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The Attitude of Lecturers toward E-learning Acceptance in Kuwaiti Applied Colleges during COVID-19 Pandemic

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Abstract

Coinciding with the coronavirus pandemic, most higher education institutions around the world have tended to activate distance education, including universities and colleges in Kuwait that previously had not fully implemented e-learning, especially the applied colleges that rely on vocational and practical training. This study aims to identify the attitude of faculty members toward e-learning and to reveal the technical and educational challenges as well as the requirements that must be met according to the professors' point of view. Of the 137 faculty members who participated in completing the questionnaire, 18 faculty members were interviewed. The study found that the professors hold neutral views and at the same time acknowledge the existence of great educational and technical difficulties and challenges; they also emphasized the need to provide the necessary requirements for the educational and technical level. The educational challenges that emerged included classroom management, class size, unethical behaviors, interaction, and mental and social presence. The technical challenges were internet coverage, server stress, technical support, training, and user interface. Statistically significant differences also emerged, indicating that faculty members who use educational technologies or use social media in their teaching are more optimistic than members who do not use these technologies. Finally, recommendations were raised after discussing the results of the study considering previous studies and reviewing the relevant literature.

Keywords: E-learning, Educational Challenges, Technical Challenges, Applied Colleges, Kuwait

1. Introduction

The digital transformation occurring at all levels of education systems has allowed the incorporation of e-learning. E-learning refers to a learning system that utilizes electronic technologies to acquire an educational curriculum when learners are not physically present in a traditional classroom (Nortvig, Petersen, and Balle, 2018). According to recent studies, the COVID-19 pandemic resulted in the closure of classrooms around the globe and forced 63 million educators and more than 1.5 billion students to modify their teaching and learning practices (Dhawan, 2020). The

situation has revealed the strengths and weaknesses of education systems around the globe, which include digitalization challenges in classrooms. The digital breach remains a big challenge in the modern day.

The COVID-19 pandemic brought challenges to the learning system for both learners and educators as the crisis forced them out of their traditional learning methods. The shift to online learning came with massive technology challenges (Carrillo and Flores, 2020) as it is entirely dependent on the internet and technological devices; thus, educators experienced challenges in bringing all students on board due to bad internet connections and outdated technological devices (Moorhouse, 2020). Research also shows that the provision of the technological equipment that would enable e-learning was not smooth. Some students' social-economic status made it difficult to access learning as they had previously relied on free internet and computers in school (Aboagye, Yawson, and Appiah, 2020). School closures made the migration process for these students slow. Some educators and learners also lack the digital competence required to transition fully to online classes. Those with low digital competence are more likely to lag with e-learning.

According to studies, the historical development of e-learning dates back to the 1980s. However, it is becoming more approachable and more viable during this digital era. It evolved from computer-based training to a level where students can take their classes wherever they go. Researchers consider it a natural evolution for what previously started as distance learning (Thorpe and Godwin, 2006). According to existing research, e-learning makes use of the available modern technology to advance and adapt the educational tool framework for shaping education. Mobile technology advancements have led to m-learning, which is a new era in e-learning (Turnbull, Chugh, and Luck, 2020). Mobile learning enables learners to engage in various learning activities irrespective of their geographical locations. It has enabled access to e-learning through various digital devices, including smartphones, laptops, tablets, handheld computers, and media players.

Studies have shown that the demand for learning management systems (LMS) grew to 7.8 billion dollars by 2018. The global e-learning market continues to grow. The education sector comprises more than 21% of the LMS market, while other areas like manufacturing (Castro and Tumibay, 2019), healthcare, and technology account for smaller percentages. Massive open online courses (MOOC), a new educational phenomenon, enabled the technology of e-learning that emerged more than a decade ago. MOOCs provide a massive and free online education system that involves self-learning courses and open-access courses (Roumell and Salajan, 2016). Studies have shown that online e-learning websites such as Udemy provide massive online instruction-orientated courses. According to research carried out in 2015, more than 35 million students had enrolled in at least one online course.

According to research, rapid developments in technology have simplified distance education. It allows students to learn and interact with other students and instructors from different parts of the world. It is a learning environment with no live sharing of content in classes or lectures. Instead, students access learning content through different learning forums and systems (Bawa, 2016). However, immediate response and immediate feedback are not present in these environments. According to previous research, e-learning provides numerous opportunities that students can utilize for social interactions. Individuals can now clearly see the benefits of e-learning, especially during this pandemic period (Aboagye, Yawson, and Appiah, 2020). Online platforms during this period enable video conferencing where more than 40 students can hold discussions, thereby keeping classes organic even without physical meetings. Students can comfortably access their lectures through portable devices like mobile phones.

Scholars argue that e-learning is no longer an option but a necessity. The severity of the COVID-19 pandemic forced the whole world into quarantine, and its effects are evident in many learning institutions, including colleges and universities (Dhawan, 2020). The pandemic has forced these institutions to shift from the offline to online mode of schooling. The crisis has pushed institutions that were previously reluctant to accept rapidly-changing modern technology. Studies have shown that the catastrophe will contribute to reveal to the world the lucrative side of e-learning. Most universities around the globe are working on fully digitalizing their operations as a move to cope with this current situation. Studies have indicated that Chinese universities tremendously increased online enrollment after the coronavirus outbreak (Dhawan, 2020). There has been a massive shift from traditional classrooms to e-classrooms. Educators have responded by shifting their pedagogical approach to enable them to meet the changing market conditions. The debate has now moved from the quality of e-learning education to how academic institutions can quickly and massively adopt online pedagogy.

Although there are numerous issues attached to e-learning, its significance, especially in such times of crisis, is immeasurable. Possible solutions can help in solving some challenges that come with online learning, such as prerecording video calls and testing the content (Nortvig, Petersen, and Balle, 2018). Learning institutions need to work on making their online classes interesting, interactive, and dynamic. Researchers have suggested that educators

should make efforts to humanize the online learning processes as much as possible (Carrillo and Flores, 2020). It is important to ensure continuous improvement in the quality of courses for quality education. Researchers recommend that educators should design online programs that are relevant, self-centered, interactive, and group-based.

The concept of e-learning has existed for more than two decades. What began as a radical idea has now grown into a mainstream phenomenon since the outbreak of COVID-19. The fundamentals for e-learning include the platform, technological infrastructure, participants, and e-learning content. The current pandemic has revealed the strengths and weaknesses that face education systems around the globe, which include digitalization challenges in classrooms. According to existing research, e-learning makes use of the available modern technology to advance and adapt the educational tool framework for shaping education.

Research Questions

Although a number of universities apply e-learning as one of their programs, many universities around the world still do not apply e-learning as an accredited program or have included only limited practices of e-learning. However, there is an increasing need to conduct studies related to distance education and e-learning, particularly today, as digital education is no longer a secondary source of education but rather has become one of the main patterns of learning, especially after the remarkable growth in the number of those enrolled in distance learning programs (Moore and Fodrey, 2018). As is well known, the world is currently experiencing circumstances that forced many governments to suspend studies in all stages due to the COVID-19 pandemic. Therefore, many governments, including the Kuwaiti government, have activated e-learning as an alternative to traditional learning to adapt to the current global circumstances.

The current study aspires to provide the educational research community with results on the attitudes of university professors toward e-learning and on the most prominent educational challenges and requirements while also extracting the most prominent technical challenges and requirements. As for the local level, the study aspires to provide recommendations that contribute to improving university e-learning in Kuwait, especially in the applied colleges that rely on practice-based learning in the first place.

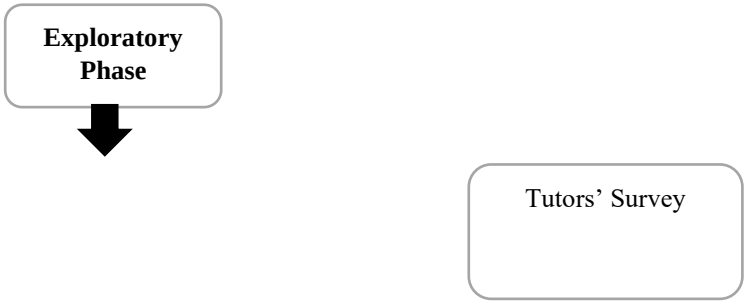
One question this study asks is: How do professors perceive e-learning in Kuwaiti applied colleges, and what are its requirements in light of the current educational and technical challenges? In order to answer for this main question, the following sub-questions were developed:

- What are the attitudes of lecturers toward e-learning in Kuwaiti applied colleges?
- What are the most prominent educational and technical challenges resulting from learning through electronic platforms?
- What are the most prominent educational and technical requirements that must be met to achieve the quality of education in e-learning from the perspective of lecturers?
- Are there statistically significant differences in the attitudes of the participants as well as the educational and technical challenges and requirements according to the variables of the study?

2. Methodology

2.1 Research Design

This study is based on an interpretive worldview. The research strategy is a large-scale survey based on a mixed methods approach, where both quantitative and qualitative methods are applied. The proposed research adopted the sequential explanatory strategy from Creswell (2003), which can be formulated in two main phases, as illustrated in Figure 1.



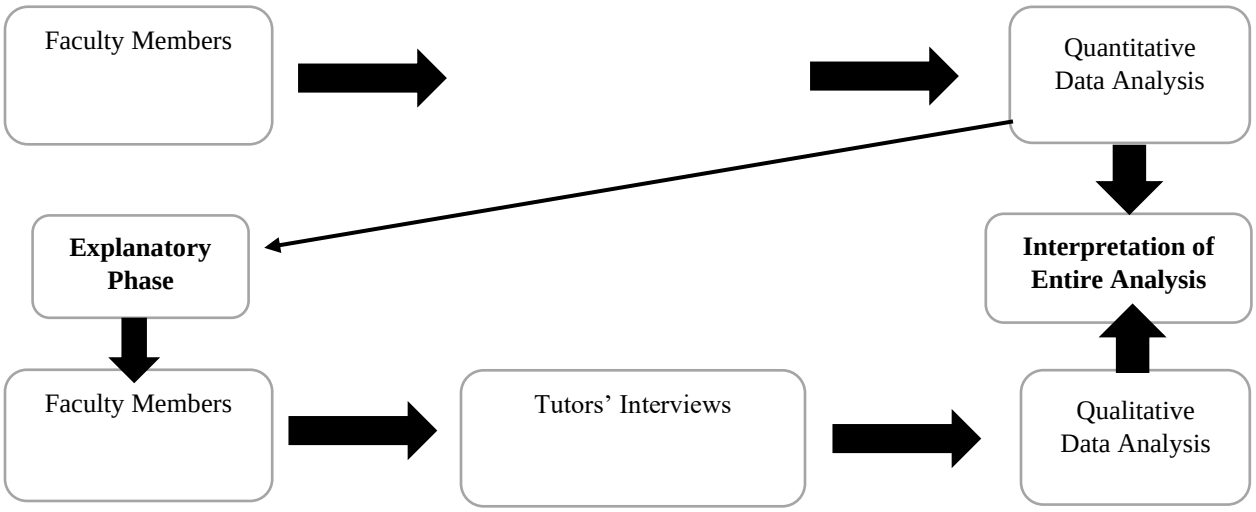


Figure 1. Sequential Explanatory Design

This design relies primarily on quantitative data to answer research questions while qualitative data are a secondary source for interpreting quantitative results (Creswell, 2009). However, this design does not diminish the importance of qualitative tools; rather, it provides rich data that interpret digital data.

2.2 Sample

The research sample was derived from five applied colleges in Kuwait: the College of Basic Education, the College of Technological Studies, the College of Business Studies, the College of Health Sciences, and the College of Nursing. The population of the study consisted of 2065 faculty members working in these five colleges.

Table 1. Population of Faculty Members at the Five Colleges

College	Faculty from teaching sector	Faculty form training sector	Total members
College of Basic Education	426	653	1079
College of Business Studies	370	38	408
College of Health Sciences	85	29	114
College of Technological Studies	324	87	411
College of Nursing	33	20	53
Overall	1238	827	2065

The study sample included 137 faculty members chosen using a simple random method. This sample represents 6.63% of the population of the study and is considered an acceptable percentage according to Richard Geiger's statistical formula.

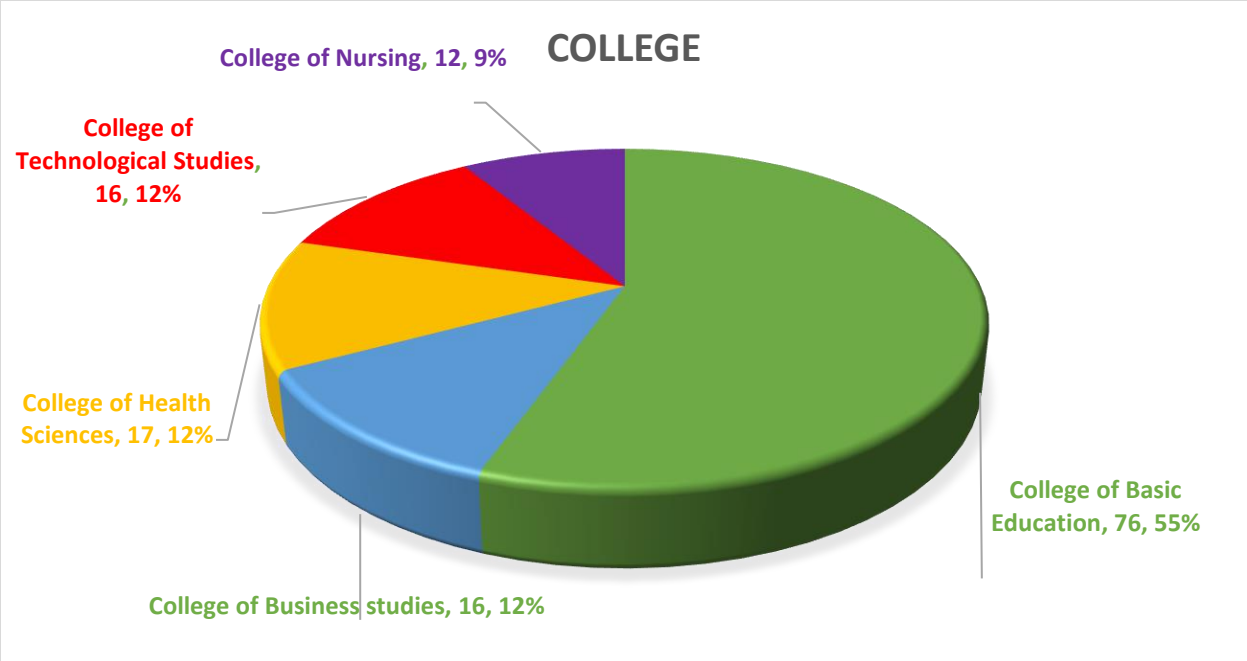


Figure 2. Number and Percentages of Participants based on their Colleges

The sample comprises participants with various job titles and years of teaching experience. More than half of the participants were professors at the College of Basic Education (N=76), with the remaining participants working at the other colleges. There is also a convergence between the number of males (N=74, 54%) and the number of females (N=63, 46%). Yet a clear disparity exists between the participants in terms of e-learning training, use of smart boards, and use of interactive programs (see Table 1).

Table 2. Demographic Information of Participants

Variable	Level	N	Percentage	Total N (%)
Gender	Male	74	54%	137 (100%)
	Female	63	46%	
LMS training	Yes	24	17.5%	137 (100%)
	No	113	82.5%	
E-learning program training	Yes	31	22.6%	137 (100%)
	No	106	77.4%	
Use of interactive programs in teaching	Yes	95	69.3%	137 (100%)
	No	42	30.7%	
Use of ICT in lectures	Yes	94	68.6%	137 (100%)
	No	43	31.4%	
Years of expertise	10 years or less	71	51.8%	137 (100%)
	11-20 years	33	24.1%	
	21 years or more	33	24.1%	
Academic title	Trainer	23	16.8%	137 (100%)
	Assistant professor	70	51.1%	
	Associate professor	27	19.7%	
	Professor	17	12.4%	

The researchers also contacted faculty members from the five colleges to request that they participate in the qualitative phase. Eighteen faculty members agreed to participate in distance interviews, including the director of distance learning in PAAET. Further details regarding interviewees are provided in Table 3.

Table 3. Interviewees' Information

N	Job title	College	Department	Years of teaching	Duration mm:ss	Conduction
1	Associate professor	Director of the distance education	Computer science	--	76:08	MS Teams
2	Assistant professor	Technological studies	Electrical engineering	23	39:07	Audio call
3	Assistant professor	Nursing	Nursing	2	28:58	Audio call
4	Assistant professor	Basic education	Computer science	2	39:27	Audio call
5	Assistant professor	Technological studies	Electronic engineering	5	18:35	Audio call
6	Associate professor	Basic education	Curriculum and teaching methods	11	76:00	Audio call
7	Assistant professor	Basic education	ICT	28	49:04	Audio call
8	Assistant professor	Basic education	Educational administration	14	56:00	Audio call
9	Assistant professor	Technological studies	Electronic engineering	14	19:53	WhatsApp call
10	Assistant professor	Basic education	Special education	4	41:46	Audio call
11	Assistant professor	Basic education	Psychology	4	33:06	Audio call
12	professor	Basic education	Educational administration	12	24:53	Audio call
13	Assistant professor	Basic education	Interior design	4	28::42	Audio call
14	Assistant professor	Technological studies	Electronic engineering	6	25:27	Audio call
15	Assistant professor	Technological studies	Mechanical engineering	5	35:42	Audio call
16	Assistant professor	Basic education	ICT	4	22:31	Audio call
17	Assistant professor	Basic education	Physical education	4	30:38	Audio call
18	Assistant professor	Business studies	Economy	5	30:01	MS Teams

2.3 Methods

Multiple methods were developed for the current study's research design—namely, questionnaires and semi-structured interviews. There are many advantages of adopting multiple data collection methods, such as investigating the area of study from different angles and compensating for the weaknesses of an individual research method.

2.3.1 E-survey

The researchers developed an online questionnaire to elicit faculty members' and students' attitudes toward e-learning, the educational and technical challenges confronting them in e-learning, and the educational and technical requirements needed to provide quality e-learning. The questionnaire included two versions: one for faculty members

and the other for students. However, both versions included similar items with narrow modifications except for the demographic information section. The questionnaire comprised, sequentially, a number of demographic questions, 18 closed-ended items focusing on attitudes toward e-learning, 20 closed-ended items examining educational challenges of and requirements for e-learning, and 18 closed-ended items on the technical challenges of and requirements for e-learning. The participants were asked to rate their perceptions using a 5-point Likert scale ranging from "strongly agree" to "strongly disagree." Some examples of the closed-end items from each section are shown in Table 4.

Table 4. Exemplary Items from Questionnaire Sections

Scale	Domain	N of items	Exemplary item
Attitude toward e-learning	Educational goals	4	• Educational goals can be easily achieved through e-learning.
	Student's competencies	5	• E-learning improves the student's self-learning skills.
	Interactive learning	4	• E-learning provides an opportunity for positive interaction between undergraduates.
	Alternative education	5	• E-learning programs offer alternative services to traditional academic services.
Educational challenges and requirements	Social participation	6	• E-learning limits students' interactions with the course professor and with their colleagues.
	pedagogical practices	7	• It is difficult for the professor to diversify the student-centered activities and teaching methods when applying e-learning.
	Self-study ability	7	• Undergraduates are not proficient in using the e-learning resources provided by the college, such as electronic journals.
Technical challenges and requirements	Training courses	4	• The student needs LMS training courses, such as for the Moodle platform.
	Synchronous learning	4	• College-approved e-learning programs face technical problems due to the increase in the number of users during peak times.
	LMS	4	• The course professor does not have a sufficient background in the characteristics and options offered by distance education programs.
	IT support	6	• E-learning requires a dedicated technical support unit for distance education programs that maintains and develops them periodically.

2.3.2 Semi-Structured Interviews

The second method was semi-structured interviews through audio and video calls due to the curfew caused by the COVID-19 pandemic. The interviews consisted of 17 open-ended questions divided into four sections, beginning with two ice-breaking questions on interviewees' background and personal information. Five questions focused on attitude

toward e-learning and its quality while four questions focused on educational challenges of and requirements for e-learning. The last six questions focused on technical challenges of and requirements for e-learning. The semi-structured schedule enabled the interviewer to ask questions that were not prepared in advance, meaning the schedule was not limited by predefined questions. Some examples of prepared questions include the following:

Q3: What do you think of digital or e-learning?

Q5: How do you evaluate the quality of education provided via digital platforms? To what degree do you find it similar to or different from learning inside the classroom?

Q9: How can a teacher maintain undergraduates' cognitive presence, such as attention and consideration, during online lectures?

Q10: How can undergraduates maintain interaction with each other and with the course professor during the implementation of e-learning in the form of simultaneous presentation or by downloading content via Moodle?

Q13: What are the skills that undergraduates and professors must be trained in before starting an e-learning application?

2.4 Pilot Study

The questionnaire and interview schedule were developed by following practical procedures to ensure validity and reliability. First, the researchers reviewed the relevant literature and empirical papers to compare their research methods with the current ones. Second, three experts from the College of Basic Education examined the inventories to check their appropriateness in terms of content, language, style, and typos; changes were made based on their feedback. Third, a pilot study was conducted to test consistencies among items, domains, and scales. The instrument was piloted with 60 undergraduates, who were able to add notes on each item that they believed was not precise. Concerning internal reliability, the Cronbach's alpha results presented in Table 5 ranged from .502 to .907.

Table 5. Internal Reliability

Sub-scales	Domain	N of items	Items	Alpha
Attitude toward e-learning	Educational goals	4	EG4, EG9, EG17, EG18*	.838
	Student's competencies	5	SC1, SC2, SC3, SC5, SC11*	.826
	Interactive learning	4	IL10, IL12, IL13*, IL14*	.502
	Alternative education	5	AE6, AE7, AE8, AE15*, AE16*	.778
Educational challenges & requirements	Social participation	6	SP27, SP30, SP31, SP34, SP36, SP37	.885
	Pedagogical practices	7	PP19, PP23, PP24, PP25, PP29, PP35, PP38	.765
	Self-study ability	7	SA20, SA21, SA22, SA26, SA28, SA32, SA33	.888
Technical challenges & requirements	Training courses	4	TC39, TC40, TC41, TC42	.899
	Synchronous learning	4	SL49, SL50, SL51, SL52	.852
	LMS	4	LMS45, LMS46, LMS47, LMS48	.855
	IT support	6	IT43, IT53, IT54, IT55, IT56, IT57	.907

All the domains exceeded .7 for the Cronbach's alpha test except for the interactive learning domain, which reached .502. The interactive learning domain is still acceptable, as the Cronbach's alpha can be affected by the number of items. Scales that include fewer than 10 items tend to have a low Cronbach's alpha (Pallant, 2013).

Table 6. Internal Validity

Attitude toward E-learning

Educational goals		Student's competencies		Interactive learning		Alternative education	
Item	Alpha	Item	Alpha	Item	Alpha	Item	Alpha
EG4	.873**	SC1	.895**	IL10	.621**	AE6	.732**
EG9	.886**	SC2	.908**	IL12	.651**	AE7	.658**
EG17	.879**	SC3	.928**	IL13*	.509**	AE8	.797**
EG18*	.624**	SC5	.823**	IL14*	.749**	AE15*	.713**
--	--	SC11*	.265*	--	--	AE16*	.742**
Educational Challenges & Requirements							
Social participation		Pedagogical practices		Self-study ability			
Item	Alpha	Item	Alpha	Item	Alpha		
SP27	.892**	PP19	.181	SA20	.778**		
SP30	.701**	PP23	.662**	SA21	.831**		
SP31	.858**	PP24	.824**	SA22	.807**		
SP34	.832**	PP25	.784**	SA26	.891**		
SP36	.763**	PP29	.696**	SA28	.815**		
SP37	.744**	PP35	.593**	SA32	.675**		
--	--	PP38	.789**	SA33	.616**		
Technical Challenges & Requirements							
Training courses		Synchronous learning		LMS		IT support	
Item	Alpha	Item	Alpha	Item	Alpha	Item	Alpha
TC39	.866**	SL49	.721**	LMS45	.921**	IT43	.703**
TC40	.846**	SL50	.888**	LMS46	.822**	IT53	.838**
TC41	.906**	SL51	.854**	LMS47	.821**	IT54	.832**
TC42	.890**	SL52	.865**	LMS48	.775**	IT55	.847**
--	--	--	--	--	--	IT56	.911**
--	--	--	--	--	--	IT57	.866**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

According to Table 6, almost all 57 items were significantly correlated with their domains, where the correlations ranged between .593 and .921. Only item 19 was weakly correlated with its domain. Moreover, the correlations between domains and their scales were also significantly correlated, with the results ranging between .750 and .925, as shown in Table 7.

Table 7. Correlations between Domains and Scales

Scales	Domains			
Total of perspective	Educational goals	Student's competencies	Interactive learning	Alternative education
	.917**	.925**	.750**	.923**
Total of educational challenges and requirements	Social participation	Pedagogical practices	Self-study ability	
	.916**	.923**	.965**	
Total of technical challenges and requirements	Training courses	Synchronous learning	LMS	IT support
	.882**	.830**	.924**	.908**

** Correlation is significant at the 0.01 level (2-tailed).

2.5 Data Analysis

The raw data were fed into the Statistical Package for Social Sciences (SPSS) software program, version 23.0. Descriptive statistical analyses such as percentages, frequencies, means, and standard deviations were performed to

present participants' demographic information and figure out the means of scales and subscales. The current study also applied inferential statistical analyses, such as variance analysis and correlation analysis, in order to identify possible statistical comparisons and relationships among the overall responses.

The digital data derived from focus groups were transcribed and then fed into Max Qualitative Data Analysis (MAXQDA) 2020. The qualitative raw data were analyzed by adopting the model of categorizing indexing based on Radnor's (2002) analysis strategy. This model provides six stages, starting with topic ordering. Major themes can be ordered after scanning and reading the transcripts many times, especially when the interviews' and focus groups' schedules focused on specific scopes. The second stage was constructing categories under each major theme in order to move to the third stage of reading for content, which identifies and highlights statements from the transcripts by carefully reading the whole text data. The fourth stage was completing the coding sheets, where codes are grouped in the related categories. In the fifth stage, coded transcripts were generated, transferring coded extracts from raw transcripts to the coded transcripts. Finally, analysis to interpretation was the final stage, in which specific descriptions were given to each category to review and select exemplary extracts for presenting the findings.

3. Findings

3.1 Quantitative Findings

The statistical results revealed that faculty members hold neutral attitudes toward e-learning (*M*= 3.09, *SD*=.87), where all the domains ranged between M=3.23 and 2.96.

Table 8. Means and Standard Deviations of Subscales and Domains

Sub-scale	Domain	N	*M*	*SD*	Descent order	Level
Attitude toward e-learning	Student's competencies	137	3.23	.100	1	Neutral
	Educational goals		3.06	.95	2	Neutral
	Alternative education		3.01	1.03	3	Neutral
	Interactive learning		2.96	.97	4	Neutral
	Total		3.09	.87	--	Neutral
Educational challenges & requirements	Self-study ability	137	3.90	.76	1	High
	Social participation		3.83	.90	2	High
	Pedagogical practices		3.80	.77	3	High
	Total		3.69	.83	--	High
Technical challenges & requirements	IT support	137	4.57	.59	1	High
	Training courses		4.30	.77	2	High
	LMS		4.11	.80	3	High
	Synchronous learning		3.71	1.00	4	High
	Total		4.22	.63	--	High

As illustrated in Table 8, all the domains of educational and technical challenges showed strong drawbacks. Nevertheless, technical problems (*M*=4.22, *SD*=.63) appeared to be more challenging than educational ones (*M*=3.69, *SD*=.83). With respect to the educational challenges, faculty members felt that their students' self-study ability is the greatest educational challenge of e-learning (*M*=3.90, *SD*=.76), followed by the limitation of social participation (*M*=3.80, *SD*=.90) and finally the limitation of pedagogical activities (*M*=3.80, *SD*=.77).

Meanwhile, faculty members are most concerned with IT support (*M*=4.57, *SD*=.59) based on the capability of the IT support unit to offer immediate support, especially in peak hours. Training courses (*M*=4.30, *SD*=.77) are also a very challenging issue as faculty believed that training courses should be provided on a regular basis for both tutors and undergraduates. The mean of the learning management system (LMS) was also high, exceeding 4.10, whereas the problems associated with synchronous learning were the professors' lowest-rated technical concern (*M*=3.71, *SD*=1).

Furthermore, an independent-sample *t*-test revealed significant differences between the scores of faculty members who use interactive programs and those who do not in all domains. Tutors familiar with interactive programs were more optimistic than those who do not use interactive programs based on their means. Table 9 shows that tutors not familiar with interactive programs scored low means in all attitude domains, ranging between 2.76 and 2.57.

Table 9. Independent-sample *t*-test based on Use of Interactive Programs

Sub-scale	Domain	Using interactive programs	N	*M*	*SD*	df	T	Sig
Attitude toward e-learning	Educational goals	Yes	95	3.22	.85	135	3.116	.002*
		No	42	2.69	1.05			
	Student's competencies	Yes	95	3.44	.92	135	3.849	.000*
		No	42	2.76	1.02			
	Alternative education	Yes	95	3.21	.98	135	3.433	.001*
		No	42	2.57	1.05			
	Interactive learning	Yes	95	3.10	.91	135	2.573	.011*
		No	42	2.65	1.05			
Educational challenges & requirements	Self-study ability	Yes	95	3.76	.74	135	-3.317	.001*
		No	42	4.21	.72			
	Social participation	Yes	95	3.68	.89	135	-3.069	.003*
		No	42	4.17	.86			
	Pedagogical practices	Yes	95	3.55	.81	135	-2.992	.003*
		No	42	4.00	.80			
Technical challenges & requirements	IT support	Yes	95	4.54	.60	135	-1.046	.297
		No	42	4.65	.57			
	LMS	Yes	95	4.00	.78	135	-2.354	.020*
		No	42	4.35	.80			
	Training courses	Yes	95	4.18	.78	135	-2.795	.006*
		No	42	4.57	.67			
	Synchronous learning	Yes	95	3.55	1.00	135	-2.770	.006*
		No	42	4.05	.93			

Similarly, significant differences existed in educational and technical challenges and requirements. Tutors who use interactive programs scored high means, but not higher than tutors who do not use interactive programs. The means of tutors who use interactive programs were 3.76, 3.68, and 3.55 in the poor self-study ability, limited social participation, and limited pedagogical practices domains, respectively, whereas tutors who do not use interactive programs scored higher (4.21, 4.17, and 4.00). The results of technical challenges are similar to those of educational challenges except for the domain of IT support. Both groups scored high and close means, t(135)= -1.046, p=297. In other words, tutors who use interactive programs (*M*=4.54, *SD*=.60) and those who do not (*M*=4.65, *SD*=.57) believe that providing sustainable and appropriate IT support for users will be the most challenging issue.

Table 10. Independent-sample *t*-test based on Application of ICT in On-campus Lectures

Domain	Applying ICT	N	*M*	*SD*	df	T	Sig
Educational goals	Yes	94	3.18	.94	135	2.016	.046*
	No	43	2.82	.92			
Student's competencies	Yes	94	3.46	.96	135	4.044	.000*
	No	43	2.75	.92			
Interactive learning	Yes	94	3.10	.98	135	2.447	.016*
	No	43	2.70	.89			
Alternative education	Yes	94	3.13	1.1	135	2.067	.041*
	No	43	2.67	.90			
Total attitude toward e-learning	Yes	94	3.24	.87	135	3.165	.002*
	No	43	2.75	.78			

Another independent-sample *t*-test was conducted to compare tutors who do not use ICT (N=43, 31.4%) and those who regularly do (N=94, 68.6%), such as smart boards, computers, and smart devices. The results in Table 10 indicated significant differences in all domains of attitudes toward e-learning, where tutors who do not use ICT scored lower means (*M*=2.75, *SD*=.78) than those who use ICT (*M*=3.24, *SD*=.87); t(135)=3.165, p=.002.

Moreover, a one-way between-groups analysis of variance was conducted to explore the differences among faculty members based on colleges. The results indicated no significant differences in terms of attitudes toward e-learning, although significant differences emerged in terms of educational and technical challenges (see Table 11).

Table11. One-way ANOVA Test and Tukey HSD based on Colleges

	ANOVA				Tukey HSD		
Position	Group	*M*(*SD*)	F (4,132)	Sig	Other groups	*M* (*SD*)	Sig
Self-study ability	_	_	1.392	.045	_	_	_
Pedagogical practices	College of Nursing	4.35(.67)	2.187	.012	College of Business Studies	3.27(.61)	.006
Total educational challenges	College of Nursing	4.32(.65)	1.655	.022	College of Business Studies	3.46(.67)	.026
Training courses	College of Health Sciences	4.80(.35)	2.337	.002	College of Education	4.24(.71)	.043
					College of Business Studies	4.06(1.03)	.037
					College of Technological Studies	3.98(.91)	.015
IT support	College of Business Studies	4.13(.96)	1.437	.002	College of Education	4.64(.50)	.009
					College of Nursing	4.90(.29)	.004
LMS	College of Technological Studies	3.39(.79)	3.333	.000	College of Education	4.22(.75)	.001
					College of Health Sciences	4.19(.65)	.021
					College of Nursing	4.58(.67)	.000
Total technical challenges	College of Technological Studies	3.82(.49)	1.805	.001	College of Education	4.30(.58)	.032
					College of Nursing	4.63(.51)	.008

There were significant differences at the p<.05 level in educational challenges: F (4,132)=1.655, p=.022 for total educational challenges; F (4,132)=1.392, p=.045 for weak self-study skills; and F (4,132)=1.287, p=.012. The post-hoc test (Tukey HSD) revealed that the differences in total educational challenges are located between faculty members at the College of Nursing and faculty members at the College of Business Studies: Members of the former scored *M*=4.32, *SD*=.65, while members of the latter scored *M*=3.46, *SD*=.67 (p=0.26). Similarly, limited pedagogical practices showed a significant difference between the two colleges: Members of the College of Nursing (*M*=4.35, *SD*=.67) found that e-learning limits their pedagogical activities more than the members of the College of Business Studies (*M*=3.27, *SD*=.61), p=.006. Meanwhile, the post-hoc test failed to identify the location of the significant differences in terms of self-study challenges.

On the other hand, three domains of technical challenges have significant differences; F (4,132)=1.437, p=.002 for IT support difficulties; F (4,132)=3.333, p=.000 for LMS difficulties; F (4,132)= 2.337, p=.002 for limited e-learning training courses; and F (4,132)=1.805, p=.001 for total technical challenges. The difference in IT support was between the College of Business Studies (*M*=4.13, *SD*=.96) and both the College of Education (*M*=4.64, *SD*=.50, p=.009) and the College of Nursing (*M*=4.90, *SD*=.29, p=.004). Differences in training courses emerged between the College of Health Sciences (*M*=4.80, *SD*=.35) and the College of Education (*M*=4.24, *SD*=.71, p=.043), College of Business Studies (*M*=4.06, *SD*=.1.03, p=.037), as well as College of Technological Studies (*M*=3.98, *SD*=.91, p=.015). Meanwhile, the differences in LMS difficulties were between the College of Technological Studies (*M*=3.39, *SD*=.79) and the College of Education (*M*=4.22, *SD*=.75, p=.001), College of Health Sciences (*M*=4.19, *SD*=.65, p=.021), as well as College of Nursing (*M*=4.58, *SD*=.67, p=.000).

3.2 Qualitative Findings

This section explores the educational challenges and requirements as well as technical challenges and requirements. The findings are organized and illustrated with participants' quotes.

3.2.1 PAAET Preparation for Distance Education

The establishment of an integrated and successful e-learning system in the PAAET requires administrators' faculty members' and students' belief in the importance of using an e-learning system. Therefore, as mentioned by the director of distance education (participant 1), the stakeholders at PAAET provided the required support through collaboration with the Measurement and Evaluation Center, the Ibn Al-Haytham Training Center, the Information Systems Center, the Deanship of Library Affairs, the Deanship of Student Affairs, and the Public Relations and Media Department to spread the knowledge of e-learning by offering training courses for faculty, students, and administrators.

In addition, participant 1 explained that PAAET has formed a group of teams called the E-learning Committee to establish guidelines and foundations to effectively transfer from face-to-face learning to online learning. The committees include the Development Committee, Committee for Technical Support, Committee for Training, Committee to Transfer the Content into the E-learning Platforms, Media Committee for E-learning System, the Quality Control Committee for E-learning System, and the E-learning Quality Control and Evaluation Committee.

Participant 1 then declared that PAAET should examine the infrastructure for its colleges: "[There should be an] inspection of servers and systems, and all related services such as following up, installation and updating of e-learning systems and applications. Provide telephone lines and communication channels to the technical support for faculty to communicate with them. The presence of a qualified technical support team to follow up any technical and emergency problems in colleges at all levels to control the quality of performance of the e-learning system."

As for the technical support, participant 1 said, "there will be a technical support team for students and another technical support team for professors, and there is another technical support team for students with special needs." Participant 1 also mentioned that "[the] technical support team will be working inside the college. If any professor needs help during the time of the lecture, the technical support team will come to the place of the lecture and operate the device and make sure that all systems are working properly, and then the technical support team will come after the lecture to shut down the device."

Overall, participant 1 clarified that PAAET must verify the following points before implementing an e-learning system:

- Ensure that the applications used at PAAET such as Banner, TAS, Office 365, and LMS, are merged and linked together;

- Ensure that the networks and servers are always working properly, especially during peak hours;
- Adopt the Microsoft Teams application to create virtual classrooms and to support the principle of distance learning and provide an integrated learning environment; and
- Adopt the Moodle system as an LMS and link it to other systems at PAAET as well as provide the IT support for this system.

The following figure outlines the stages of PAAET readiness.

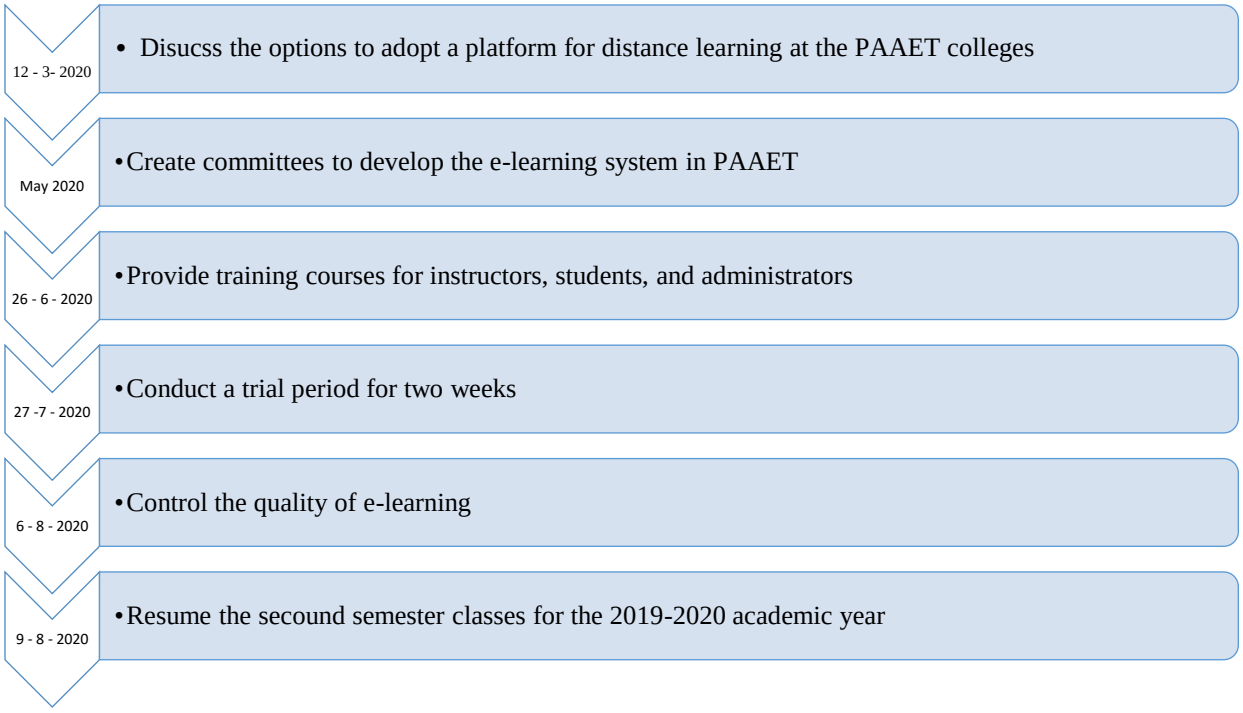


Figure 3. Stages of PAAET Readiness

3.2.2 Educational Challenges and Requirements

The participants in this study revealed several educational challenges regarding the implementation of e-learning at PAAET colleges, although they also suggested some solutions to overcome these challenges. The participants' educational challenges and requirements are presented in Table 12.

Table 12. Educational Challenges and Requirements

Theme	Category	Codes	Frequency (n=18)	Exemplary code
Educational challenges and requirements		Lack of student support services	6	"Student support services are almost non-existent, as there are no libraries, online books, or publishers are available. This is the current reality" (participant 2)

	Challenges	The quality of education	6	"The quality of online education differs from traditional education due to the limited communication between the teacher and the student in the event of questions or so on, the face-to-face learning is different from online learning" (participant 9)
		Online class size	7	"The challenge facing the idea of synchronous learning or live online classrooms is how to manage the online classroom; for example if 100-150 students have accessed to this virtual classroom, let's say the number is 120 students, which means that the number of students in the classroom is large… how can we control and administrate this virtual classroom and respond to the students' questions during lecture" (participant 4)
		Lack of interactivity	6	"The lack of interaction between the professor and students, as the professor cannot interact with students like in traditional education" (participant 12)
		Unethical issues (cheating)	7	"The biggest challenge is that the students will stay at home to do their exams and assignments which may increase the chance of cheating or they may collaborate with each another to solve their assignments" (participant 5)
	Requirements	Student's retention and attention	17	"As for maintaining the interaction among the students and between the students and teachers, this interaction can be implemented through discussions, questionnaires, or quizzes, or in the form of question-and-answer for the benefit of all students… otherwise students will easily lose their attention" (participant 9)
		Blended education	5	"I hope that the e-learning system will be adopted as a supportive method even during the normal periods after the end of COVID-19 to reduce the chances of any other risks that disrupt the study, so we will have a permanent supportive system. We must encourage professors to use this system always" (participant 9)
		Self-study ability	8	"The most important thing is self-electronic learning, which depends on how the student finds all the information electronically by knowing and accessing the application. The student can use scientific research and he can begin to use keywords" (participant 4)
		Prepare student's environment	5	"The environment of e-learning should be complete and perfect. The infrastructure must be set up and ready. The internet connection must be strong. All supplies, such as modern devices, microphone, and headphones, must be prepared" (participant 7)

		Interactivity between students	7	"During the online class the instructor assign an assignment that the students would collaborate on to solve it" (participant 15)
		Online classroom management	10	"… when the teacher exists in the face-to-face classroom, he may request certain things and he may set specific criteria for evaluation; but when the education is electronic, these criteria must be changed and they should not depend on the same evaluation that is adopted in the regular classroom. Second, the evaluation method must be changed. Third, we must focus on the quality and not the quantity, since if education is transformed into an e-learning system, the subject of quality must be taken into account, as students must learn simple but important things, and their skills must be further developed" (participant 13)

As shown in Table 12, the participants discussed the educational challenges associated with the implementation of e-learning at PAAET colleges. The participants viewed students' lack of attention during online classes, individual differences between students, the lack of student support services, and ethical issues as educational challenges that could face the faculty during the implementation of e-learning. However, the participants widely explained the educational requirements, such as ways to help students focus during online classes, apply blended education by using face-to-face teaching along with online materials, prepare students' environment, promote interactivity between students, as points for the faculty to consider to assist them in successfully preparing their online classes and improving students' self-study ability. Participant 6 said, "the professor explains scientific research skills to the student, and the student will acquire problem-solving skills, and then the student will rely on himself to solve problems."

3.2.3 Technical Challenges and Requirements

The most prominent technical challenges and requirements that must be met to achieve the quality of education in e-learning from the perspective of lecturers are presented in Table 13.

Table 13. Technical Challenges and Requirements

Theme	Category	Codes	Frequency (n=18)	Exemplary code
Technical Challenges and Requirements		Electronic test application	14	"However, I am concerned more about students' evaluation in e-learning system. The evaluation may not be fair, or it may have limitations or problems that may harm the student more than the professor" (participant 10)
		Weak coverage of internet connectivity	9	"Internet connection quality is sometimes bad. Some students may have good internet network connection, but others may have not" (participant 11)
		Practical courses	7	"In terms of practical specializations such as interior design, art education, music education and other practical majors, it is almost impossible to turn these specializations into e-learning, because

	Challenges			these majors require personal attendance before professors to educate the students, especially in the first two years in college. Because in the first two years, the student must attend in person so the professor can teach the student how to draw the line, how to make the line, how to apply his drawings, how to color correctly or how to play music correctly, and how to hold the instrument in the correct way. Teaching these practical courses electronically is very difficult" (participant 13)
		Pressure on the server	6	"Imagine the number of students and users who are accessing the server and the large number of downloaded operations, especially if there is a specific capacity for servers that creates huge pressure for the servers. Indeed, I have used the server (Moodle) for 3 academic years now, and I can say that it needs some repairs and maintenance" (participant 10)
		Faculty's and students' readiness	13	"For the level of readiness, we are not ready, and the evidence which I told you before is the division between the old and new generations, as the new generation is ready enough" (participant 7)
		Interface	7	"Some LMS programs are complicated and hard to use… Personally, I have struggled to teach my students how to use Moodle… The Moodle interface is not easy to use" (participant 14)
	Requirements	Training courses for faculty	18	"Faculty members and students should receive enough training on all program features and how to use it" (participant 7)
		Providing computer labs in colleges	10	"There is an urgent need to provide computer labs for students. The college library has computers but, unfortunately, the college library closes approximately at 1 pm, while there are students who finish their classes at 7 or 8 pm" (participant 4)
		The readiness of PAAET	13	"The decision-makers should have a willingness at the beginning to adopt this idea (e-learning system) seriously, which will help motivate students. Therefore, there must be actual adoption and not just declarations; a plan must be drawn up and followed, and this plan should motivate and encourage students and faculty members to use it" (participant 4)
		IT support	10	"Technical support must be provided, and they must keep up with the updates, they must have appropriate training in order to develop their skills and give them the ability to deal with a large number of students because the number of students in the PAAET colleges is large" (participant 4)

According to Table 13, the technical challenges expressed by the participants were the ability to apply e-learning in laboratories, weak internet network connections for students, students who do not use their e-mails, pressure on the server, and weak network connection in the college. However, nine of the participants repeatedly pointed out the electronic test application as a technical challenge. Participant 7 suggested that the students should have training on the electronic test: "There is a need to give training at the beginning of the semester for all students. The training must be provided in 3 stages—the first, second, and third trainings. When the professor makes sure that all students are ready for the electronic test, the teacher applies the electronic tests." Participant 14 suggested a way to reduce cheating during tests: "If it is possible to take the IP from each student, for example during the test, we can make more than one test and compare the IPs of each test to determine who accessed the test to be sure that no person other than the student accessed it."

In addition, participants expressed their concerns regarding faculty's rejection of using e-learning. Therefore, the participants pointed out the importance of having appropriate training courses for faculty members and students to overcome the challenges and positively change their perspectives and attitudes toward the e-learning system. Participants also stressed the need for legislation and regulations to guide and manage the e-learning system. According to participant 7, "of course we need legislation, and we need a decision and strong support from the administration in the issue of implementing such ideas (e-learning) in PAAET."

Another highly common requirement reported by the participants was IT support as participants expressed the need to increase the number of technical supports for staff at each college. As Participant 15 mentioned, "it is necessary to increase the IT staff members because their number is not enough now. We have only two persons in the college." Participants also identified other technical requirements, such as preparing a place for online classes for faculty in the college, providing instructional design, and implementing a trail period, which are crucial to the success of the e-learning system.

4. Discussion

Considering the neutral views of e-learning and the high level of educational and technical challenges accompanying it, faculty members noted serious concerns. The first of these concerns lies in the readiness of colleges, faculty members, and students. For example, the study found that faculty members with previous experience using interactive platforms such as Moodle, Google Classroom, and Microsoft Teams are less fearful than faculty members who have not used such technology in their teaching process. Consequently, the process of training each of the faculty members and students is a basic requirement as indicated in this study and in concurrence with the recommendations of previous studies (e.g., Al-Azawei, Parslow, and Lundqvist, 2016; Aldowaj, Ghazal, and Umar, 2018; Koçoğlu and Tekdal, 2020). Therefore, reducing the challenges and providing the requirements may contribute to improving faculty members' attitudes toward e-learning in the field of higher applied education.

One of the most important points faculty members made is educational challenges and requirements, which may in turn affect the quality of education. A number of professors stated that the quality of education will be negatively affected during e-learning due to the absence of a set of factors that improve the quality of education. The rapid transition from education on campus to learning via electronic platforms must be done in an integrated manner, meaning that all campus services are available electronically. Otherwise, the shift to online learning will come with massive technology challenges (Carrillo and Flores, 2020). Yet in the current circumstances, there is a shortage in the provision of electronic services, whether electronic learning resources or even regular student services (Arinto, 2016; Al-Azawei, Parslow, and Lundqvist, 2016), such as psychological and social support, academic counseling, and student elections.

In addition to some challenges that faculty members face during simultaneous e-learning, such as large class size and decreased class interaction (Siemens et al., 2015), some colleges' deanships have contributed to obstructing e-learning, as they allowed a greater-than-normal number of students to enroll, increasing the number from 40 to 120 students per course. This reduces student–professor and student–student interactions. Although university professors have difficulty maintaining the mental and social presence of students during the virtual session, it is easy for the student to become distracted and not pay attention throughout the lecture. Students have a short attention span during virtual education, based on the results of recent studies (e.g., Geri, Winer, and Zaks, 2017).

One factor that increases teachers 'fears is the increase in unethical behaviors, such as cases of cheating on electronic exams and increased academic plagiarism in assumptions due to the lack of appropriate programs such as the Lockdown browser, Turnitin, and Ithenticate(Al-Hunaiyyan, Alhajri, and Al-Sharha, 2018; Maman Suryaman,

Muliansyah, Bustani, Suryani, and Fahlevi, 2020). Professors also see technical deficiencies in the applications used to test students' performance, which are characterized by the teacher's restriction of the type of questions and the method of answering. Thus, the professor is forced to apply ineffective tests that do not reflect students' true performance level. The lack of appropriate technical and administrative tools will lead to defects in students' evaluations (Al-Hunaiyyan, Alhajri, and Al-Sharha, 2018; Maman Suryaman, Muliansyah, Bustani, Suryani, and Fahlevi, 2020).

Other technical problems include poor internet coverage and pressure on the server due to the large number of users, especially during peak hours, which may reach about 21,000 users, according to the director of e-learning for all colleges. E-learning it is completely reliant on the internet and technological devices, and instructors have experienced challenges in bringing all undergraduates on board due to bad internet connections and outdated technological devices (Moorhouse, 2020). In addition, some scientific departments in various colleges have faced problems in scientific and applied courses, as the adopted platforms lack features that allow the provision of electronic laboratories. At the same time, professors are calling for the use of blended learning instead of e-learning, as some courses require individual training and skill tests.

In the same context, professors have called for providing computer tests in colleges so that students can benefit from laboratories even during emergency situations (e.g., poor internet coverage or problems related to their personal computers). A technical support unit is necessary on electronic platforms and in computer laboratories to solve urgent problems for students and faculty members. This requirement is consistent with the recommendations of recent studies calling for a technical support unit specializing in addressing technical problems of e-learning (e.g., Mishraa, Guptab, and Shreeb, 2020; Eunice and Cosmas, 2020; Teymori and Fardin, 2020).

5. Recommendations and Implications

This study identified a set of challenges and requirements for e-learning in applied colleges that occur at three levels: the college, the faculty member, and the student.

At the college level, decision-makers should create an appropriate virtual educational environment by setting regulations compatible with e-learning, adopting appropriate interface users, providing the necessary programs and applications, providing technical and educational support services, providing computer laboratories, limiting the number of students in the academic divisions, finding practical solutions to server problems that occur at peak times, applying blended learning to specializations that need direct training, and providing training courses for all programs approved by the college.

At the faculty member level, course professors must be well-versed and trained not only on the use of virtual platforms, but also on how to manage the virtual classroom and motivate students to participate and interact through the use of appropriate training methods while paying attention to students and centering the educational process around students instead of using didactic teaching.

At the student level, students must pass training courses in order to be well prepared. Students must also be mentally and socially present during concurrent lectures, and a home climate suitable for distance education must be created.

In conclusion, there is still a need to conduct research on e-learning, especially experimental studies. As e-learning is a new path that many higher education institutions have been forced to adopt due to social distancing requirements related to the COVID-19 pandemic, there is an urgent need to implement studies that enrich the research community.

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The Attitude of Undergraduates toward E-learning Considering Educational and Technical Challenges and Requirements in Kuwaiti Applied Colleges

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Abstract

Digital learning has become one of the constituent elements of higher education in many countries. E-learning platforms provide remarkable opportunities to creatively overcome many problems of traditional learning approaches. Nevertheless, e-learning is not flawless, as there are many educational and technical difficulties of implementing online learning in higher education, especially when higher education relies on applied learning. The current study aims to explore undergraduates' attitudes towards e-learning in applied colleges. It also seeks to expose the most central educational and technical challenges of e-learning. It defines the educational and technical requirements for ensuring quality e-learning. The research sample consisted of 1650 undergraduates and 37 interviewees drawn from five applied colleges in Kuwait (the College of Basic Education, the College of Technological Studies, the College of Business Studies, the College of Health Sciences, and the College of Nursing). The research design is based on mixed methods (questionnaire and focus groups). The findings revealed that students held neutral attitudes toward e-learning, while the educational and technical challenges are high concerns. Educational challenges and requirements highlighted several themes, including instructional support, progress valuation, self-study skills, attention span, interactivity, and class size. Meanwhile, the technical challenges include poor internet connectivity, IT support, LMS interface, and training courses. The findings are discussed to offer recommendations and implications.

Keywords: E-learning, Educational Challenges, Technical Challenges, Applied Colleges, Kuwait

1. Introduction

The COVID-19 pandemic has catalyzed the adoption of e-learning in many educational contexts in Kuwait and around the globe. However, this adoption has been met with its fair share of challenges that have limited the effectiveness of the method. Various studies have looked at the challenges limiting the effectiveness of e-learning outcomes. Some studies have revealed challenges specifically related to students. Teymori and Fardin (2020) noted that students are discouraged from using the e-learning platform whenever they feel that their learning is not spontaneously supported by the instructors available to answer their questions and clarify concepts they are teaching. Alateeq, Aljhani, and

Eesa (2020) established that students were limited whenever the content shared on the e-learning platform has not been developed in a manner meaningful to the students' context.

Adnan and Anwar (2020) found that some learners were biased against the e-learning platforms. Mpungose (2020) found that e-learners in Kuwait experienced technical difficulties in using e-learning platforms—a problem complicated by poor interface designs of the e-learning applications. In this case, students may face trouble logging in, finding learning resources, or giving feedback to their instructors. In another study, Okereke, Williams, Emmanuella, Ashinedu, and Mairaj (2020) found that students in remote areas where internet connectivity is poor or unavailable are unable to keep up with their counterparts in better-connected areas, which has led to educational inequalities.

Studies have also revealed challenges that specifically affected the effectiveness of instructors when using e-learning platforms to disseminate knowledge during the spread of coronavirus. Maman Suryaman, Muliansyah, Bustani, Suryani, and Fahlevi (2020) found that instructors were grappling with evaluation challenges in e-learning contexts, which were characterized by inconsistencies between the learning and teaching strategies, unethical practices by the students characterized by cheating, and restrictions in terms of the evaluation methods available for instructors. According to Teymori and Fardin (2020), the implementation of e-learning has also proved problematic in institutions with limited or nonexistent technical and administrative support as instructors are left on their own to grapple with the various challenges they encounter during the delivery of their instructions.

Okereke et al. (2020) established that the e-learning platform limits the instructors' control over their students, who may log in but engage in other activities unrelated to learning. The learning environments are also prone to frequent interruption due to either technical failures or third-party interruptions, over which the instructors may have no control. In some instances instructors have resisted the change demanded by their institutions to teach students using e-learning platforms, slowing down the learning process as they come to terms with or slowly learn the required pedagogies.

The infrastructural challenges experienced in e-learning used during the pandemic have been characterized by organizational and technological preparedness. According to Unger and Meiran (2020), although the developed platform may be effective, it may not be used to the benefit of both instructors and students in cases where either or both parties are ICT illiterate. In this case, it takes a steep learning curve before they begin to reap the benefits of e-learning. Mishraa, Guptab, and Shreeb (2020) established that some of the institutional issues include inadequate management support, a lack of strategic direction and planning, and a lack of appropriate content development and assessment. Murphy (2020) found that the institutional factors also included inadequate methodological models for e-learning, the lack of resources, and in some cases a missing e-learning curriculum. This makes it difficult for the instructor to effectively impart knowledge and for the students to make most of their online lessons.

In another study, Koçoğlu and Tekdal (2020) identified the lack of institutional support, lack of adequate training for instructors, lack of adequate ICT infrastructure, and low penetration of internet coverage as some of the notable limitations to e-learning during the pandemic. Maman et al. (2020) concurred that technological issues included underdeveloped infrastructure, unstable internet connectivity, and the lack of technical support, which limited the effectiveness of e-learning for students and instructors.

According to Teymori and Fardin (2020), contextual and technological challenges have limited the delivery of learning through online platforms during the COVID-19 pandemic. The contextual challenges included inadequate training or a lack of training for instructors as well as a lack of e-learning awareness, inadequate planning, and a lack of support by educational institution management. The technological challenges were characterized by a lack of access to computers and a strong internet network.

Finally, Mpungose (2020) established that the technical factors that limit e-learning amongst students include the low quality of software used on the platform as well as the low quality of educational packages. Students are easily turned off from e-learning platforms when they find them to be not user-friendly, and they may refuse to collaborate with their instructors. Poorly designed platforms also make it increasingly difficult for instructors to follow up on their students and evaluate their learning progress over time.

2. Research questions and contributions

Higher education institutions in Kuwait lack experience in the field of distance education and digital education. In light of the disruption of school life due to the COVID-19 pandemic, it became important to apply e-learning in colleges and government universities throughout the country. In order to apply e-learning in a way that ensures the

quality of education and contributes to achieving educational goals set by higher education institutions, an action plan must be prepared to address the problems associated with the implementation of e-learning. It can be argued here that there are multi-level challenges to and requirements for applying e-learning, such as personal challenges, intrapersonal challenges, and external challenges. Therefore, the current research provides the applied colleges with recommendations to help them solve the educational and technical challenges as well as determine the most effective implications in line with the educational philosophy of applied colleges. These recommendations and implications are addressed to students, faculty members, decision-makers, and technical support members.

One question asked here is: How do undergraduates perceive e-learning in Kuwaiti applied colleges and its requirements in light of confronting the educational and technical challenges? In order to find a complete answer for this chief question, the following sub-questions are established:

- What are undergraduates' attitudes toward e-learning in Kuwaiti applied colleges?
- What are the most prominent educational and technical challenges resulting from learning through electronic platforms?
- What are the most prominent educational and technical requirements that must be met to achieve the quality of education in e-learning from the perspective of students?
- Are there statistically significant differences in participants' attitudes as well as the educational and technical challenges and requirements according to the study variables?

3. Methodology

3.1 Research sample

Applied colleges are distinguished from other colleges in Kuwait by adopting education based on practical application and field training within their educational programs. Applied colleges include the College of Basic Education, the College of Technological Studies, the College of Business Studies, the College of Health Sciences, and the College of Nursing. The population of the study consisted of 38,441 undergraduates affiliated with these five colleges (see Table 1).

Table 1. Research population based on gender

College	Gender	N	Percentage	Total
College of Basic Education	Male	4463	23%	19561
	Female	15098	77%	
College of Technological Studies	Male	5600	85%	6611
	Female	1011	15%	
College of Business Studies	Male	3315	37%	9054
	Female	5739	63%	
College of Health Sciences	Male	723	36%	1988
	Female	1265	64%	
College of Nursing	Male	548	45%	1227
	Female	679	55%	
All five colleges	Male	14649	38%	38441
	Female	23792	62%	

Simple random sampling was applied by asking undergraduates from the five applied colleges to complete an e-survey. The total number of participants was 1650 undergraduates (376 males and 1274 females). According to the demographic information, 61% of the participants owned a personal computer and almost a similar percentage of the participants used Microsoft Office. Meanwhile, 25% of the participants had enrolled in e-learning training courses.

Table 2. Demographic information of participants

Variable	Level	N	Percentage	Total N (%)
Gender	Male	376	22.8%	1650
	Female	1274	77.2%	(100%)
Own a computer	Yes	970	58.8%	1650
	No	680	41.2%	(100%)
Experience with Microsoft Office	Yes	1003	60.8%	1650
	No	647	39.2%	(100%)
E-learning training	Yes	410	24.8%	1650
	No	1240	75.2%	(100%)
College	College of Basic Education	1038	62.9%	
	College of Business Studies	272	16.5%	1650
	College of Health Sciences	193	11.7%	(100%)
	College of Technological Studies	91	5.5%	
	College of Nursing	56	3.4%	

Most participants were undergraduates in the College of Basic Education, followed by the College of Business Studies, College of Health Sciences, College of Technological Studies, and College of Nursing.

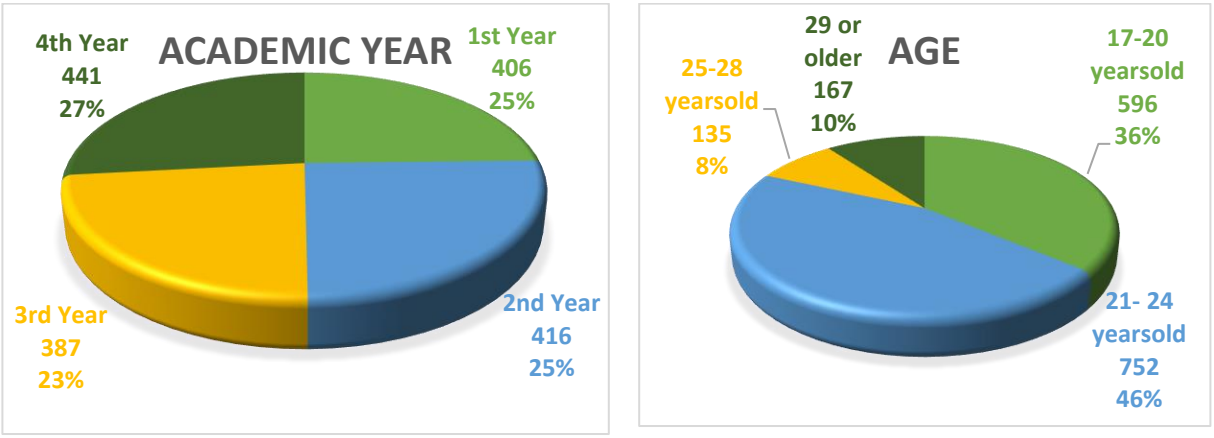

Figure 1. Participants' information according to age and academic year

As illustrated in Figure 1, the majority of participants were under 25 years old (82%). The percentage of participants according to academic year was almost equal, ranging between 23% and 27%.

In the qualitative phase, 37 interviewees participated in focus groups interviews via Zoom. The total recorded duration was 266 minutes for all interviews. Groups from each college were asked to participate in this phase, as demonstrated in Table 3.

Table 3. General information of focus group interviews

Group number	College	Number of interviewees	Duration M:S	Place
1	College of Technological Studies	5	28:42	Zoom program
2	College of Nursing	5	34:20	Zoom program
3	College of Business Studies	5	14:52	Zoom program
4	College of Health Sciences	5	22:04	Zoom program
5	College of Basic Education	6	93:02	Zoom program
6	College of Basic Education	6	48:32	Zoom program
7	College of Basic Education	5	20:22	Zoom program

3.2 Methods

Multiple methods have been developed for the current study based in research design—namely, questionnaires and focus groups. There are many advantages of adopting multiple data collection methods, such as investigating the area of study from different angles and compensating for the weaknesses of an individual research method.

3.2.1 Online questionnaire

The researchers developed an online questionnaire to elicit faculty members' and students' attitudes toward e-learning, identify the educational and technical challenges facing them in e-learning, and defining the educational and technical requirements needed to provide quality e-learning. The questionnaire has two versions: one for faculty members and the other for students. However, both versions included similar items with narrow modifications except for the section on demographic information. The questionnaire comprises, sequentially, a number of demographic questions, 18 closed-ended items in the second section focusing on attitudes toward e-learning, 20 closed-ended items in the third section targeting the educational challenges of and requirements for e-learning, and 18 closed-ended items in the last section on the technical challenges of and requirements for e-learning. The participants were asked to rate their perceptions using a 5-point Likert scale ranging from "strongly agree" to "strongly disagree." Some examples of the closed-ended items for each section are provided in Table 4.

Table 4. Exemplary items from questionnaire sections

Scale	Domain	N of items	Exemplary item
Attitude toward e-learning	Educational goals	4	• Educational goals can be easily achieved through e-learning.
	Student's competencies	5	• E-learning improves the student's self-learning skills.
	Interactive learning	4	• E-learning provides an opportunity for positive interactions between undergraduates.
	Alternative education	5	• E-learning programs offer alternative services to traditional academic services.
Educational challenges and requirements	Social participation	6	• E-learning limits students' interactions with the course professor and with their colleagues.
	pedagogical practices	7	• It is difficult for the professor to diversify student-centered activities and teaching methods when applying e-learning.
	Self-study ability	7	• Undergraduates are not proficient in using the e-learning resources provided by the college, such as electronic journals.
Technical challenges and requirements	Training courses	4	• The student needs LMS training courses such as the Moodle platform.
	Synchronous learning	4	• College-approved e-learning programs face technical problems due to the increase in the number of users during peak times.
	LMS	4	• The course professor does not have sufficient background about the characteristics and options offered by distance education programs.
	IT support	6	• E-learning requires a dedicated technical support unit for distance education programs that maintains and develops them periodically.

3.2.2 Online focus groups

The second method is an online focus group using the Zoom software. It could be argued that face-to-face interviewing enables the interviewer to connect with the interviewee based on both verbal and non-verbal communication, unlike online interview forms (e.g., chatroom and e-mail forms). Nevertheless, face-to-face interviews could limit the sample from the most "relevant to accessible people" for many reasons, such as "interviewees spread across the country" the

curfew implemented by the pandemic, as is the case today (Flick, 2009, p. 266). In addition, synchronized communication via the Internet has become more advanced, so the interviewer can communicate with participants via a live broadcast (audio and video), which allows the interviewer to communicate both verbally and non-verbally with participants.

The interviews consisted of 17 open-ended questions divided into four sections, beginning with two ice-breaking questions focused on the interviewee's background and personal information. Another five questions focused on attitude toward e-learning and its quality, four questions focused on educational challenges and requirements of e-learning. The last six questions focused on technical challenges and requirements of e-learning. Furthermore, the semi-structured schedule enabled the interviewer to ask questions that were not prepared in advance, meaning the schedule was not limited by the predetermined questions. Some examples of the questions prepared in advance are presented next:

Q3: What do you think of digital or e-learning?

Q5: How do you evaluate the quality of education provided via digital platforms? To what degree do you find it similar to or different from learning inside the classroom?

Q9: How can a teacher maintain the cognitive presence of undergraduates, such as attention and consideration, during online lectures?

Q10: How can undergraduates maintain interaction with each other and with the course professor during the implementation of e-learning in the form of simultaneous presentation or by downloading content via Moodle?

Q13: What are the skills that undergraduates and professors must be trained in before starting an e-learning application?

3.3 Pilot study

The questionnaire and interview schedule were developed by following practical procedures to ensure validity and reliability. First, the researchers reviewed the relevant literature and empirical papers to compare their research methods with the current ones. Second, three experts from the College of Basic Education examined the inventories to check their appropriateness in terms of content, language, style, and typos; changes were made based on their feedback. Third, a pilot study was conducted to test consistencies among items, domains, and scales. The instrument was piloted with 60 undergraduates, who could add notes on each item that they believed was not precise. Concerning internal reliability, the results of Cronbach's alpha presented in Table 5 ranged from .502 to .907.

Table 5. Internal reliability

Sub-scales	Domain	N of items	Items	alpha
Attitude toward e-learning	Educational goals	4	EG4, EG9, EG17, EG18*	.838
	Student's competencies	5	SC1, SC2, SC3, SC5, SC11*	.826
	Interactive learning	4	IL10, IL12, IL13*, IL14*	.502
	Alternative education	5	AE6, AE7, AE8, AE15*, AE16*	.778
Educational challenges & requirements	Social participation	6	SP27, SP30, SP31, SP34, SP36, SP37	.885
	Pedagogical practices	7	PP19, PP23, PP24, PP25, PP29, PP35, PP38	.765
	Self-study ability	7	SA20, SA21, SA22, SA26, SA28, SA32, SA33	.888
Technical challenges & requirements	Training courses	4	TC39, TC40, TC41, TC42	.899
	Synchronous learning	4	SL49, SL50, SL51, SL52	.852
	LMS	4	LMS45, LMS46, LMS47, LMS48	.855

	IT support	6	IT43, IT53, IT54, IT55, IT56, IT57	.907

All domains exceeded .7 in the Cronbach's alpha test except for the interactive learning domain, which reached .502. The interactive learning domain is still acceptable, as Cronbach's alpha can be affected by the number of items. Scales that include fewer than 10 items tend to have a low Cronbach's alpha (Pallant, 2013).

Table 6. Internal validity

Attitude toward e-learning							
Educational goals		Student's competencies		Interactive learning		Alternative education	
Item	Alpha	Item	Alpha	Item	Alpha	Item	Alpha
EG4	.873**	SC1	.895**	IL10	.621**	AE6	.732**
EG9	.886**	SC2	.908**	IL12	.651**	AE7	.658**
EG17	.879**	SC3	.928**	IL13*	.509**	AE8	.797**
EG18*	.624**	SC5	.823**	IL14*	.749**	AE15*	.713**
--	--	SC11*	.265*	--	--	AE16*	.742**
Educational challenges & requirements							
Social participation			Pedagogical Practices			Self-study ability	
Item	Alpha		Item	Alpha		Item	Alpha
SP27	.892**		PP19	.181		SA20	.778**
SP30	.701**		PP23	.662**		SA21	.831**
SP31	.858**		PP24	.824**		SA22	.807**
SP34	.832**		PP25	.784**		SA26	.891**
SP36	.763**		PP29	.696**		SA28	.815**
SP37	.744**		PP35	.593**		SA32	.675**
--	--		PP38	.789**		SA33	.616**
Technical challenges & requirements							
Training courses		Synchronous learning		LMS		IT support	
Item	Alpha	Item	Alpha	Item	Alpha	Item	Alpha
TC39	.866**	SL49	.721**	LMS45	.921**	IT43	.703**
TC40	.846**	SL50	.888**	LMS46	.822**	IT53	.838**
TC41	.906**	SL51	.854**	LMS47	.821**	IT54	.832**
TC42	.890**	SL52	.865**	LMS48	.775**	IT55	.847**
--	--	--	--	--	--	IT56	.911**
--	--	--	--	--	--	IT57	.866**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

According to Table 6, almost all 57 items were significantly correlated with their domains, where the correlations ranged between .593 and .921, except for item 19, which was weakly correlated with it is domain. Moreover, the correlations between domains and their scales were also significantly correlated as the results ranged between .750 and .925 (see Table 7).

Table 7. Correlations between domains and scales

Scales	Domains			
Total of perspective	Educational goals	Student's competencies	Interactive learning	Alternative education
	.917**	.925**	.750**	.923**
Total of educational challenges and requirements	Social participation	Pedagogical practices	Self-study ability	
	.916**	.923**	.965**	

Total of technical challenges and requirements	Training courses	Synchronous learning	LMS	IT support
	.882**	.830**	.924**	.908**

** Correlation is significant at the 0.01 level (2-tailed).

3.4 Data analysis

The raw data were fed into the Statistical Package for Social Sciences (SPSS) software program, version 23.0. Descriptive statistical analyses such as percentages, frequencies, means, and standard deviations were performed to present the participants' demographic information and figure out the means of scales and subscales. The current study also applied inferential statistical analyses, such as a variance analysis and correlation analysis, in order to identify possible statistical comparisons and relationships among the overall responses.

Meanwhile, the digital data derived from students' focus groups were transcribed and then fed into Max Qualitative Data Analysis (MAXQDA) 2020. The qualitative raw data were analyzed by adopting the model of "categorizing indexing" based on Radnor's (2002) analysis strategy. This model provides six stages, starting with topic ordering. Major themes can be ordered after scanning and reading the transcripts many times, especially when the interviews' and focus groups' schedules focus on specific scopes. The second stage is constructing categories under each major theme in order to move to the third stage, which is reading for content. The third stage aims to identify and highlight statements from the transcripts by carefully reading the whole text data. The fourth stage is completing the coding sheets, where codes are grouped in the related categories. The fifth stage is generating coded transcripts, which transfers coded extracts from the raw transcripts to the coded transcripts. Finally, in the analysis to interpretation stage, a specific description is given to each category to review and select exemplary extracts for presenting the findings.

4. Findings

The findings of this study highlight undergraduates' attitudes toward e-learning, educational challenges and requirements, and technical challenges and requirements in Kuwaiti applied colleges. The findings are presented in two sections: quantitative findings and qualitative findings.

4.1 Quantitative findings

According to Table 8, the undergraduates had neutral attitudes toward e-learning (*M*=3.14, *SD*=1), with the means of domains ranging between 3 and 3.29.

Table 8. Means and stranded deviations of sub-scales and domains

Sub-scale	Domain	N	*M*	*SD*	Descent order	Level
Attitude toward e-learning	Educational goals	1650	3.29	1.13	1	Neutral
	Student's competencies		3.15	1.16	2	Neutral
	Alternative education		3.12	1.13	3	Neutral
	Interactive learning		3.00	.91	4	Neutral
	Total		3.14	1.00	--	Neutral
Educational challenges & requirements	Self-study ability	1650	3.48	1.11	1	high
	Social participation		3.42	1.25	2	high
	Pedagogical practices		3.40	.92	3	high
	Total		3.43	1.02	--	high
Technical challenges & requirements	IT support	1650	4.17	1.01	1	high
	LMS		3.93	1.10	2	high
	Training courses		3.78	1.17	3	high

Synchronous learning	3.64	1.17	4	Neutral
Total	3.92	.96	--	high

Meanwhile, it appears that the educational challenges and requirements scored 3.43, indicating that undergraduates see these challenges as high obstacles that could hinder their learning process. The highest educational challenge was self-study ability (*M*=3.48, *SD*=1.01) rather than social participation and pedagogical practices. Nevertheless, undergraduates are more afraid of technical challenges (*M*=3.92, *SD*=.96) than educational ones. Their first concern is the weakness of technical support services (*M*=4.17, *SD*=1.01), followed by the difficulty of using LMS programs (*M*=3.93, *SD*=1.1). The final concerns were the lack of training courses related to distance education and problems related to simultaneous education.

An independent-samples *t*-test revealed significant differences between the scores of undergraduates receiving training courses in LMS and untrained undergraduates (Table 9) in all domains except for IT support domain, which appeared to be the supreme requirement for all participants.

Table 9. Comparing groups of trained undergraduates and untrained undergraduates

Sub-scale	Domain	E-learning training course	N	*M*	*SD*	Equality of variances	df	T	Sig
Attitude toward e-learning	Educational goals	Yes	410	3.73	1.02	Not assumed	760	9.805	.000*
		No	1240	3.15	1.12				
	Student's competencies	Yes	410	3.61	1.04	Not assumed	768	9.969	.000*
		No	1240	3.00	1.15				
	Alternative education	Yes	410	3.59	1.04	Assumed	1648	10.081	.000*
		No	1240	2.96	1.11				
	Interactive learning	Yes	410	3.32	1.04	Assumed	1648	8.265	.000*
		No	1240	2.90	1.11				
Educational challenges & requirements	Self-study ability	Yes	410	3.15	1.13	Assumed	1648	-7.122	.000*
		No	1240	3.59	1.08				
	Social participation	Yes	410	3.03	1.24	Assumed	1648	-7.451	.000*
		No	1240	3.55	1.23				
	pedagogical practices	Yes	410	3.25	.98	Not assumed	651	-3.647	.000*
		No	1240	3.45	.89				
Technical challenges & requirements	IT support	Yes	410	4.09	1.01	Assumed	1648	-1.710	.87
		No	1240	4.19	1.01				
	LMS	Yes	410	3.72	1.09	Assumed	1648	-4.446	.000*
		No	1240	3.99	1.09				
	Training courses	Yes	410	3.46	1.23	Not assumed	652	-6.240	.000*
		No	1240	3.90	1.13				
	Synchronous learning	Yes	410	3.89	1.17	Assumed	1648	-5.151	.000*
		No	1240	3.73	1.15				

Trained (N=410) and untrained undergraduates (N=1240) differed significantly in all domains of attitudes toward e-learning, in which trained undergraduates held more positive than untrained ones. Educational challenges such as self-study, social participation, and pedagogical practices challenges can be better handled by trained undergraduates compared to untrained undergraduates, who find them to be obstacles to their education process. The result of social participation is an example of these differences, t(1648)= -7.45, p=.000, with untrained students (*M*=3.55, *SD*=1.23) scoring higher compared to trained ones (*M*=3.03, *SD*=1.24). Similarly, untrained undergraduates scored higher means than the means of trained students in almost all technical challenges.

Another independent-sample *t*-test revealed significant differences between the scores of undergraduates experienced in using Microsoft Office (N=1003) compared to inexperienced ones (N=647). As shown in Table 10, experienced

undergraduates hold positive attitudes whereas inexperienced students hold negative feelings toward e-learning. For example, in the domain of educational goal, t(1340)= 18.1, p=.000, experienced students (*M*=3.66, *SD*=1.01) scored higher compared to inexperienced ones (*M*=2.72, *SD*=1.05).

Table 10. Comparison of experienced versus inexperienced undergraduates

Sub-Scale	Domain	Experience in Microsoft Office	N	*M*	*SD*	Equality of variances	df	T	Sig
Attitude toward e-learning	Educational goals	Yes	1003	3.66	1.01	Not assumed	1340	18.098	.000*
		No	647	2.72	1.05				
	Student's competencies	Yes	1003	3.55	1.03	Not assumed	1332	18.900	.000*
		No	647	2.54	1.07				
	Alternative education	Yes	1003	3.49	1.03	Assumed	1648	18.483	.000*
		No	647	2.54	1.01				
	Interactive learning	Yes	1003	3.22	.89	Assumed	1648	13.131	.000*
		No	647	2.65	.84				
Educational challenges & requirements	Self-study ability	Yes	1003	3.27	1.05	Assumed	1648	-9.638	.000*
		No	647	3.80	1.12				
	Social participation	Yes	1003	3.17	1.20	Assumed	1648	-10.183	.000*
		No	647	3.80	1.23				
	pedagogical practices	Yes	1003	3.33	.86	Not assumed	1245	-3.707	.000*
		No	647	3.51	.99				
Technical challenges & requirements	IT support	Yes	1003	4.23	.90	Not assumed	1130	2.896	.004*
		No	647	4.07	1.16				
	LMS	Yes	1003	3.86	1.03	Not assumed	1237	-3.125	.002*
		No	647	4.03	1.19				
	Training courses	Yes	1003	3.66	1.12	Assumed	1648	-5.308	.000*
		No	647	3.97	1.20				
	Synchronous learning	Yes	1003	3.52	1.13	Assumed	1648	-5.226	.000*
		No	647	3.83	1.20				

Table 10 also indicates that experienced students are less afraid of educational and technical challenges than other students. However, both groups of students stressed the importance of technical support as a key requirement for the success of the distance learning process.

4.2 Qualitative findings

Focus group interviews were conducted with students from PAAET colleges. A qualitative analysis was used to explore the students' perspectives of e-learning, educational challenges and requirements, and technical challenges and requirements.

4.2.1 Perspective of e-learning

This theme presents the students' attitudes and perspectives toward e-learning, as reflected in the following sub-themes: e-learning during the COVID-19 pandemic, the availability of e-learning, instructional support, and alternative education.

E-learning during COVID-19 pandemic. During the COVID-19 pandemic, many students agreed that the education provided at the PAAET colleges should be resumed by implementing e-learning, especially for the theoretical courses. A student at the College of Basic Education mentioned, "closing the campus and postponing [the semester] during the COVID-19 pandemic is not helpful, [as] the students will not be able to graduate this year; therefore, the students should continue their education, and the e-learning is the solution and savior in this situation."

Availability of E-learning. When students discussed their perspective of e-learning, they mentioned the advantages of using e-learning at PAAET colleges. A student at the College of Basic Education said, "the online lecture will be available to me at any time when I need it. [If] I forgot a certain point that the doctor said ... I will be able to return to it at any time and hear what he said or what the point is and repeat it more than once in order to understand it." Another student mentioned, "I see [e-learning as] more enjoyable than the traditional education."

Instructional support. Students also expressed the challenges of applying e-learning in PAAET colleges. A student from the College of Health Sciences said, "there will be a lack of communication skill, meaning when I am sitting at home, there will be no interaction with people, students, and doctors, and whatever knowledge I have without the communication skills I will not be able to communicate with others." Another student at the same college said, "I mean, for example, we are at the College of Health Sciences, we have the lab. We must work with our hands, see with our eyes, behave as if we are working in the hospital. These things are difficult to do in e-platforms, [so] e-learning could work with theoretical courses [but] not practical courses." A student from the College of Nursing pointed out the "difficulty of practical courses. We do more work than we receive information from the tutors... besides all materials are in the laboratory. … If I've e-learned and then graduated, what's going to happen if I get a job?"

Alternative education. Students reported that e-learning is not an alternative for traditional education. As a student from the College of Health Sciences reported, "e-learning will not be an alternative to the traditional education because the College of Health Sciences deals with panels, for example in laboratories and emergencies. These skills need to be learned closely. After all, there is no replacement." On the other hand, some students suggested that e-learning could be applied along with the traditional education (blended education). A student from the College of Basic Education stated that "but why not to support online learning by seeing it as an assistant method that complements the traditional education … if the professor forgot to mention anything in the class, … e-learning will be an assistant factor, I mean, but of course the traditional education is the basis, while [e-learning] is complementary."

4.2.2 Educational challenges and requirements

As students discussed their challenges regarding the implementation of e-learning, they identified issues related to class size, students' attention and duration of the online class, pedagogical practices, and self-study ability. Students also discussed ways to overcome these challenges.

Attention span and length of online class. Regarding the duration of the online class, a student from the College of Basic Education recommended that, "if the time of the online class is too long, then there should be a break every 30 minutes." A student from the College of Business Studies had the same opinion regarding the duration of the class. She mentioned that "half an hour is fine, [but] more than half an hour… the majority of students would go to sleep and play with their phone … it is half an hour in which the lesson will be explained for the students to understand everything." Another student suggested that "the professor should summarize the lecture and talk about the essential things and then assign homework to the students."

Interactivity and class size. A student at the College of Business Studies suggested that the "class size should be between 20 to 30 students" to maintain interactive class. A student from the College of Basic Education thought that, "the fewer number of students in the online class, the more interactive and more successful for the students." Another student from the same college believed a greater number of students would be challenging for the professor to maintain control over the online class, which "would lead to directional teaching."

Pedagogical practices. The students consistently determined that pedagogical practices such as applying discussion as a practice should be used with students in online classes. A student from the College of Basic Education said, "every ten minutes the professor should give the students two to three questions to create more interaction between the professor and the students as well between the students in the online class." A student from the College of Nursing said, "Exactly. It is not just delivering and explaining, and us listening to the lecture, you know? It must be a discussion or group work—that's the thing that helps the student focus in the online class."

Self-study ability. Self-study ability was considered an educational requirement for the students to obtain in order to successfully implement e-learning. As a student from the College of Basic Education stressed, "the student must prepare himself in sufficient time before the class starts; for example, he has a paper and a pen so he takes notes. Most of these things that I see, I mean, it helps the students focus." A student from the College of Nursing stated it would be helpful "if you prepare the atmosphere and surround yourself with things that would help you study and manage your time."

Progress evaluation. Students offered some suggestions to effectively evaluate students' progress (exams). A student from the College of Basic Education believed that "cheating is a big problem in online learning … perhaps the best way is to use cam option to mentor students' behavior during the test. [Also] I think this method is the most appropriate method for essay to evaluate the student's ability and understanding of the whole material." Another student said, "but in terms of life cam, I strongly advise you to use the cam; even if you do not have a computer, you can download it to your phone." According to another student, "some students can easily cheat in online test because the college does not use the Lockdown browser programs."

4.2.3 Technical challenges and requirements

Two subthemes emerged from the technical requirements: interface and internet connections. Meanwhile, the most relevant focus group discourses on the theme of technical requirements were training courses, trial periods, and IT support.

Trial periods. The students mentioned the importance of having a trial period before implementing e-learning in PAAET colleges. A student from the College of Basic Education stated that, "I mean, a course (trial period), even if one week before studying, to practice how do we upload files? How do we make sure that the homework is uploaded? How do we do exams? … I see if we focus on the basic matters, it serves the student to complete the distance education process." A student at the College of Nursing suggested taking "a week and a half, a maximum of two weeks, to be familiar with [e-learning] platform, I mean ... they inform us about it because our college did not apply distance education before."

Training courses. The students highlighted the technical requirements to effectively implement e-learning in PAAET colleges. Students' statements reflected the importance of having training courses for faculty as well as students. A student at the College of Basic Education said, "the educational courses are useful. [They] give the opportunity to practice... I have to apply and see what is correct to do. It's then the training courses that are helpful." Another student reported that, "at least if it was in a training course to teach me the things that I will face, we will reach an excellent level that prepares us to resume the course—I cannot say without any problems, but I mean, we will resume the course very well."

User interface. Some of the students, like students at the College of Basic Education, appeared to be concerned about the user interface for the LMS (Moodle). According to a student at the College of Basic Education, "the structure of the user interface for the Moodle system is very difficult." Another student describe it as "very, very difficult. I mean, even when I want to see my grades, I cannot… I have to try a thousand ways to enter the system. What do I do?!"

Internet connection. Another technical challenge that the students raised was internet connection. Most of the students reported a lack of internet connection either in their houses or at the PAAET colleges. A student at the College of Basic Education said, "I mean, if they tell me to classify the problems in order, what is the most important problem I will face? … Poor internet and server problems."

IT support. The students consistently mentioned that implementing e-learning in PAAET colleges requires sufficient support from IT to assist the students. A student from the College of Health Sciences stated, "there must be technical support or specialized people to help with problems. His job is to help students if they encounter a problem. Problems are present in traditional education and distance education as well." A student from the College of Basic Education reported, "there must be people who specializes in helping students. I mean, the student does not ask for help from his colleagues. It should be a special unit. If the student faces a problem, he must talk to IT support."

5. Discussion

Quantitative and qualitative findings are discussed here based on relevant literature and previous studies. Three major areas are highlighted to draw a holistic picture of undergraduates' attitudes, challenges, and requirements for E-learning.

5.1 Students' attitudes toward e-learning

Although students mentioned several challenges and difficulties related to e-learning, they held neutral sentiments, and their attitudes toward e-learning were unbiased (M =3.14). In addition, students experienced in using Microsoft Office programs were more optimistic than those without such experience. This finding appeared to be different from previous findings by Adnan and Anwar (2020) and Alkharang and Ghinea (2013), who concluded that students were biased against e-learning. A possible reason for not being biased against e-learning is that students were aware of the advantages and disadvantages of e-learning. Indeed, students were reluctant to postpone their studies due to the COVID-19 pandemic, so that they found e-learning to be a great chance to avoid any delay in their graduation plans. They also pointed out that e-learning platforms allow them to access the online lessons at any time and attend lectures from a distance. However, students identified differences between learning on-campus and e-learning, such as a lack of communications (Ali & Magalhaes. 2012), a lack of pedagogical practices, and a lack of instructional support (Alkharang, 2014; Al-Azawei, Parslow, & Lundqvist, 2016). Therefore, students did not see online learning as an alternative to on-campus learning, but rather a temporary solution to cope with the COVID-19 pandemic.

5.2 Educational challenges and requirements

As stated, students were aware of several challenges, including educational ones that they identified as strong challenges, such as poor self-study skills, limited pedagogical activities, a lack of participation and interactivity, students' attention and length of the online class, and class size.

Students called for the diversification of teaching methods and the use of different pedagogical applications. They do not want to follow a single style of teaching that is often based on indoctrination. Therefore, they demanded That teachers provide educational supports to properly deliver scientific content (Koçoğlu & Tekdal, 2020). In addition to the need to find practical solutions that regulate the process of evaluating student performance and prevent unethical behaviors, such as cheating on tests and scientific plagiarism. Students believe that the lack of appropriate technical and administrative tools will lead to a defect in students 'evaluation (Al-Hunaiyyan, Alhajri, & Al-Sharha, 2018; Maman Suryaman, Muliansyah, Bustani, Suryani, & Fahlevi, 2020).

The results also indicate that self-learning skills are one of the most important requirements of e-learning, as students must possess these skills to manage their learning process remotely and use them with different learning resources (Arinto, 2016; Al-Azawei, Parslow, & Lundqvist, 2016). A student unable to organize his distance learning process will face difficulties during online learning. The matter does not stop at self-learning skills, but extends to external factors that pose challenges as indicated by the participants, such as maintaining students' attention and stimulating their participation and interaction throughout the virtual lecture. Students are wary of the problems they will face due to the class size and length of the study lecture, as these factors will reduce student interaction and attention during the virtual lecture. A recent study found that interactivity increases learners' attention span in online learning (Geri, Winer, & Zaks, 2017). However, a large class size and lengthy lectures of synchronous e-learning could negatively influence the learning process, as Okereke et al. (2020) stated that the e-learning platform limits the control of the instructors over their students, who may log in but engage in other activities unrelated to learning. Interactivity is a vital component for refining the superiority of e-learning (Siemens et al., 2015), but with a big class size, teachers are more likely to adopt teacher-centered activities, limiting students' interaction. Unfortunately, some applied colleges have issued a decree permitting the registration of 120 students in a single division instead of 40 students. Therefore, opportunities for student interaction with the teacher and with his colleagues are very scarce.

5.3 Technical challenges and requirements

Students identified many concerns regarding the technical problems associated with e-learning infrastructure (Eunice & Cosmas, 2020). Therefore, they demanded a trial period to identify potential problems and address them before the start of the semester. Indeed, the applied colleges provided a trial period of two weeks before resuming the distance learning semester; this procedure helped students get acquainted with the educational platform as it was a completely new experience. The second requirement is to provide training courses for students so that they can learn how to deal with the platforms and use them effectively. This requirement is in line with many of the results from recent studies, which all recommended offering courses to students on an ongoing basis (e.g., Al-Azawei, Parslow, & Lundqvist, 2016; Aldowaj, Ghazal, & Umar, 2018; Koçoğlu & Tekdal, 2020). This explains the reason for the statistical differences between students who passed training courses on distance education and untrained students, as the trained students had better attitudes toward e-learning and were less afraid of educational and technical challenges than the untrained ones.

Furthermore, one of the most prominent challenges that students face is the user interface of the Moodle program, as they find it difficult to use it professionally or even practically. LMS programs were complicated for them and consumed their time and efforts, which could limit students' learning (Mpungose, 2020). Thus, students do not prefer e-learning due to the complexity of the user interface, as Adnan and Anwar (2020) also found; in their study, students had negative attitudes about e-learning for several reasons, including the complex user interface. Poor internet connectivity was another issue raised by interviewees because problems may occur (Eunice & Cosmas, 2020) that prevent some students from attending the synchronized lecture, delaying the broadcast of live sessions, completing the exam, or submitting assignments on time. Thus, e-learning may not provide equal opportunities for all students. when internet connectivity is weak or unavailable in certain areas, meaning some students are unable to keep track of their counterparts in better-connected areas (Okereke, Williams, Emmanuella, Ashinedu, & Mairaj, 2020; Alrashidi, 2017).

In previous technical cases, users referred to a specialized team that provides appropriate technical support. Therefore, students see technical support as one of the priorities that must be secured. If technical support services are poor and their response to urgent problems is slow or inadequate, students face many problems, especially during peak hours. Indeed, a large number of studies have confirmed the importance of having a dedicated technical support team to treat distance education problems (e.g., Mishraa, Guptab, & Shreeb, 2020; Eunice & Cosmas,2020; Teymori & Fardin, 2020).

6. Recommendations and Implications

This study's findings indicate the need to continuously provide students with specialized training courses in the field of e-learning. An appropriate infrastructure is also necessary to ensure the quality of distance education and secure the educational and technical requirements. The deanship of each of the five colleges included in this study should develop appropriate plans and solutions to meet the challenges students are facing. In addition, tutors should be trained to manage the virtual classroom, increase interaction, attract student attention, and apply effective evaluation methods.

In light of the findings, future research should study professors' attitudes toward e-learning as it is a new experience in the Kuwaiti higher education context. Future research can investigate faculty members' challenges and requirements. Such research will provide higher educational institutions in Kuwait with integrated results that help them improve the infrastructure and develop the e-learning process.

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The Attitude of Undergraduates toward E-learning Considering Educational and Technical Challenges and Requirements in Kuwaiti Applied Colleges

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Abstract

Digital learning has become one of the constituent elements of higher education in many countries. E-learning platforms provide remarkable opportunities to creatively overcome many problems of traditional learning approaches. Nevertheless, e-learning is not flawless, as there are many educational and technical difficulties of implementing online learning in higher education, especially when higher education relies on applied learning. The current study aims to explore undergraduates' attitudes towards e-learning in applied colleges. It also seeks to expose the most central educational and technical challenges of e-learning. It defines the educational and technical requirements for ensuring quality e-learning. The research sample consisted of 1650 undergraduates and 37 interviewees drawn from five applied colleges in Kuwait (the College of Basic Education, the College of Technological Studies, the College of Business Studies, the College of Health Sciences, and the College of Nursing). The research design is based on mixed methods (questionnaire and focus groups). The findings revealed that students held neutral attitudes toward e-learning, while the educational and technical challenges are high concerns. Educational challenges and requirements highlighted several themes, including instructional support, progress valuation, self-study skills, attention span, interactivity, and class size. Meanwhile, the technical challenges include poor internet connectivity, IT support, LMS interface, and training courses. The findings are discussed to offer recommendations and implications.

Keywords: E-learning, Educational Challenges, Technical Challenges, Applied Colleges, Kuwait

1. Introduction

The COVID-19 pandemic has catalyzed the adoption of e-learning in many educational contexts in Kuwait and around the globe. However, this adoption has been met with its fair share of challenges that have limited the effectiveness of the method. Various studies have looked at the challenges limiting the effectiveness of e-learning outcomes. Some studies have revealed challenges specifically related to students. Teymori and Fardin (2020) noted that students are discouraged from using the e-learning platform whenever they feel that their learning is not spontaneously supported by the instructors available to answer their questions and clarify concepts they are teaching. Alateeq, Aljhani, and

Eesa (2020) established that students were limited whenever the content shared on the e-learning platform has not been developed in a manner meaningful to the students' context.

Adnan and Anwar (2020) found that some learners were biased against the e-learning platforms. Mpungose (2020) found that e-learners in Kuwait experienced technical difficulties in using e-learning platforms—a problem complicated by poor interface designs of the e-learning applications. In this case, students may face trouble logging in, finding learning resources, or giving feedback to their instructors. In another study, Okereke, Williams, Emmanuella, Ashinedu, and Mairaj (2020) found that students in remote areas where internet connectivity is poor or unavailable are unable to keep up with their counterparts in better-connected areas, which has led to educational inequalities.

Studies have also revealed challenges that specifically affected the effectiveness of instructors when using e-learning platforms to disseminate knowledge during the spread of coronavirus. Maman Suryaman, Muliansyah, Bustani, Suryani, and Fahlevi (2020) found that instructors were grappling with evaluation challenges in e-learning contexts, which were characterized by inconsistencies between the learning and teaching strategies, unethical practices by the students characterized by cheating, and restrictions in terms of the evaluation methods available for instructors. According to Teymori and Fardin (2020), the implementation of e-learning has also proved problematic in institutions with limited or nonexistent technical and administrative support as instructors are left on their own to grapple with the various challenges they encounter during the delivery of their instructions.

Okereke et al. (2020) established that the e-learning platform limits the instructors' control over their students, who may log in but engage in other activities unrelated to learning. The learning environments are also prone to frequent interruption due to either technical failures or third-party interruptions, over which the instructors may have no control. In some instances instructors have resisted the change demanded by their institutions to teach students using e-learning platforms, slowing down the learning process as they come to terms with or slowly learn the required pedagogies.

The infrastructural challenges experienced in e-learning used during the pandemic have been characterized by organizational and technological preparedness. According to Unger and Meiran (2020), although the developed platform may be effective, it may not be used to the benefit of both instructors and students in cases where either or both parties are ICT illiterate. In this case, it takes a steep learning curve before they begin to reap the benefits of e-learning. Mishraa, Guptab, and Shreeb (2020) established that some of the institutional issues include inadequate management support, a lack of strategic direction and planning, and a lack of appropriate content development and assessment. Murphy (2020) found that the institutional factors also included inadequate methodological models for e-learning, the lack of resources, and in some cases a missing e-learning curriculum. This makes it difficult for the instructor to effectively impart knowledge and for the students to make most of their online lessons.

In another study, Koçoğlu and Tekdal (2020) identified the lack of institutional support, lack of adequate training for instructors, lack of adequate ICT infrastructure, and low penetration of internet coverage as some of the notable limitations to e-learning during the pandemic. Maman et al. (2020) concurred that technological issues included underdeveloped infrastructure, unstable internet connectivity, and the lack of technical support, which limited the effectiveness of e-learning for students and instructors.

According to Teymori and Fardin (2020), contextual and technological challenges have limited the delivery of learning through online platforms during the COVID-19 pandemic. The contextual challenges included inadequate training or a lack of training for instructors as well as a lack of e-learning awareness, inadequate planning, and a lack of support by educational institution management. The technological challenges were characterized by a lack of access to computers and a strong internet network.

Finally, Mpungose (2020) established that the technical factors that limit e-learning amongst students include the low quality of software used on the platform as well as the low quality of educational packages. Students are easily turned off from e-learning platforms when they find them to be not user-friendly, and they may refuse to collaborate with their instructors. Poorly designed platforms also make it increasingly difficult for instructors to follow up on their students and evaluate their learning progress over time.

2. Research questions and contributions

Higher education institutions in Kuwait lack experience in the field of distance education and digital education. In light of the disruption of school life due to the COVID-19 pandemic, it became important to apply e-learning in colleges and government universities throughout the country. In order to apply e-learning in a way that ensures the

quality of education and contributes to achieving educational goals set by higher education institutions, an action plan must be prepared to address the problems associated with the implementation of e-learning. It can be argued here that there are multi-level challenges to and requirements for applying e-learning, such as personal challenges, intrapersonal challenges, and external challenges. Therefore, the current research provides the applied colleges with recommendations to help them solve the educational and technical challenges as well as determine the most effective implications in line with the educational philosophy of applied colleges. These recommendations and implications are addressed to students, faculty members, decision-makers, and technical support members.

One question asked here is: How do undergraduates perceive e-learning in Kuwaiti applied colleges and its requirements in light of confronting the educational and technical challenges? In order to find a complete answer for this chief question, the following sub-questions are established:

- What are undergraduates' attitudes toward e-learning in Kuwaiti applied colleges?
- What are the most prominent educational and technical challenges resulting from learning through electronic platforms?
- What are the most prominent educational and technical requirements that must be met to achieve the quality of education in e-learning from the perspective of students?
- Are there statistically significant differences in participants' attitudes as well as the educational and technical challenges and requirements according to the study variables?

3. Methodology

3.1 Research sample

Applied colleges are distinguished from other colleges in Kuwait by adopting education based on practical application and field training within their educational programs. Applied colleges include the College of Basic Education, the College of Technological Studies, the College of Business Studies, the College of Health Sciences, and the College of Nursing. The population of the study consisted of 38,441 undergraduates affiliated with these five colleges (see Table 1).

Table 1. Research population based on gender

College	Gender	N	Percentage	Total
College of Basic Education	Male	4463	23%	19561
	Female	15098	77%	
College of Technological Studies	Male	5600	85%	6611
	Female	1011	15%	
College of Business Studies	Male	3315	37%	9054
	Female	5739	63%	
College of Health Sciences	Male	723	36%	1988
	Female	1265	64%	
College of Nursing	Male	548	45%	1227
	Female	679	55%	
All five colleges	Male	14649	38%	38441
	Female	23792	62%	

Simple random sampling was applied by asking undergraduates from the five applied colleges to complete an e-survey. The total number of participants was 1650 undergraduates (376 males and 1274 females). According to the demographic information, 61% of the participants owned a personal computer and almost a similar percentage of the participants used Microsoft Office. Meanwhile, 25% of the participants had enrolled in e-learning training courses.

Table 2. Demographic information of participants

Variable	Level	N	Percentage	Total N (%)
Gender	Male	376	22.8%	1650
	Female	1274	77.2%	(100%)
Own a computer	Yes	970	58.8%	1650
	No	680	41.2%	(100%)
Experience with Microsoft Office	Yes	1003	60.8%	1650
	No	647	39.2%	(100%)
E-learning training	Yes	410	24.8%	1650
	No	1240	75.2%	(100%)
College	College of Basic Education	1038	62.9%	
	College of Business Studies	272	16.5%	1650
	College of Health Sciences	193	11.7%	(100%)
	College of Technological Studies	91	5.5%	
	College of Nursing	56	3.4%	

Most participants were undergraduates in the College of Basic Education, followed by the College of Business Studies, College of Health Sciences, College of Technological Studies, and College of Nursing.

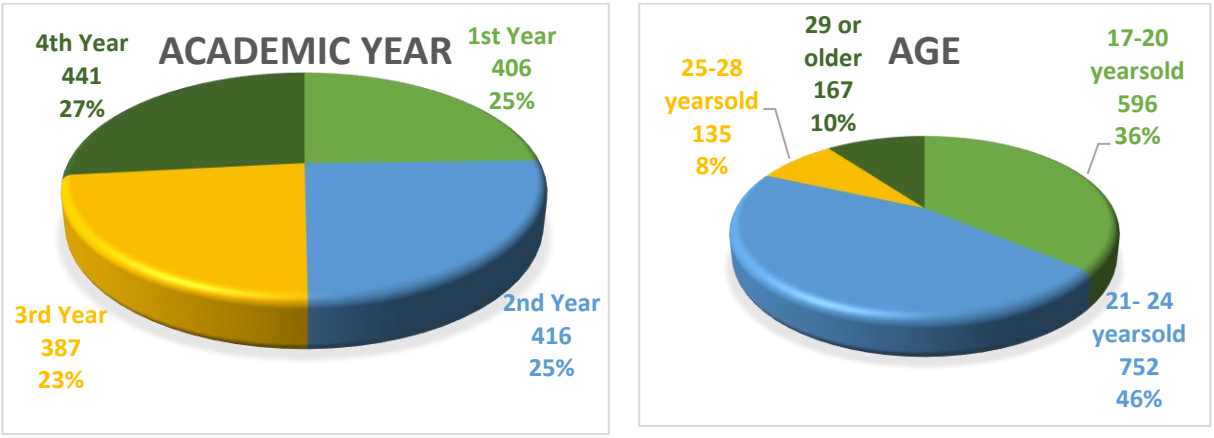

Figure 1. Participants' information according to age and academic year

As illustrated in Figure 1, the majority of participants were under 25 years old (82%). The percentage of participants according to academic year was almost equal, ranging between 23% and 27%.

In the qualitative phase, 37 interviewees participated in focus groups interviews via Zoom. The total recorded duration was 266 minutes for all interviews. Groups from each college were asked to participate in this phase, as demonstrated in Table 3.

Table 3. General information of focus group interviews

Group number	College	Number of interviewees	Duration M:S	Place
1	College of Technological Studies	5	28:42	Zoom program
2	College of Nursing	5	34:20	Zoom program
3	College of Business Studies	5	14:52	Zoom program
4	College of Health Sciences	5	22:04	Zoom program
5	College of Basic Education	6	93:02	Zoom program
6	College of Basic Education	6	48:32	Zoom program
7	College of Basic Education	5	20:22	Zoom program

3.2 Methods

Multiple methods have been developed for the current study based in research design—namely, questionnaires and focus groups. There are many advantages of adopting multiple data collection methods, such as investigating the area of study from different angles and compensating for the weaknesses of an individual research method.

3.2.1 Online questionnaire

The researchers developed an online questionnaire to elicit faculty members' and students' attitudes toward e-learning, identify the educational and technical challenges facing them in e-learning, and defining the educational and technical requirements needed to provide quality e-learning. The questionnaire has two versions: one for faculty members and the other for students. However, both versions included similar items with narrow modifications except for the section on demographic information. The questionnaire comprises, sequentially, a number of demographic questions, 18 closed-ended items in the second section focusing on attitudes toward e-learning, 20 closed-ended items in the third section targeting the educational challenges of and requirements for e-learning, and 18 closed-ended items in the last section on the technical challenges of and requirements for e-learning. The participants were asked to rate their perceptions using a 5-point Likert scale ranging from "strongly agree" to "strongly disagree." Some examples of the closed-ended items for each section are provided in Table 4.

Table 4. Exemplary items from questionnaire sections

Scale	Domain	N of items	Exemplary item
Attitude toward e-learning	Educational goals	4	• Educational goals can be easily achieved through e-learning.
	Student's competencies	5	• E-learning improves the student's self-learning skills.
	Interactive learning	4	• E-learning provides an opportunity for positive interactions between undergraduates.
	Alternative education	5	• E-learning programs offer alternative services to traditional academic services.
Educational challenges and requirements	Social participation	6	• E-learning limits students' interactions with the course professor and with their colleagues.
	pedagogical practices	7	• It is difficult for the professor to diversify student-centered activities and teaching methods when applying e-learning.
	Self-study ability	7	• Undergraduates are not proficient in using the e-learning resources provided by the college, such as electronic journals.
Technical challenges and requirements	Training courses	4	• The student needs LMS training courses such as the Moodle platform.
	Synchronous learning	4	• College-approved e-learning programs face technical problems due to the increase in the number of users during peak times.
	LMS	4	• The course professor does not have sufficient background about the characteristics and options offered by distance education programs.
	IT support	6	• E-learning requires a dedicated technical support unit for distance education programs that maintains and develops them periodically.

3.2.2 Online focus groups

The second method is an online focus group using the Zoom software. It could be argued that face-to-face interviewing enables the interviewer to connect with the interviewee based on both verbal and non-verbal communication, unlike online interview forms (e.g., chatroom and e-mail forms). Nevertheless, face-to-face interviews could limit the sample from the most "relevant to accessible people" for many reasons, such as "interviewees spread across the country" the

curfew implemented by the pandemic, as is the case today (Flick, 2009, p. 266). In addition, synchronized communication via the Internet has become more advanced, so the interviewer can communicate with participants via a live broadcast (audio and video), which allows the interviewer to communicate both verbally and non-verbally with participants.

The interviews consisted of 17 open-ended questions divided into four sections, beginning with two ice-breaking questions focused on the interviewee's background and personal information. Another five questions focused on attitude toward e-learning and its quality, four questions focused on educational challenges and requirements of e-learning. The last six questions focused on technical challenges and requirements of e-learning. Furthermore, the semi-structured schedule enabled the interviewer to ask questions that were not prepared in advance, meaning the schedule was not limited by the predetermined questions. Some examples of the questions prepared in advance are presented next:

Q3: What do you think of digital or e-learning?

Q5: How do you evaluate the quality of education provided via digital platforms? To what degree do you find it similar to or different from learning inside the classroom?

Q9: How can a teacher maintain the cognitive presence of undergraduates, such as attention and consideration, during online lectures?

Q10: How can undergraduates maintain interaction with each other and with the course professor during the implementation of e-learning in the form of simultaneous presentation or by downloading content via Moodle?

Q13: What are the skills that undergraduates and professors must be trained in before starting an e-learning application?

3.3 Pilot study

The questionnaire and interview schedule were developed by following practical procedures to ensure validity and reliability. First, the researchers reviewed the relevant literature and empirical papers to compare their research methods with the current ones. Second, three experts from the College of Basic Education examined the inventories to check their appropriateness in terms of content, language, style, and typos; changes were made based on their feedback. Third, a pilot study was conducted to test consistencies among items, domains, and scales. The instrument was piloted with 60 undergraduates, who could add notes on each item that they believed was not precise. Concerning internal reliability, the results of Cronbach's alpha presented in Table 5 ranged from .502 to .907.

Table 5. Internal reliability

Sub-scales	Domain	N of items	Items	alpha
Attitude toward e-learning	Educational goals	4	EG4, EG9, EG17, EG18*	.838
	Student's competencies	5	SC1, SC2, SC3, SC5, SC11*	.826
	Interactive learning	4	IL10, IL12, IL13*, IL14*	.502
	Alternative education	5	AE6, AE7, AE8, AE15*, AE16*	.778
Educational challenges & requirements	Social participation	6	SP27, SP30, SP31, SP34, SP36, SP37	.885
	Pedagogical practices	7	PP19, PP23, PP24, PP25, PP29, PP35, PP38	.765
	Self-study ability	7	SA20, SA21, SA22, SA26, SA28, SA32, SA33	.888
Technical challenges & requirements	Training courses	4	TC39, TC40, TC41, TC42	.899
	Synchronous learning	4	SL49, SL50, SL51, SL52	.852
	LMS	4	LMS45, LMS46, LMS47, LMS48	.855

	IT support	6	IT43, IT53, IT54, IT55, IT56, IT57	.907

All domains exceeded .7 in the Cronbach's alpha test except for the interactive learning domain, which reached .502. The interactive learning domain is still acceptable, as Cronbach's alpha can be affected by the number of items. Scales that include fewer than 10 items tend to have a low Cronbach's alpha (Pallant, 2013).

Table 6. Internal validity

Attitude toward e-learning							
Educational goals		Student's competencies		Interactive learning		Alternative education	
Item	Alpha	Item	Alpha	Item	Alpha	Item	Alpha
EG4	.873**	SC1	.895**	IL10	.621**	AE6	.732**
EG9	.886**	SC2	.908**	IL12	.651**	AE7	.658**
EG17	.879**	SC3	.928**	IL13*	.509**	AE8	.797**
EG18*	.624**	SC5	.823**	IL14*	.749**	AE15*	.713**
--	--	SC11*	.265*	--	--	AE16*	.742**
Educational challenges & requirements							
Social participation			Pedagogical Practices			Self-study ability	
Item	Alpha		Item	Alpha		Item	Alpha
SP27	.892**		PP19	.181		SA20	.778**
SP30	.701**		PP23	.662**		SA21	.831**
SP31	.858**		PP24	.824**		SA22	.807**
SP34	.832**		PP25	.784**		SA26	.891**
SP36	.763**		PP29	.696**		SA28	.815**
SP37	.744**		PP35	.593**		SA32	.675**
--	--		PP38	.789**		SA33	.616**
Technical challenges & requirements							
Training courses		Synchronous learning		LMS		IT support	
Item	Alpha	Item	Alpha	Item	Alpha	Item	Alpha
TC39	.866**	SL49	.721**	LMS45	.921**	IT43	.703**
TC40	.846**	SL50	.888**	LMS46	.822**	IT53	.838**
TC41	.906**	SL51	.854**	LMS47	.821**	IT54	.832**
TC42	.890**	SL52	.865**	LMS48	.775**	IT55	.847**
--	--	--	--	--	--	IT56	.911**
--	--	--	--	--	--	IT57	.866**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

According to Table 6, almost all 57 items were significantly correlated with their domains, where the correlations ranged between .593 and .921, except for item 19, which was weakly correlated with it is domain. Moreover, the correlations between domains and their scales were also significantly correlated as the results ranged between .750 and .925 (see Table 7).

Table 7. Correlations between domains and scales

Scales	Domains			
Total of perspective	Educational goals	Student's competencies	Interactive learning	Alternative education
	.917**	.925**	.750**	.923**
Total of educational challenges and requirements	Social participation	Pedagogical practices	Self-study ability	
	.916**	.923**	.965**	

Total of technical challenges and requirements	Training courses	Synchronous learning	LMS	IT support
	.882**	.830**	.924**	.908**

** Correlation is significant at the 0.01 level (2-tailed).

3.4 Data analysis

The raw data were fed into the Statistical Package for Social Sciences (SPSS) software program, version 23.0. Descriptive statistical analyses such as percentages, frequencies, means, and standard deviations were performed to present the participants' demographic information and figure out the means of scales and subscales. The current study also applied inferential statistical analyses, such as a variance analysis and correlation analysis, in order to identify possible statistical comparisons and relationships among the overall responses.

Meanwhile, the digital data derived from students' focus groups were transcribed and then fed into Max Qualitative Data Analysis (MAXQDA) 2020. The qualitative raw data were analyzed by adopting the model of "categorizing indexing" based on Radnor's (2002) analysis strategy. This model provides six stages, starting with topic ordering. Major themes can be ordered after scanning and reading the transcripts many times, especially when the interviews' and focus groups' schedules focus on specific scopes. The second stage is constructing categories under each major theme in order to move to the third stage, which is reading for content. The third stage aims to identify and highlight statements from the transcripts by carefully reading the whole text data. The fourth stage is completing the coding sheets, where codes are grouped in the related categories. The fifth stage is generating coded transcripts, which transfers coded extracts from the raw transcripts to the coded transcripts. Finally, in the analysis to interpretation stage, a specific description is given to each category to review and select exemplary extracts for presenting the findings.

4. Findings

The findings of this study highlight undergraduates' attitudes toward e-learning, educational challenges and requirements, and technical challenges and requirements in Kuwaiti applied colleges. The findings are presented in two sections: quantitative findings and qualitative findings.

4.1 Quantitative findings

According to Table 8, the undergraduates had neutral attitudes toward e-learning (*M*=3.14, *SD*=1), with the means of domains ranging between 3 and 3.29.

Table 8. Means and stranded deviations of sub-scales and domains

Sub-scale	Domain	N	*M*	*SD*	Descent order	Level
Attitude toward e-learning	Educational goals	1650	3.29	1.13	1	Neutral
	Student's competencies		3.15	1.16	2	Neutral
	Alternative education		3.12	1.13	3	Neutral
	Interactive learning		3.00	.91	4	Neutral
	Total		3.14	1.00	--	Neutral
Educational challenges & requirements	Self-study ability	1650	3.48	1.11	1	high
	Social participation		3.42	1.25	2	high
	Pedagogical practices		3.40	.92	3	high
	Total		3.43	1.02	--	high
Technical challenges & requirements	IT support	1650	4.17	1.01	1	high
	LMS		3.93	1.10	2	high
	Training courses		3.78	1.17	3	high

Synchronous learning	3.64	1.17	4	Neutral
Total	3.92	.96	--	high

Meanwhile, it appears that the educational challenges and requirements scored 3.43, indicating that undergraduates see these challenges as high obstacles that could hinder their learning process. The highest educational challenge was self-study ability (*M*=3.48, *SD*=1.01) rather than social participation and pedagogical practices. Nevertheless, undergraduates are more afraid of technical challenges (*M*=3.92, *SD*=.96) than educational ones. Their first concern is the weakness of technical support services (*M*=4.17, *SD*=1.01), followed by the difficulty of using LMS programs (*M*=3.93, *SD*=1.1). The final concerns were the lack of training courses related to distance education and problems related to simultaneous education.

An independent-samples *t*-test revealed significant differences between the scores of undergraduates receiving training courses in LMS and untrained undergraduates (Table 9) in all domains except for IT support domain, which appeared to be the supreme requirement for all participants.

Table 9. Comparing groups of trained undergraduates and untrained undergraduates

Sub-scale	Domain	E-learning training course	N	*M*	*SD*	Equality of variances	df	T	Sig
Attitude toward e-learning	Educational goals	Yes	410	3.73	1.02	Not assumed	760	9.805	.000*
		No	1240	3.15	1.12				
	Student's competencies	Yes	410	3.61	1.04	Not assumed	768	9.969	.000*
		No	1240	3.00	1.15				
	Alternative education	Yes	410	3.59	1.04	Assumed	1648	10.081	.000*
		No	1240	2.96	1.11				
	Interactive learning	Yes	410	3.32	1.04	Assumed	1648	8.265	.000*
		No	1240	2.90	1.11				
Educational challenges & requirements	Self-study ability	Yes	410	3.15	1.13	Assumed	1648	-7.122	.000*
		No	1240	3.59	1.08				
	Social participation	Yes	410	3.03	1.24	Assumed	1648	-7.451	.000*
		No	1240	3.55	1.23				
	pedagogical practices	Yes	410	3.25	.98	Not assumed	651	-3.647	.000*
		No	1240	3.45	.89				
Technical challenges & requirements	IT support	Yes	410	4.09	1.01	Assumed	1648	-1.710	.87
		No	1240	4.19	1.01				
	LMS	Yes	410	3.72	1.09	Assumed	1648	-4.446	.000*
		No	1240	3.99	1.09				
	Training courses	Yes	410	3.46	1.23	Not assumed	652	-6.240	.000*
		No	1240	3.90	1.13				
	Synchronous learning	Yes	410	3.89	1.17	Assumed	1648	-5.151	.000*
		No	1240	3.73	1.15				

Trained (N=410) and untrained undergraduates (N=1240) differed significantly in all domains of attitudes toward e-learning, in which trained undergraduates held more positive than untrained ones. Educational challenges such as self-study, social participation, and pedagogical practices challenges can be better handled by trained undergraduates compared to untrained undergraduates, who find them to be obstacles to their education process. The result of social participation is an example of these differences, t(1648)= -7.45, p=.000, with untrained students (*M*=3.55, *SD*=1.23) scoring higher compared to trained ones (*M*=3.03, *SD*=1.24). Similarly, untrained undergraduates scored higher means than the means of trained students in almost all technical challenges.

Another independent-sample *t*-test revealed significant differences between the scores of undergraduates experienced in using Microsoft Office (N=1003) compared to inexperienced ones (N=647). As shown in Table 10, experienced

undergraduates hold positive attitudes whereas inexperienced students hold negative feelings toward e-learning. For example, in the domain of educational goal, t(1340)= 18.1, p=.000, experienced students (*M*=3.66, *SD*=1.01) scored higher compared to inexperienced ones (*M*=2.72, *SD*=1.05).

Table 10. Comparison of experienced versus inexperienced undergraduates

Sub-Scale	Domain	Experience in Microsoft Office	N	*M*	*SD*	Equality of variances	df	T	Sig
Attitude toward e-learning	Educational goals	Yes	1003	3.66	1.01	Not assumed	1340	18.098	.000*
		No	647	2.72	1.05				
	Student's competencies	Yes	1003	3.55	1.03	Not assumed	1332	18.900	.000*
		No	647	2.54	1.07				
	Alternative education	Yes	1003	3.49	1.03	Assumed	1648	18.483	.000*
		No	647	2.54	1.01				
	Interactive learning	Yes	1003	3.22	.89	Assumed	1648	13.131	.000*
		No	647	2.65	.84				
Educational challenges & requirements	Self-study ability	Yes	1003	3.27	1.05	Assumed	1648	-9.638	.000*
		No	647	3.80	1.12				
	Social participation	Yes	1003	3.17	1.20	Assumed	1648	-10.183	.000*
		No	647	3.80	1.23				
	pedagogical practices	Yes	1003	3.33	.86	Not assumed	1245	-3.707	.000*
		No	647	3.51	.99				
Technical challenges & requirements	IT support	Yes	1003	4.23	.90	Not assumed	1130	2.896	.004*
		No	647	4.07	1.16				
	LMS	Yes	1003	3.86	1.03	Not assumed	1237	-3.125	.002*
		No	647	4.03	1.19				
	Training courses	Yes	1003	3.66	1.12	Assumed	1648	-5.308	.000*
		No	647	3.97	1.20				
	Synchronous learning	Yes	1003	3.52	1.13	Assumed	1648	-5.226	.000*
		No	647	3.83	1.20				

Table 10 also indicates that experienced students are less afraid of educational and technical challenges than other students. However, both groups of students stressed the importance of technical support as a key requirement for the success of the distance learning process.

4.2 Qualitative findings

Focus group interviews were conducted with students from PAAET colleges. A qualitative analysis was used to explore the students' perspectives of e-learning, educational challenges and requirements, and technical challenges and requirements.

4.2.1 Perspective of e-learning

This theme presents the students' attitudes and perspectives toward e-learning, as reflected in the following sub-themes: e-learning during the COVID-19 pandemic, the availability of e-learning, instructional support, and alternative education.

E-learning during COVID-19 pandemic. During the COVID-19 pandemic, many students agreed that the education provided at the PAAET colleges should be resumed by implementing e-learning, especially for the theoretical courses. A student at the College of Basic Education mentioned, "closing the campus and postponing [the semester] during the COVID-19 pandemic is not helpful, [as] the students will not be able to graduate this year; therefore, the students should continue their education, and the e-learning is the solution and savior in this situation."

Availability of E-learning. When students discussed their perspective of e-learning, they mentioned the advantages of using e-learning at PAAET colleges. A student at the College of Basic Education said, "the online lecture will be available to me at any time when I need it. [If] I forgot a certain point that the doctor said ... I will be able to return to it at any time and hear what he said or what the point is and repeat it more than once in order to understand it." Another student mentioned, "I see [e-learning as] more enjoyable than the traditional education."

Instructional support. Students also expressed the challenges of applying e-learning in PAAET colleges. A student from the College of Health Sciences said, "there will be a lack of communication skill, meaning when I am sitting at home, there will be no interaction with people, students, and doctors, and whatever knowledge I have without the communication skills I will not be able to communicate with others." Another student at the same college said, "I mean, for example, we are at the College of Health Sciences, we have the lab. We must work with our hands, see with our eyes, behave as if we are working in the hospital. These things are difficult to do in e-platforms, [so] e-learning could work with theoretical courses [but] not practical courses." A student from the College of Nursing pointed out the "difficulty of practical courses. We do more work than we receive information from the tutors... besides all materials are in the laboratory. … If I've e-learned and then graduated, what's going to happen if I get a job?"

Alternative education. Students reported that e-learning is not an alternative for traditional education. As a student from the College of Health Sciences reported, "e-learning will not be an alternative to the traditional education because the College of Health Sciences deals with panels, for example in laboratories and emergencies. These skills need to be learned closely. After all, there is no replacement." On the other hand, some students suggested that e-learning could be applied along with the traditional education (blended education). A student from the College of Basic Education stated that "but why not to support online learning by seeing it as an assistant method that complements the traditional education … if the professor forgot to mention anything in the class, … e-learning will be an assistant factor, I mean, but of course the traditional education is the basis, while [e-learning] is complementary."

4.2.2 Educational challenges and requirements

As students discussed their challenges regarding the implementation of e-learning, they identified issues related to class size, students' attention and duration of the online class, pedagogical practices, and self-study ability. Students also discussed ways to overcome these challenges.

Attention span and length of online class. Regarding the duration of the online class, a student from the College of Basic Education recommended that, "if the time of the online class is too long, then there should be a break every 30 minutes." A student from the College of Business Studies had the same opinion regarding the duration of the class. She mentioned that "half an hour is fine, [but] more than half an hour… the majority of students would go to sleep and play with their phone … it is half an hour in which the lesson will be explained for the students to understand everything." Another student suggested that "the professor should summarize the lecture and talk about the essential things and then assign homework to the students."

Interactivity and class size. A student at the College of Business Studies suggested that the "class size should be between 20 to 30 students" to maintain interactive class. A student from the College of Basic Education thought that, "the fewer number of students in the online class, the more interactive and more successful for the students." Another student from the same college believed a greater number of students would be challenging for the professor to maintain control over the online class, which "would lead to directional teaching."

Pedagogical practices. The students consistently determined that pedagogical practices such as applying discussion as a practice should be used with students in online classes. A student from the College of Basic Education said, "every ten minutes the professor should give the students two to three questions to create more interaction between the professor and the students as well between the students in the online class." A student from the College of Nursing said, "Exactly. It is not just delivering and explaining, and us listening to the lecture, you know? It must be a discussion or group work—that's the thing that helps the student focus in the online class."

Self-study ability. Self-study ability was considered an educational requirement for the students to obtain in order to successfully implement e-learning. As a student from the College of Basic Education stressed, "the student must prepare himself in sufficient time before the class starts; for example, he has a paper and a pen so he takes notes. Most of these things that I see, I mean, it helps the students focus." A student from the College of Nursing stated it would be helpful "if you prepare the atmosphere and surround yourself with things that would help you study and manage your time."

Progress evaluation. Students offered some suggestions to effectively evaluate students' progress (exams). A student from the College of Basic Education believed that "cheating is a big problem in online learning … perhaps the best way is to use cam option to mentor students' behavior during the test. [Also] I think this method is the most appropriate method for essay to evaluate the student's ability and understanding of the whole material." Another student said, "but in terms of life cam, I strongly advise you to use the cam; even if you do not have a computer, you can download it to your phone." According to another student, "some students can easily cheat in online test because the college does not use the Lockdown browser programs."

4.2.3 Technical challenges and requirements

Two subthemes emerged from the technical requirements: interface and internet connections. Meanwhile, the most relevant focus group discourses on the theme of technical requirements were training courses, trial periods, and IT support.

Trial periods. The students mentioned the importance of having a trial period before implementing e-learning in PAAET colleges. A student from the College of Basic Education stated that, "I mean, a course (trial period), even if one week before studying, to practice how do we upload files? How do we make sure that the homework is uploaded? How do we do exams? … I see if we focus on the basic matters, it serves the student to complete the distance education process." A student at the College of Nursing suggested taking "a week and a half, a maximum of two weeks, to be familiar with [e-learning] platform, I mean ... they inform us about it because our college did not apply distance education before."

Training courses. The students highlighted the technical requirements to effectively implement e-learning in PAAET colleges. Students' statements reflected the importance of having training courses for faculty as well as students. A student at the College of Basic Education said, "the educational courses are useful. [They] give the opportunity to practice... I have to apply and see what is correct to do. It's then the training courses that are helpful." Another student reported that, "at least if it was in a training course to teach me the things that I will face, we will reach an excellent level that prepares us to resume the course—I cannot say without any problems, but I mean, we will resume the course very well."

User interface. Some of the students, like students at the College of Basic Education, appeared to be concerned about the user interface for the LMS (Moodle). According to a student at the College of Basic Education, "the structure of the user interface for the Moodle system is very difficult." Another student describe it as "very, very difficult. I mean, even when I want to see my grades, I cannot… I have to try a thousand ways to enter the system. What do I do?!"

Internet connection. Another technical challenge that the students raised was internet connection. Most of the students reported a lack of internet connection either in their houses or at the PAAET colleges. A student at the College of Basic Education said, "I mean, if they tell me to classify the problems in order, what is the most important problem I will face? … Poor internet and server problems."

IT support. The students consistently mentioned that implementing e-learning in PAAET colleges requires sufficient support from IT to assist the students. A student from the College of Health Sciences stated, "there must be technical support or specialized people to help with problems. His job is to help students if they encounter a problem. Problems are present in traditional education and distance education as well." A student from the College of Basic Education reported, "there must be people who specializes in helping students. I mean, the student does not ask for help from his colleagues. It should be a special unit. If the student faces a problem, he must talk to IT support."

5. Discussion

Quantitative and qualitative findings are discussed here based on relevant literature and previous studies. Three major areas are highlighted to draw a holistic picture of undergraduates' attitudes, challenges, and requirements for E-learning.

5.1 Students' attitudes toward e-learning

Although students mentioned several challenges and difficulties related to e-learning, they held neutral sentiments, and their attitudes toward e-learning were unbiased (M =3.14). In addition, students experienced in using Microsoft Office programs were more optimistic than those without such experience. This finding appeared to be different from previous findings by Adnan and Anwar (2020) and Alkharang and Ghinea (2013), who concluded that students were biased against e-learning. A possible reason for not being biased against e-learning is that students were aware of the advantages and disadvantages of e-learning. Indeed, students were reluctant to postpone their studies due to the COVID-19 pandemic, so that they found e-learning to be a great chance to avoid any delay in their graduation plans. They also pointed out that e-learning platforms allow them to access the online lessons at any time and attend lectures from a distance. However, students identified differences between learning on-campus and e-learning, such as a lack of communications (Ali & Magalhaes. 2012), a lack of pedagogical practices, and a lack of instructional support (Alkharang, 2014; Al-Azawei, Parslow, & Lundqvist, 2016). Therefore, students did not see online learning as an alternative to on-campus learning, but rather a temporary solution to cope with the COVID-19 pandemic.

5.2 Educational challenges and requirements

As stated, students were aware of several challenges, including educational ones that they identified as strong challenges, such as poor self-study skills, limited pedagogical activities, a lack of participation and interactivity, students' attention and length of the online class, and class size.

Students called for the diversification of teaching methods and the use of different pedagogical applications. They do not want to follow a single style of teaching that is often based on indoctrination. Therefore, they demanded That teachers provide educational supports to properly deliver scientific content (Koçoğlu & Tekdal, 2020). In addition to the need to find practical solutions that regulate the process of evaluating student performance and prevent unethical behaviors, such as cheating on tests and scientific plagiarism. Students believe that the lack of appropriate technical and administrative tools will lead to a defect in students 'evaluation (Al-Hunaiyyan, Alhajri, & Al-Sharha, 2018; Maman Suryaman, Muliansyah, Bustani, Suryani, & Fahlevi, 2020).

The results also indicate that self-learning skills are one of the most important requirements of e-learning, as students must possess these skills to manage their learning process remotely and use them with different learning resources (Arinto, 2016; Al-Azawei, Parslow, & Lundqvist, 2016). A student unable to organize his distance learning process will face difficulties during online learning. The matter does not stop at self-learning skills, but extends to external factors that pose challenges as indicated by the participants, such as maintaining students' attention and stimulating their participation and interaction throughout the virtual lecture. Students are wary of the problems they will face due to the class size and length of the study lecture, as these factors will reduce student interaction and attention during the virtual lecture. A recent study found that interactivity increases learners' attention span in online learning (Geri, Winer, & Zaks, 2017). However, a large class size and lengthy lectures of synchronous e-learning could negatively influence the learning process, as Okereke et al. (2020) stated that the e-learning platform limits the control of the instructors over their students, who may log in but engage in other activities unrelated to learning. Interactivity is a vital component for refining the superiority of e-learning (Siemens et al., 2015), but with a big class size, teachers are more likely to adopt teacher-centered activities, limiting students' interaction. Unfortunately, some applied colleges have issued a decree permitting the registration of 120 students in a single division instead of 40 students. Therefore, opportunities for student interaction with the teacher and with his colleagues are very scarce.

5.3 Technical challenges and requirements

Students identified many concerns regarding the technical problems associated with e-learning infrastructure (Eunice & Cosmas, 2020). Therefore, they demanded a trial period to identify potential problems and address them before the start of the semester. Indeed, the applied colleges provided a trial period of two weeks before resuming the distance learning semester; this procedure helped students get acquainted with the educational platform as it was a completely new experience. The second requirement is to provide training courses for students so that they can learn how to deal with the platforms and use them effectively. This requirement is in line with many of the results from recent studies, which all recommended offering courses to students on an ongoing basis (e.g., Al-Azawei, Parslow, & Lundqvist, 2016; Aldowaj, Ghazal, & Umar, 2018; Koçoğlu & Tekdal, 2020). This explains the reason for the statistical differences between students who passed training courses on distance education and untrained students, as the trained students had better attitudes toward e-learning and were less afraid of educational and technical challenges than the untrained ones.

Furthermore, one of the most prominent challenges that students face is the user interface of the Moodle program, as they find it difficult to use it professionally or even practically. LMS programs were complicated for them and consumed their time and efforts, which could limit students' learning (Mpungose, 2020). Thus, students do not prefer e-learning due to the complexity of the user interface, as Adnan and Anwar (2020) also found; in their study, students had negative attitudes about e-learning for several reasons, including the complex user interface. Poor internet connectivity was another issue raised by interviewees because problems may occur (Eunice & Cosmas, 2020) that prevent some students from attending the synchronized lecture, delaying the broadcast of live sessions, completing the exam, or submitting assignments on time. Thus, e-learning may not provide equal opportunities for all students. when internet connectivity is weak or unavailable in certain areas, meaning some students are unable to keep track of their counterparts in better-connected areas (Okereke, Williams, Emmanuella, Ashinedu, & Mairaj, 2020; Alrashidi, 2017).

In previous technical cases, users referred to a specialized team that provides appropriate technical support. Therefore, students see technical support as one of the priorities that must be secured. If technical support services are poor and their response to urgent problems is slow or inadequate, students face many problems, especially during peak hours. Indeed, a large number of studies have confirmed the importance of having a dedicated technical support team to treat distance education problems (e.g., Mishraa, Guptab, & Shreeb, 2020; Eunice & Cosmas,2020; Teymori & Fardin, 2020).

6. Recommendations and Implications

This study's findings indicate the need to continuously provide students with specialized training courses in the field of e-learning. An appropriate infrastructure is also necessary to ensure the quality of distance education and secure the educational and technical requirements. The deanship of each of the five colleges included in this study should develop appropriate plans and solutions to meet the challenges students are facing. In addition, tutors should be trained to manage the virtual classroom, increase interaction, attract student attention, and apply effective evaluation methods.

In light of the findings, future research should study professors' attitudes toward e-learning as it is a new experience in the Kuwaiti higher education context. Future research can investigate faculty members' challenges and requirements. Such research will provide higher educational institutions in Kuwait with integrated results that help them improve the infrastructure and develop the e-learning process.

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