920**	0.678	0.734
SA1	0.786	0.763	0.307	0.657	0.700	0.847	0.748	**1.000**	0.850
SE1	0.802	0.797	0.411	0.649	0.698	0.777	0.789	0.746	**0.923**
SE2	0.766	0.760	0.324	0.705	0.700	0.840	0.732	0.825	**0.924**

Finally, table 8 shows the results of HTMT as a third criterion of discriminant validity, which shows that most of the 36 values of various constructs do not exceed the critical value of 0.90, except for 12 values, which are BI-AT 0.98, PE-AT 0.95, PU-AT 0.985, PE-BI 0.965, PU-BI 0.973, SE-AT 0.970, OPT-INN 0.953, SE-INN 0.919, SE-OPT 0.906, SE-PE 1.021, SE-PU 0942, and SE-SA 0934. These results, therefore, confirm that most of the constructs are qualified according the criteria of HTMT ratio for its discriminant validity.

Table 8.

Heterotrait-Monotrait ratio (HTMT) results

	AT	BI	DIS	INN	OPT	PE	PU	SA
AT								
BI	0.983							
DIS	0.381	0.498						
INN	0.776	0.875	0.706					
OPT	0.819	0.871	0.610	0.953				
PE	0.950	0.965	0.404	0.868	0.868			
PU	0.985	0.973	0.432	0.784	0.838	0.912		
SA	0.818	0.839	0.324	0.746	0.763	0.899	0.779	
SE	0.970	1.020	0.473	0.919	0.906	1.021	0.942	0.934

Table 9 indicates the path coefficient values. The path coefficients from original sample 0 indicate the size and direction of a relationship between two latent constructs. The results suggest that AT has the largest positive relationship with BI [O = 0.86; SD = 0.011], followed by PU ® AT [O = 0.62; SD = 0.036], and then SE ® PE [O = 0439; SD = 0.045], whereas, INN has the largest, negative relationship with PU [O = -0.052; SD = 0.034], followed by DIS ® PE [O = -0.031; SD = 0.017], and SA ® PU [O = -0.002; SD = 0.050].

Table 9.

Path Coefficients and model quality assessment (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision	f^2	VIF	R^2_{adj}
PE ® AT	0.349	0.353	0.036	9.791	0.000	Accept	0.290	3.142	0.866
PU ® AT	0.621	0.618	0.036	17.471	0.000	Accept	0.918	3.142	

Cont. Table 9.

Path Coefficients and model quality assessment (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision	f^2	VIF	R^2_{adj}
AT ® BI	0.861	0.861	0.011	80.055	0.000	Accept	2.865	1.000	0.741
DIS ® PE	-0.031	-0.032	0.017	1.840	0.066	Reject	0.004	1.474	
INN ® PE	0.098	0.100	0.037	2.674	0.008	Accept	0.018	2.985	
OPT ® PE	0.128	0.127	0.031	4.175	0.000	Accept	0.028	3.270	0.817
SA ® PE	0.330	0.329	0.038	8.700	0.000	Accept	0.158	3.787	
SE ® PE	0.439	0.439	0.045	9.717	0.000	Accept	0.223	4.759	
DIS ® PU	0.043	0.045	0.024	1.765	0.078	Reject	0.005	1.479	
INN ® PU	-0.052	-0.053	0.034	1.531	0.126	Reject	0.003	3.038	
OPT ® PU	0.194	0.195	0.042	4.593	0.000	Accept	0.043	3.360	0.739
PE ® PU	0.393	0.392	0.055	7.095	0.000	Accept	0.108	5.512	
SA ® PU	-0.002	-0.001	0.050	0.041	0.968	Reject	0.000	4.388	
SE ® PU	0.355	0.355	0.056	6.332	0.000	Accept	0.083	5.820	

Table 10 demonstrates the results related to 16 paths of impact, including the mediating effect. Based on the critical significant value of P = 0.05, 11 out of 16 paths are accepted, whereas the rest of 5 paths are rejected.

Table 10.

Indirect effects of the mediating variables (Specific Indirect Effects: Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
DIS ← PE ← AT	-0.011	-0.011	0.006	1.820	0.069	Reject

Cont. Table 10.

Indirect effects of the mediating variables (Specific Indirect Effects: Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
INN → PE → AT	0.034	0.035	0.013	2.603	0.010	Accept
OPT → PE → AT	0.045	0.045	0.011	3.941	0.000	Accept
SA → PE → AT	0.115	0.116	0.017	6.644	0.000	Accept
SE → PE → AT	0.153	0.155	0.024	6.378	0.000	Accept
DIS → PU → AT	0.027	0.028	0.015	1.759	0.079	Reject
INN → PU → AT	-0.033	-0.033	0.022	1.503	0.133	Reject
OPT ← PU ← AT	0.121	0.121	0.026	4.557	0.000	Accept
DIS → PE → PU → AT	-0.008	-0.008	0.005	1.686	0.092	Reject
INN → PE → PU → AT	0.024	0.025	0.011	2.231	0.026	Accept
OPT → PE → PU → AT	0.031	0.031	0.009	3.627	0.000	Accept
SA → PE → PU → AT	0.081	0.080	0.014	5.611	0.000	Accept
PE → PU → AT	0.244	0.242	0.035	7.054	0.000	Accept
SE → PE → PU → AT	0.107	0.106	0.017	6.245	0.000	Accept
SA → PU → AT	-0.001	-0.001	0.031	0.041	0.967	Reject
SE → PU → AT	0.220	0.220	0.040	5.491	0.000	Accept

Table 11 demonstrates the overall results related to 19 hypotheses. Based on the critical significant value of P = 0.05, 13 hypothesis are accepted, whereas the rest (6 hypothesis) are rejected.

Table 11.

Total Effects (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/ STDEV|)	P Values	Decision
AT → BI	0.861	0.861	0.011	80.055	0.000	Accept
DIS → AT	0.008	0.009	0.017	0.466	0.642	Reject
DIS → BI	0.007	0.008	0.015	0.466	0.641	Reject
DIS → PE	-0.031	-0.032	0.017	1.840	0.066	Reject
DIS → PU	0.031	0.032	0.025	1.242	0.215	Reject
INN → AT	0.026	0.026	0.032	0.788	0.431	Reject
INN → BI	0.022	0.023	0.028	0.788	0.431	Accept
INN → PE	0.098	0.100	0.037	2.674	0.008	Accept
INN → PU	-0.014	-0.014	0.039	0.359	0.719	Reject
OPT → AT	0.197	0.196	0.030	6.578	0.000	Accept
OPT →BI	0.169	0.169	0.026	6.595	0.000	Accept
OPT → PE	0.128	0.127	0.031	4.175	0.000	Accept
OPT → PU	0.244	0.245	0.041	5.966	0.000	Accept
PE → AT	0.594	0.595	0.043	13.909	0.000	Accept
PE → BI	0.511	0.512	0.037	13.772	0.000	Accept
PE → PU	0.393	0.392	0.055	7.095	0.000	Accept
PU → AT	0.621	0.618	0.036	17.471	0.000	Accept
PU → BI	0.535	0.532	0.032	16.972	0.000	Accept
SA → AT	0.195	0.195	0.036	5.375	0.000	Accept
SA → BI	0.168	0.168	0.031	5.361	0.000	Accept
SA → PE	0.330	0.329	0.038	8.700	0.000	Accept
SA → PU	0.128	0.127	0.048	2.686	0.007	Accept

Cont. Table 11.

Total Effects (Mean, STDEV, T-Values, P-Values)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
SE → AT	0.481	0.481	0.038	12.671	0.000	Accept
SE → BI	0.414	0.414	0.034	12.152	0.000	Accept
SE → PE	0.439	0.439	0.045	9.717	0.000	Accept
SE → PU	0.527	0.527	0.051	10.260	0.000	Accept

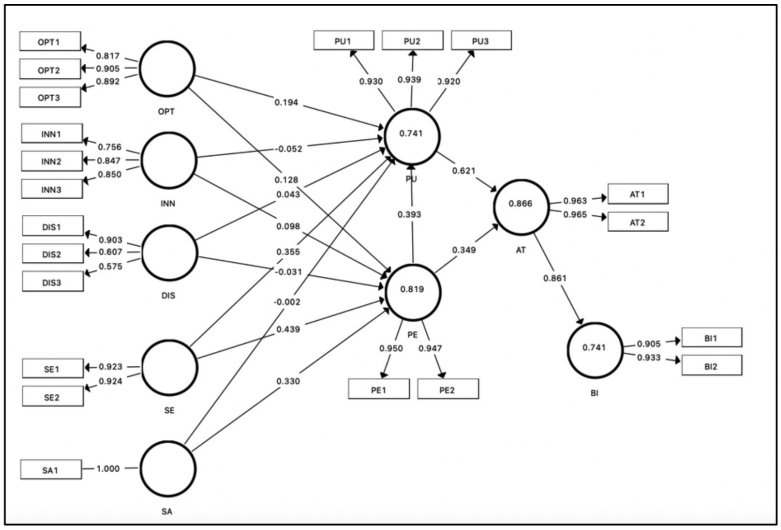

Figure 3: PLS algorithm results

Figure 3 shows the PLS algorithm results, where the technology readiness is measured through optimism (OPT), innovativeness (INN), discomfort (DIS) and security (SE) related to technology. OPT, INN, and DIS are measured through 3 factors each, whereas SE is measured through 2 factors and SA through a single factor. PU is measured through three factors, whereas PE, AT, and BI are individually measured through two factors each.

Discussion

Technology readiness has a fundamental role to play in the overall e-learning readiness that moves through complex paths of impacts, which are explained in this paper.

H1: Technology readiness has positive relationships with students' perceived usefulness.

The first hypothesis refers to the influence of student's technology readiness on their perceived usefulness. Findings suggest that the very core of technology emerges from the students' optimism, indicating a positive impact on the perceived ease of using the technology, their attitudes, and overall behaviors towards using technology. These results support the theorem in TAM literature on how optimism is important for creating a positive perception of technology usefulness (Erdodmuq & Esen, 2011). Results showed that optimism and innovativeness dimensions of technology readiness positively influence the perceived usefulness and perceived ease of use, but security dimension does inhibit students from perceiving ease of using technology, which ultimately constrains them from accepting new technology (Acheampong et al., 2017). The discomfort part of readiness dimension, however, is found irrelevant to both perceived usage and perceived ease of use, and consequent attitude and behavior intention towards e-learning. Some these results may go beyond expectation. For example personal discomfort, in literature is often found associated with perceived usefulness (Panday, 2018), in contrary with this study, indicating the need for further investigation.

H2: Technology readiness has positive relationship with students' perceived ease of use.

The second hypothesis refers to the influence of students' technology readiness on their perceived ease of use. Students are also found to be attracted by innovations in technology causing them to consider technology easy to use and thus behave accordingly. However, students are yet to believe in the perceived usefulness of the innovations in technology, to be of no impact on their immediate attitude. More interestingly, the students discomfort was not found related to the attitude, behavior, perceived usefulness, and perceived ease of use, to enhance the technology readiness. The security related to technological use, is found to be related to all important constructs including the

attitude, behavior, perceived usefulness, and perceived ease of use and SA. Traditionally, however, perceived discomfort is significant for the overall technology acceptance literature (Chotijah & Retrialisca, 2020). Students, being millennial generation, are expected to be comfortable with technology. Such factor is, therefore, found irrelevant to the key factors of e-learning readiness in this study.

H3: Students' perceived usefulness has a positive relationship with attitudes towards online learning.

Results related to the third hypothesis have shown students' perceived usefulness has positive impact on their attitudes towards online learning. Students are found to believe that online learning is important and useful in enhancing their academic performance. This performance relevance of technology stimulates their users to develop the overall acceptance of technology. Such finding is fairly logical and confirming the very influential and founding work on technology acceptance (Davis et al., 1989). The perceived usefulness seems to constitute generic motivation for developing positive attitude because such usefulness promises aid to achieving personal objectives. This is, therefore, significantly important for the attitude, and ultimate intention to use technology (Sharma, 2020) and such usefulness can, therefore, be used in technology design to generate positive emotions about the subject technology (Roberts et al., 2019).This usefulness, considered very much associated with the perceived ease of use, is discussed next.

H4: Students' ease of use has a positive relationship on attitudes towards online learning

The results related to this hypothesis suggest that a perceived ease of use has positive and significant influence on attitude towards online learning. Such findings are in line with the technology acceptance literature, suggesting that a positive attitude appears towards technology when it is perceived to be easier to use (Lee et al., 2003; Park, 2009). The perceived ease of use is more related to the process of operating technology in terms of the perception of having no or little effort requirement for using a technology (Davis et al., 1989). If the perception is that online learning requires more effort, students may not develop the required attitude. Therefore, technology needs to be easier to use and it also must appear to be easier. In this context, age seems to

be a factor as older users may be more concerned to usage (Roberts et al., 2019; Sharma, 2020) and may therefore require special interventions compared to the technology native new generations.

H5: Students' perceived ease of use has a positive relationship on their perceived usefulness

The fifth hypothesis aims to understand the influence of students' perceived ease of use on their perceived usefulness. Both these perceptions are closely associated, as usefulness refers to the users' belief that technology has a role in enhancing their performance, whereas the easiness refers to how much efforts would be required in using the technology (Davis et al., 1989). Results suggest that perceived ease has a significant positive influence on the students to assume its usefulness too. Higher levels of perceived usefulness enhance the relevance perception; thus creating a positive attitude, which makes students see minor difficulties in utilizing technology.

H6: Students' attitudes towards online learning have a positive relationship with their behavioral intention to use online learning

The sixth and final hypothesis aims to evaluate the effect of students' attitudes towards online learning on their behavioral intention. The finding suggests that attitude towards online learning got realized into behavioral intention of the students. This concluding impact comes through a chain of effects, as the results show that other factors such as security, perceived ease of use, and optimism do contribute into the behavioral intention and such intention is less likely to be affected by any discomfort. Based on technology acceptance literature, higher levels of perceived usefulness and perceived ease of use predict favorable attitudes which, in turn, predict intentions to use (Wu and Tsai, 2006). Thus, the individual's actual use of any technology system is influenced directly or indirectly by the users' behavioral intention, attitude, perceived usefulness of the system, and perceived ease to use of the system (Park, 2009).

Conclusion

Overall, the results of the study confirmed many relationships hypothesized within the scope of literature pertaining to TAM and technology readiness, while highlighting the effects of attitude, perceived

usefulness and perceived ease of use on student's behavioral intention to use online learning. We further found interesting results regarding the effects of technology readiness on perceived usefulness and perceived ease of use. This research provides a number of contributions towards online learning, TAM, and organizational behavior literatures. The theoretical contribution of this study can be seen as: 1- developing additional knowledge about the role played by technology readiness on students' intentions for adopting online learning in the Higher Education Institutions, and 2- highlights the importance of perceived usefulness, perceived ease of use and attitude on student's behavior intention to use online learning.

Consistent with our hypotheses regarding the effects of TAM constructs and previous studies focusing on students' behavior intention to adopt online learning, we found that attitudes have positive effect on students' intentions to adopt online learning at the university. The results of this study support the assertion by that attitude is one of the important personal traits composed of personal beliefs and value systems that directly affect individual intention to use technologies including online learning. On the similar line, perceived ease of use and perceived usefulness significantly influences students' intention to adopt online learning through attitudes toward behavior. That is to say, students think higher perceived usefulness and perceived ease of use result in more positive attitudes toward the use of online learning, and perceived higher behavioral intention to adopt online learning as their medium of education. These findings supplement previous studies such as providing empirical evidence that students do not only require appropriate perceived usefulness but also require ease of use to use online learning. Furthermore, this study also found the extended variable of TAM, technology readiness has a significant effect on perceived ease of use and perceived usefulness. It means that when students' readiness to try new technology is high, their perceived usefulness and ease of use of online learning is also high, thus significantly affect their intention to use online learning. This finding is consistent with Shin & Lee (2014) that also found a significant effect of technology readiness with the perceived usefulness and perceived ease of use.

Despite the fast shift and unprepared switch from on campus education to 100% online education due to Covid-19 pandemic to

facilitate the education process and allow its continuation, students showed unexpected readiness to technology utilization in education and learning process. This result may raise a concern for the educational institutions, as students show readiness and acceptance to the use of technology. The concern refers to the need to enhance such education process and adopt more technologies in the education methodology and reinforce the online learning to gain students' engagement and develop the educational process to suit the traits and abilities of this generation.

Besides, this research found that technology readiness, perceived ease of use, perceived usefulness and attitudes are critical factors for students' behavioral intention to use online learning. Therefore, the educators and instructors of higher institution should focus on the online learning usefulness and ease of use, as well as, students' technology readiness and attitudes because they form higher predictive effect on intention to use online learning. Furthermore, higher institution could also conduct training courses to promote students' perception of ease and usefulness of online learning and also enhance their positive attitudes and consequently their behavioral intentions to practice online learning. Finally, training courses should also be performed to educators and instructors in order to enhance their knowledge and skills, which can positively influence students' technology readiness and technology acceptance.

Limitations and future research

The substantive findings of this study include certain limitations and scope for further improvement. First, the results of this study show that the proposed model has a good fit to the data. However, the model should be further validated using different samples from different locations, such as other countries, or different online learning users, such as educators and instructors, to strengthen its predictive ability and explanatory powers in order to use it in different contexts, thus increasing its usefulness to researchers. Second, because of the different levels of educational and technological status in each country, the degree of acceptance of online learning among students may vary in other countries, such as developed and developing countries, and might show different influencing factors. Research is needed for further comparisons. Such studies would enrich insights of these findings.

Third, future research could also extend the current study by assessing the combined effects of individual-level and institution-level factors for better understanding of students' behavior in relation to using online learning. Finally, results of this study can be used as a basis for subsequent studies that may be interested in exploring differences as of the types of faculties and scientific departments and comparing their preparation for e-learning. The study can also be drawn upon, to build post-pandemic studies.

قياس جاهزية الطلاب لقبول استخدام أنظمة التعلم الإلكتروني أثناء جائحة كورونا في التعليم العالي بالكويت

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ملخص

يمثل تبني التعلم الإلكتروني إحدى المشكلات الرئيسية في وزارة التربية والتعليم في الكويت خلال جائحة كوفيد -19. وتلعب جاهزية الطلاب في التعليم العالي دورًا رئيسيًا في نجاح أو فشل أنظمة التعلم الإلكتروني / عن بُعد. يتمثل الغرض من هذه الدراسة في تقييم جاهزية الطلاب وتحديد أهم العوامل التي تؤثر على استعدادهم في التعلم الإلكتروني من أجل استخدام الفرص الفعالة التي تسهل التعلم الإلكتروني. تم توزيع استبيان على طلاب التعليم العالي في الكويت. وبتحليل 760 استبانة تم استردادها، كشفت الدراسة أنه على الرغم من فُجاءة جائحة كوفيد -19 والتحول السريع إلى التعلم عبر الإنترنت، إلا أن الطلاب أظهروا استعدادا لتقبل ذلك، وكان لديهم موقف إيجابي تجاه استخدام التعلم الالكتروني؛ حيث أظهرت النتائج وجود تصورات إيجابية تتعلق بالابتكار والتفاؤل والفائدة وسهولة استخدام التكنلوجيا، مما يؤدي إلى موقف إيجابي ونية مؤكدة لاستخدام التعلم الإلكتروني.

الكلمات المفتاحية: التعلم الإلكتروني، الجاهزية، الجاهزية التقنية، نموذج قبول التكنولوجيا (TAM)

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