

## Strategic Revival of HSM

# Virtual migration of higher education institutions in times of crisis: Major challenges and critical success factors

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### Abstract.

**BACKGROUND:** In the last few months, e-learning witnessed a considerable demand due to the Covid-19 pandemic that made it the pragmatic solution for all Higher Education Institutions (HEI). Currently, all public and private universities relying on technology to make education continues with few interruptions. The migration of HEI into the virtual education model experienced several challenges in delivering rich education content to educators and learners.

**OBJECTIVE:** Critical Success Factors (CSFs) enabled many universities to transform efficiently into the virtual environment. Before this transition, universities should carefully consider the key challenges and the CSFs to achieve successful migration to the virtual environment. E-learning is not a substitute anymore, it is gradually becoming a de-facto technology transformation in the current exceptional situation. This paradigm shift contributes to the success of education continuity in higher education settings.

**METHODOLOGY:** A survey instrument was distributed to 500 students effectively using e-learning systems. Out of which only 330 were completed and used in the analysis which determined 66% as the overall response rate.

**RESULTS:** The results of the study indicate a positive and significant relationship between the 13 CSFs and the e-learning systems usage, and that also indicates a notable impact of the CSFs on the e-learning systems usage.

**CONCLUSION:** The outcome of this research identifies the top 13 CSFs that contribute to delivering successful e-learning systems usage. The top 13 CSFs are positively and significantly correlated with e-learning systems usage.

Keywords: Virtual migration, higher education, universities, critical success factors, challenges



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## 1. Introduction

The E-learning model is replacing the traditional model of teaching and learning in many universities as a solution to cope with the current exceptional situation. This paradigm shift to the virtual environment caused by the unexpected pandemic and that forced HEI to adopt it as a provisional solution for the current unusual situation. However, moving to a virtual environment is becoming a crucial part of the e-learning strategic plan for several universities as a step up towards the blended learning approach. Covid-19 accelerated the process and forced almost all HEI to take a step forward and quickly adopt the required technology as a temporary solution to overcome the pressures from the stakeholders and avoid losing business or reputation.

This temporary solution is gradually turning to be a permanent solution to several universities as it provides many benefits to all stakeholders from several aspects. Universities realized the importance of migration towards the virtual environment due to the current pandemic of Covid-19. However, the virtual environment is not an option anymore, it is gradually becoming a crucial part of modern education in several HEI. Therefore, universities will extremely invest in up-to-date technology to restructure the entire technical infrastructure and develop a very robust technological platform to be ready for the new educational approach.

The demand for e-learning in HEI is growing rapidly due to the current world health crisis, and that requires the universities to improve their ICT resources to provide the educators and the learners with excellent teaching and learning experience as the quality of higher education is a major concern to the ministry of higher education. To maintain a high standard of academic integrity with online delivery of education, universities should ensure the fundamental values of academic integrity such as honesty, trust, fairness, respect, responsibility, and courage. Some of the values could be a challenge within the virtual environment, but adopting the right technology infrastructure will help universities maintaining academic quality standards. Despite the benefits of e-learning to the future of education, many HEI were forced to migrate to the virtual environment as a provisional solution to the current crisis, which will satisfy the internal and external stakeholders by ensuring education continuity with few interruptions and some minor changes.

## 2. Literature review

### 2.1. The use of E-learning in HEI

The rapid growth of ICT over the past few decades and the optimum utilization of technology in HEI are providing tremendous opportunities to the education sector to transform the way of teaching and learning. E-learning technology is a platform that provides the opportunity to educators and learners to access the teaching materials at any convenient time. It saves a massive cost that is associated with traditional education such as printing and paper cost, infrastructure and electricity cost, travel and staying cost, etc. However, E-learning is the future of education as it is an interesting teaching approach with greater convenience and entertainment [1]

E-learning technology includes several features for distance education such as virtual classroom, online examination, online assignment submission, plagiarism check, upload and download any types of materials, online polls, etc. However, only a few features are commonly utilized by educators and learners, and this is mainly due to change resistance by many stakeholders. Most modern users prefer the technology option because it fits their style. The evolution of educational technology will facilitate the adoption of online courses and encourage HEI to begin with the virtual educational project to utilize and take advantage of the e-learning management systems' functionalities [2, 3].

Many HEI are still depending on the traditional approach of teaching and learning, which does not meet the new lifestyle requirements of many stakeholders. The new way of interacting and communicating with others virtually enforced many sectors to cope with these new requirements and moved entirely or partially to the virtual environment to stay competitive. Several studies revealed the importance of digital transformation in the education sector to expand the communication between educators and learners whereby many students engaged more in the virtual classroom and that resulted in improved teaching and learning environment. A recent study in Nigeria revealed the readiness of the students in the college of education to embrace mobile learning rather than e-learning only, this is a good indication of the passion of the students to adopt the latest technology either related to education or any other business [4].

The traditional face-to-face interaction was dominant in most educational institutes, whereby the

educators meet the learners physically. This is the common practice by many of the stakeholders in education to communicate synchronously in real-time, which is more convenient for all of them. However, the rapid evolution of ICT in the educational sector has entirely changed the pedagogical approach of knowledge transfer to learners. Two universities in KSA were surveyed to capture the students' perceptions of the existing e-learning systems which show a significant impact on students learning in terms of depth of learning, productivity, and satisfaction [5].

E-learning benefits educators and learners in several ways such as saving various associated costs, moving towards a global and digital environment, and providing many options to learners like flexibility in time and place. The success of teaching and learning quality within the e-learning environment mainly relies on some critical success factors such as interaction, delivery, content, structure, support, and mentoring. Other factors considered as important factors by several authors like responsiveness, ease of use, accuracy, reliability, usability, usefulness, access, personalization, security, and privacy. It is important for all HEI to understand the critical success factors of the e-learning systems as perceived by educators and learners. Understanding the perceptions of e-learning stakeholders will enhance the performance of e-learning systems and end-up with satisfied and happy end-users [6].

Noesgaard and Ørnsgreen argued that e-learning is an effective way of teaching, and its effectiveness can be measured by learning outcomes. E-learning and the end-users can make e-learning very effective as these two factors are the most important parameters in the success of any information system. Motivation and engagement are the keys to make e-learning an effective solution, and in some cases, it could be more effective than face-to-face interaction. E-learning was limited to deliver the teaching materials via the e-learning portal, but with the advent of ICT, many educational institutes have moved partially or totally to online teaching using most of the features in the e-learning platform such as virtual classes, online assessments, online communication, online materials, and many more [7].

## 2.2. Blended learning

Blended learning helps in providing extensive teaching and learning environment includes physical and virtual teaching. Technology readiness will create an effective educational environment that

enables educators and learners to communicate seamlessly. Effective blended learning is a combination of traditional and online learning which includes asynchronous and synchronous learning. Keeping a balance between the traditional classroom and online teaching is crucial to combat any unexpected situation [8].

Educators and learners both still prefer the blended learning environment to ensure appropriate education continues. Currently, turning to online learning is becoming mandatory and not just a substitute to solve the existing issues related to education continuity. E-learning is an essential part of blended learning that ensures a rich educational environment supported with the needed technology to enable proper communication among educators and learners. 140 online students and 466 blended learning students were investigated to measure the motivated strategies for learning. The outcome indicated that online students used self-regulated learning more than blended learning students [9].

Effective education in the higher education context enables educators and learners to engage, interact, negotiate, argue, debate, communicate, etc. which is all supported by e-learning technology [10]. Both educators and learners are aware of their teaching and learning responsibility towards the self-learning approach, which requires both parties to do the needed parts. Self-directed learning encourages students to engage more in the learning processes and become active learners via searching, planning, evaluating, participating, investigating, etc. to get the right information and be an active part of the learning processes. This process will improve the students' critical skills and learning processes performance [11].

Virtual teaching is far enough from the traditional one, where the instructors need to create digital content and upload it on the learning management systems portal. In addition to that, appropriate communication and interaction have to be conducted via synchronous learning systems. Therefore, effective online teaching is a combination of Asynchronous and Synchronous learning. Asynchronous learning is more common because it provides a just-in-time, on-demand, and flexible learning experience where learners don't need to schedule their time around the predetermined teaching schedule and they have complete flexibility since the interaction is not in real-time [12].

Asynchronous learning refers to pre-recorded video lessons, discussion forums, digital reading,

posted assignments, etc. Whereas synchronous learning means at the same time, and that involves online interaction with the instructor and the group of learners in real-time. However, synchronous is still a less common way of teaching compared to the asynchronous approach, it involves a live session with geographically dispersed learners sharing the same conferencing system with the instructor. The learners' group broadcast audio and video sessions to interact with each other through presenting a slideshow, asking questions, providing comments, discussion, etc. This practice will enhance the ability of the learners to effectively engage in learning processes and all related activities [13].

Synchronous learning refers to an online learning event where a group of learners engages with real-time activities via a videoconferencing system to avoid the feeling of isolation and keep communicating with each other. Therefore, to provide an effective virtual teaching environment, instructors need to provide a blended learning framework by working with Asynchronous and Synchronous in a parallel way to provide learners with the right digital content and avoid relying on one method, however, the other method will be a backup and supporting materials for any future reference. This practice will help educational institutions to stay competitive and avoid any isolation in the education system [14].

### 2.3. *Major challenges*

The main challenges of online teaching can be divided into three parts technical, organizational, and cultural, these key dimensions are essential to the educational processes' continuity. Technology readiness is a major technical challenge to learners in particular and educators in general which prevents them to entirely adopt e-learning technology. Mobility is another major technical challenge since educators and learners prefer mobile access to communicate anytime and anywhere [15]. Students are virtual natives and they know how to use technology very well. However, they still face some challenges related to learning technology such as technology readiness, learning effectiveness, web-based learning resources, and technology-based application. Technology readiness and self-directed learning readiness motivate both learners and educators to seamlessly adopt e-learning, which eventually enhances their intellectual development [16, 17].

Therefore, universities should utilize technology in teaching and learning to support face-to-face

education and get the advantage of the technical background of the instructors and students as e-learning systems end-users. Despite the significant benefits of technology on education, there is still a huge debate in the literature about the students' learning outcomes. Past studies have shown variation in results, some show positive and significant relationship and some negative and insignificant relationship between e-learning and students learning outcome [18–20].

Assessments, academic misconduct, and academic integrity are considered in literature the most critical challenges in the virtual learning environment. However, a take-home exam (assignment) could be a solution as an alternative to traditional sit-down (in class)/ limited-time exams with a different format, it is a mix between homework and open book exam. Take-home exams can be done at home with access to several resources such as lecture notes, textbooks, or any other resource materials that might be useful. Take-home exams are usually returned within a specified time, often after a few days. It allows testing the student's ability to find and apply information and knowledge that given and discussed in class, and to make use of the earned information in answering the take-home exam questions. The materials used in take-home exams usually can't be restricted, but can be guided by the course instructor by giving general guidelines and some tips to indicate the materials that could be useful to answer the exam questions [21].

Take-home exams usually test more than the rote-learning technique that tests the students' ability in memorization, but it tests their analytical and intellectual abilities and skills, which are extremely needed at the university level. This technique help students to understand, analyze, and apply the learned knowledge to critically argue and solve the given problems and then present it in a good format and structure. Such abilities and skills are particularly required to equip students with academic capabilities that vital to many employers in the marketplace. Usually, this type of exam is not an easy option for many students since it requires more than just copying the information directly from the source materials, which might lead to incorrect answers. In such type of exam, students are required to find, locate, collect, and then use the relevant information in different sources to provide valid argument and solution and present it in an appropriate manner [22].

Probably students have to study more to answer the questions of the take-home exam, they have to refer to many materials to find the needed information, study them well, understand, reproduce, interpret, and then

effectively apply the solution to the given situations. Questions in take-home exam perhaps require students to apply knowledge via an essay-style type of questions, problem-solving, case study analysis, analyze and interpret a set of data, critically analyze a case or scenario, present a well-evidenced argument on a topic taught in the subject, analyze and evaluate an issue or problem by referring to concepts introduced in the subject, etc. However, the type of questions depends on the nature of the course, in some fields, the hypothetical type of questions needs several references and thorough discussion which might be preferred here [23–25].

According to Lars Bengtsson, take-home exam might be the right and preferred assessment method on the higher Bloom's taxonomy levels since it provides higher-order critical thinking skills and gives enough time for reproducing and interpreting the information. However, due to the risk of some academic misconduct, this type of exam is not recommended on the lowest Bloom's taxonomy level. Currently, take-home exams could be a good choice since it is with less stress that imposed on students and turns the assessments to learning activity through reading, understanding, finding relevant information, analyzing, interpreting, presenting the outcome, etc.[26]

The major advantage of take-home exams is reducing the students' anxiety, and that considered by many as excellent tool that measures critical thinking skills. On the other hand, the major disadvantage of this choice and the most cited concern in literature is academic misconduct by some irresponsible students. A recent study on the Malaysian higher education sector reported that 26.9% of the Malaysian universities consider the lack of e-learning center in the universities is one of the major challenges in the e-learning environment, because the e-learning center usually offers content management, online examination, e-learning portal management, etc. 11.5% of the Malaysian HEI stated that lack of top management support is also another major challenge to e-learning settings. Take-home exam is also considered a challenge by some universities, but it is a suitable assessment method within the online environment [27].

#### 2.4. Critical success factors

Participation and motivation are two of the major critical success factors that motivate learners to adopt online learning which will positively affect

the students' engagement in the e-learning environment. Self-efficacy is considered a critical factor in understanding the students' attitude towards e-learning satisfaction. The outcome of some research in the literature indicates that the self-efficacy of female students is greater than male students. Perceived usefulness is also a crucial factor that is mainly influenced by teaching and learning materials and considered in the literature as a key indicator for learners' intention to use the e-learning systems. Ease of use is a factor that influences intention to use e-learning systems, and the content of e-learning is an essential factor that encourages the learners to use the e-learning systems [27, 28].

Individual behavior and technology readiness indicate a significant impact on learners' attitudes in the virtual learning context. Integration among education systems and a centralized platform for teaching, which includes all required features for teaching and learning that match the need of educators and learners, are also critical to the success of online teaching. Students' engagement and accountability are also crucial to ensure the success of online teaching and the continuity of the appropriate learning process. Other factors such as quality, technology fit, and usefulness are also critical factors that significantly influence the e-learning continuity [29].

Online-only arena requires several factors to be successfully adopted by educational institutions, like engagement, where all students should engage in the virtual class, active learning strategy where students have to be active in the class and not passive, this can be by asking questions during the lessons, open discussion, shared thoughts, etc., provide recoded videos through splitting long virtual class to several videos, online availability of instructor and students, especially in the virtual class, offer pre and post virtual class activities by providing some short videos or reading to prepare for the lesson, and finally students should be given some assignments and homework after the online lessons to keep them active. Self-directed learning, course design, course instructor, students' motivation, technology readiness, prior training, e-learning platform, interaction among stakeholders, technical and academic support, and administrative services are also critical factors that significantly influence the learners' perception of the virtual environment [17, 29].

Several CSFs such as users' attitudes, security, privacy, trust, regulatory framework, legislations, awareness, risks uncertainties, speed, and user friendly were all highlighted in a study that attempts

to understand the issues related to the adoption of online mobile services in the Sultanate of Oman. The outcome of the study indicates that trust and security are the two major concerns perceived by the end-users [30]. Other factors like compatibility, trust, and human contact, were the most important factors for the online banking adopters in the United Arab Emirates [31]. The adopters of online services in the Kingdom of Bahrain perceived ease of use and usefulness as two significant factors that positively influence their intention to adopt and use the provided e-services in the country [32].

Al-Shafi and Weerakkody investigated several factors influencing the adoption of e-government in one of the GCC countries. The study indicated that among 9 factors i.e. facilitating condition, performance expectancy, effort expectancy, social influence, behavioral intention to adopt, adoption behavior, gender, age, and education level, only 3 factors i.e. facilitating condition, performance expectancy, and social influence are significantly influenced the citizens to adopt and use the online government services in that country. Age, education level, and position are the three critical factors that positively and significantly influence the users' intention to adopt the e-government services in the United Arab Emirates [33].

In the Kingdom of Saudi Arabia, several studies listed the key factors that affect the customers' decision to adopt e-commerce and online retail services. The factors are trust, ICT infrastructure, education, online payment, security, quality of service, training, compatibility, and complexity [34, 35]. In Kuwait, slightly different factors were indicated such as usefulness, ease of use, culture, technology, and awareness, all are important factors in the adoption of online services in the country [36, 37]. The past studies of online services in the Iranian context demonstrate worthwhile factors that significantly affect the intention to use online services in general and online banking in particular, the factors are usefulness, ease of use, attitude, perceived risk, and trust. This will help the online service providers to understand the users' perceptions about the provided online services to enhance the services and improve the acceptance of the end-users [38].

The Jordanian e-learning system was investigated to demonstrate the factors affecting the adoption of e-learning services, the study revealed that training and development are the two most CSFs that need to be considered prior to the adoption of the e-learning management system. Service quality, system quality,

technical support, confidence, satisfaction, perceived usefulness, and perceived ease of use were observed as CSFs that influence the adoption of e-learning management system by many instructors in several universities [39]. An exploratory study in Malaysia indicated that perceived usefulness, ease of use, trust, and security are the top CSFs among the 13 investigated factors that have a significant impact on the adoption of m-commerce services [40]. Moreover, other past studies have been conducted in Kenya, Ethiopia, and Mexico demonstrated similar factors i.e. usefulness, ease of use, security, payment, and human contact as CSFs for the adoption of online services [41–44].

The virtual learning environment in Chain was examined using the extended TAM2 model, the outcome indicated that perceived usefulness has a positive and direct impact on the virtual learning environment, but perceived ease of use has an indirect impact on the virtual learning environment [45]. E-learning system has boosted the capabilities of HEIs to enable excellent virtual learning environment. Enabling factors like technical support, perceived usefulness, perceived ease of use, computer self-efficacy significantly influence the attitude and the e-learning systems usage [46].

### 3. Research methodology

#### 3.1. Research population and sample

The primary goal of this research is to investigate the major challenges and the CSFs of the virtual migration in higher education institutions in times of crisis. All students using e-learning management systems in a private university in Bahrain with a total number of around 3000 students in 10 undergraduate programmes and 5 postgraduate programmes at 4 colleges were determined as the population of this study. The sampling technique used for this study was random sampling. The participating students' list was obtained from the admission and registration department with the association of information and communication unit to make sure all students who participated in this study are active students on the university e-learning management systems and effectively used the key features of the systems.

A link of the online questionnaire was randomly sent to 500 active students as a primary unite of this study from a population of around 3000 active online students at 4 colleges in 15 different programmes.

Table 1  
Summary of Respondents

Variables	Category	Frequency	Percentage	Skewness	Kurtosis
				Std. Error	Std. Error
Gender	Male	122	37	0.134	0.268
	Female	208	63	0.134	0.268
Age	19–25	235	71.2	0.134	0.268
	26–30	38	11.5	0.134	0.268
31–35		20	6.1	0.134	0.268
	36–40	15	4.5	0.134	0.268
41–50		19	5.8	0.134	0.268
	46–50	3	0.9	0.134	0.268
Occupation	Undergraduate Student (Year 1)	27	8.2	0.134	0.268
	Undergraduate Student (Year 2)	48	14.5	0.134	0.268
Undergraduate Student (Year 3)		89	27.0	0.134	0.268
	Undergraduate Student (Year4)	107	32.4	0.134	0.268
Postgraduate Student (Year 1)		36	10.9	0.134	0.268
	Postgraduate Student (Year 2)	23	7.0	0.134	0.268
Discipline	Business	131	39.7	0.134	0.268
	Humanities	37	11.2	0.134	0.268
$\Sigma$	Applied Sciences	162	49.1	0.134	0.268
		<b>330</b>	<b>100</b>		

Out of which only 330 were completed and used in the analysis which determined 66% as the overall response rate. The sampling technique that used in the qualitative phase was convenience sampling, because of the availability of the students on the campus and they were the champions that representing and supporting the students from several academic departments such as MIS, Accounting, Business Administration, Civil Engineering, Computer Science, Architecture Design, Commercial Law, English Studies, and Political Science.

### 3.2. The respondent's profile

The online survey instrument was randomly sent to 500 students that effectively using the university e-learning systems, out of which only 330 usable survey instruments were completed properly. Most of the respondents are female rating 63%, followed by a male rating of 37%. The students' age is ranging from 19 to 25 years rating of 71.2%. The vast majority are undergraduate students in the 4th year rating 32.4%, followed by undergraduate students in year 3 rating 27%, and only 17.9% are postgraduate students in both years 1 and 2. The discipline of the respondents is at most from applied science background rating 49.1%, followed by business background

rating 39.7%, and finally from humanities discipline rating 11.2%. Table 1 presents the demographic profile of all respondents.

### 3.3. The theoretical framework

The independent variables which include the CSFs were selected based on the significant contribution of each factor in the success of the e-learning systems usage which is the dependent variable of this study. After an extensive literature review, 13 CSFs were selected as the top thirteen CSFs that significantly contribute to the success of the e-learning systems usage. This study develops the following framework in light of the Technology Acceptance Model (TAM) [47] to test the impact of the identified top 13 CSFs on the e-learning systems which moderated with motivation to adopt the systems in the university context as demonstrated in Fig. 1.

### 3.4. Research methods and analysis

The data collection has been carried out via a mixed-method approach that presented in two stages to measure the variable of interest of this study and achieve the research objectives. The first stage was in charge of collecting the quantitative data via a

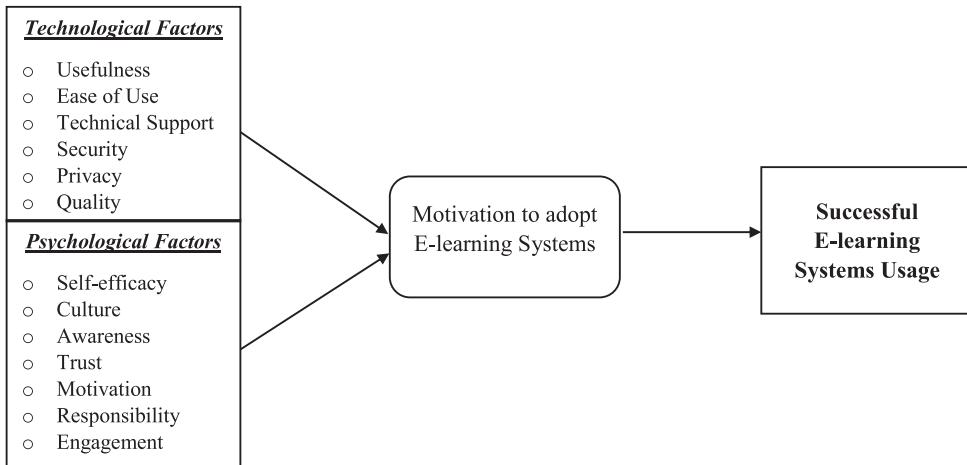


Fig. 1. Theoretical Framework.

pretested questionnaire that was used as a survey instrument to measure the relationship between the pre-identified CSFs and the e-learning systems usage. The CSFs were identified from the literature based on the importance of the factor that contributes to the success of e-learning usage. The survey instrument development was carried out based on various items and measures that collected and adapted from several sources such as [5, 6, 46], to collect some essential data about the demographic profile of the respondents, and the factors that play a critical role in the success of the e-learning systems usage. The survey instrument was distributed to the pre-identified 500 students that effectively using the university e-learning systems.

In the second stage of the survey, an in-depth interview was conducted with 10 students that were conveniently selected due to their e-learning background and their responsibility as LMS supportive team. The students served as e-learning systems' champions that represent several academic departments to investigate their experience in the usage of the e-learning systems. These 10 semi-structured interviews were conducted to explore more about the major challenges and barriers that the students usually face while using the university e-learning management systems, and to understand how these challenges and barriers might be defeated by the university to provide an appropriate e-learning environment among educators and learners. Moreover, the interviewees were asked about the adopted critical success factors during the e-learning systems usage, and how those factors could help in achieving a successful usage of the e-learning systems.

The collected data from the respondents were analyzed via the two main tools i.e. the Smart PLS3 and the SPSS, version 21 [6]. The statistical tools and methods used in this study are reliability analysis, this technique was used to test the validity and the reliability of the measures that gauge the variables of interest of this study. Descriptive statistics, this technique was run to describe the characteristics of the respondents and to check the research variables for any violation of the assumption that underlying the statistical techniques.

Frequency analysis, this statistical technique was used to determine the frequency distribution of the research items and variables. Correlation analysis, this technique has been conducted to describe the strength and direction of the linear relationship between the independent and dependent variables. Multiple regression, this technique was used to test the impact of CSFs on e-learning systems usage. The technique was also used to address a variety of research questions to indicate how well a set of variables can predict a particular outcome and provide information about the model as a whole.

On the other hand, the qualitative data were analyzed via content analysis technique to analyze the provided data from the interview notes through coding and categorization of the gathered quantitative data. The Atlas.ti software was used to convert some codes and themes into numerical outcomes [17]. The data were analyzed and described qualitatively to interpret which factors or barriers are supporting or preventing the success of the e-learning systems usage.

Table 2  
Reliability Analysis of Scales

Item	Result
Cronbach's Alpha ( $\alpha$ )	0.99
No. of items	49
Variance	3448.7
Mean for Test	115.2
Standard Deviation for Test	58.7

Table 3  
Reliability Analysis for Constructs

Construct	$\alpha$
E-Learning Systems Usage	0.883
Usefulness	0.942
Ease of Use	0.898
Technical Support	0.903
Self-Efficacy	0.942
Culture	0.937
Awareness	0.873
Security	0.943
Privacy	0.959
Trust	0.935
Motivation	0.951
Responsibility	0.923
Engagement	0.942
Quality	0.942

## 4. Analysis and findings

### 4.1. Reliability analysis

To assess the internal consistency across 49 items in the survey instrument that all measuring the same underlying construct which will be indicated by the internal consistency of items in the 14 constructs i.e. E-Learning Systems Usage, Usefulness, Ease of Use, Technical Support, Self-Efficacy, Culture, Awareness, Security, Privacy, Trust, Motivation, Responsibility, Engagement, and Quality. Cronbach's alpha coefficient ( $\alpha$ ) was used and that provides a very high level of alpha i.e. ( $\alpha$ ) 0.99 compared to the acceptable level of reliability ( $\alpha$ ) which is 0.60 (Cronbach's Alpha  $> 0.60$ ) [48, 49]. Tables 2 and 3 represent the reliability analysis of the used scales and for the 14 constructs.

### 4.2. The value of the top thirteen critical success factors

The descriptive statistics outcome indicates a great value of the 13 critical success factors i.e.

Table 4  
Summary of Descriptive Statistics

Construct	$\mu$	$\sigma$
E-Learning Systems Usage	2.33	1.36
Usefulness	2.31	1.34
Ease of Use	2.33	1.29
Technical Support	2.35	1.22
Self-Efficacy	2.37	1.19
Culture	2.34	1.32
Awareness	2.54	1.18
Security	2.26	1.30
Privacy	2.26	1.29
Trust	2.30	1.32
Motivation	2.33	1.26
Responsibility	2.30	1.29
Engagement	2.42	1.27
Quality	2.42	1.27

the independent variables on the dependent variable which makes the total of 14 variables including IVs and DV within the e-learning systems usage. However, the most five critical success factors in the e-learning systems as perceived by the participants are Awareness, Engagement, Quality, Self-Efficacy, and Technical Support, rating mean value 2.54, 2.42, 2.42, 2.37, and 2.35 respectively, and standard deviation ranging from 1.18 to 1.27. The results of the descriptive statistics in Table 4 demonstrate the importance of the identified factors in the success of the e-learning systems usage and minimize the related challenges in order to avoid any unforeseen failure. A five-point Likert-type scale rating from 1 = strongly disagree to 5 = strongly agree was used for all variables items. Culture  $\mu = 2.34$ ,  $\sigma = 1.32$ , Motivation  $\mu = 2.33$ ,  $\sigma = 1.26$ , Usefulness  $\mu = 2.31$ ,  $\sigma = 1.34$ , and Responsibility  $\mu = 2.30$ ,  $\sigma = 1.29$ , are also important factors that significantly add value and contribute to the success of e-learning systems adoption as indicated by the participating students.

### 4.3. Hypotheses testing

The correlation analysis indicates significant relationship among the 13 critical success factors and the e-learning systems usage. Pearson correlation analysis was used to describe the strength and direction of the linear relationship among the 14 variables i.e. 13 independent variables and one dependent variable. The 13 IVs and the DV "E-Learning Systems Usage" were measured using a five-point Likert-type scale

Table 5  
Summary of Correlation Analysis

Measures	UF	EU	TS	SE	C	A	S	P	T	M	R	E	Q	ESU
Usefulness (UF)	1.00													
Ease of use (EU)	0.900**	1.00												
Technical Support (TS)	0.874**	0.922**	1.00											
Self-efficacy (SE)	0.898**	0.882**	0.899**	1.00										
Culture (C)	0.902**	0.851**	0.853**	0.916**	1.00									
Awareness (A)	0.808**	0.795**	0.818**	0.877**	0.877**	1.00								
Security (S)	0.894**	0.846**	0.856**	0.895**	0.904**	0.846**	1.00							
Privacy (P)	0.905**	0.855**	0.858**	0.889**	0.903**	0.822**	0.945**	1.00						
Trust (T)	0.889*	0.821**	0.817**	0.871**	0.893**	0.808**	0.893**	0.931**	1.00					
Motivation (M)	0.891**	0.840**	0.840**	0.885**	0.908**	0.825**	0.919**	0.941**	0.933**	1.00				
Responsibility (R)	0.857**	0.815**	0.818**	0.874**	0.860**	0.811**	0.892**	0.916**	0.886**	0.917**	1.00			
Engagement (E)	0.871**	0.821**	0.830**	0.885**	0.880**	0.849**	0.882**	0.918**	0.899**	0.904**	0.901**	1.00		
Quality (Q)	0.871**	0.821**	0.830**	0.885**	0.880**	0.849**	0.882**	0.918**	0.899**	0.904**	0.901**	1.000**	1.00	
E-Learning Systems Usage (ESU)	0.906**	0.802**	0.817**	0.823**	0.836**	0.758**	0.831**	0.847**	0.838**	0.857**	0.809**	0.834**	0.834**	1.00

Note: \*Correlation is significant at the 0.05 level (2 tailed). \*\*Correlation is significant at the 0.01 level (2 tailed).

rating from 1 = strongly disagree to 5 = strongly agree for each factor of the IVs and DV which all were continuous variables.

Table 5 presents the significant correlation of the critical success factors with the e-learning systems as shown by the statistics at the bottom of the table. The independent variables such as usefulness ( $r=0.906$ ,  $p<0.01$ ), ease of use ( $r=0.802$ ,  $p<0.01$ ), technical support ( $r=0.817$ ,  $p<0.01$ ), self-efficacy ( $r=0.823$ ,  $p<0.01$ ), culture ( $r=0.836$ ,  $p<0.01$ ), awareness ( $r=0.758$ ,  $p<0.01$ ), security ( $r=0.831$ ,  $p<0.01$ ), privacy ( $r=0.847$ ,  $p<0.01$ ), trust ( $r=0.838$ ,  $p<0.01$ ), motivation ( $r=0.857$ ,  $p<0.01$ ), responsibility ( $r=0.809$ ,  $p<0.01$ ), engagement ( $r=0.834$ ,  $p<0.01$ ), and quality ( $r=0.834$ ,  $p<0.01$ ) are significantly and positively correlated with the e-learning systems usage.

A preliminary analysis was conducted to ensure the non-appearance of any violation of the underlying assumptions of normality, linearity, and homoscedasticity, and to interpret the correlation among the given variables. The bivariate correlation was subject to the two-tailed test of significance from two levels i.e. highly significant ( $p<0.01$ ) and significant ( $p<0.05$ ). However, to test the Pearson correlation between every two variables, the correlation analysis was executed among the independent and dependent variables.

The R-value of usefulness is  $r=0.906$  which explains around 82% of the variance in the e-learning systems usage and that indicates a large and positive relationship and high overlap between the two

variables. This followed by motivation  $r=0.875$  (77%), privacy  $r=0.847$  (72%), trust  $r=0.838$  (70%), and culture  $r=0.836$  (70%) respectively. These factors are rating the highest percentage, which demonstrates the largest significant contribution to the success of the e-learning systems implementation. Moreover, the other factors are still important to the success of e-learning systems usage. The PLS software merged some of the variables such as Security, Privacy, and Trust in one variable. Culture and Awareness is also merged in another variable, and the rest of the variables were presented normally. Figure 2 indicates the results of path coefficients of the relation between the constructs. The results reveal a positive and significant relationship between most of the proposed variables, this outcome support most of the proposed research hypotheses. The hypotheses are in Table 7.

As per the results in Table 6, the top 13 CSFs contribute up to 84% of the variance in the e-learning systems usage ( $R^2=0.845$ ). The F value is around 143 and the significant linear model is at alpha = 0.01, which indicates that all the factors collectively make a notable and significant contribution to the success of the e-learning systems usage. The largest beta coefficient values among the 13 factors are engagement ( $\beta=0.834$ ,  $p<0.01$ ), usefulness ( $\beta=0.796$ ,  $p<0.01$ ), responsibility ( $\beta=0.298$ ,  $p<0.1$ ), technical support ( $\beta=0.228$ ,  $p<0.05$ ), and eventually quality ( $\beta=0.141$ ,  $p<0.1$ ). These statistics indicate the unique significant contribution of each factor in the success of the e-learning systems.

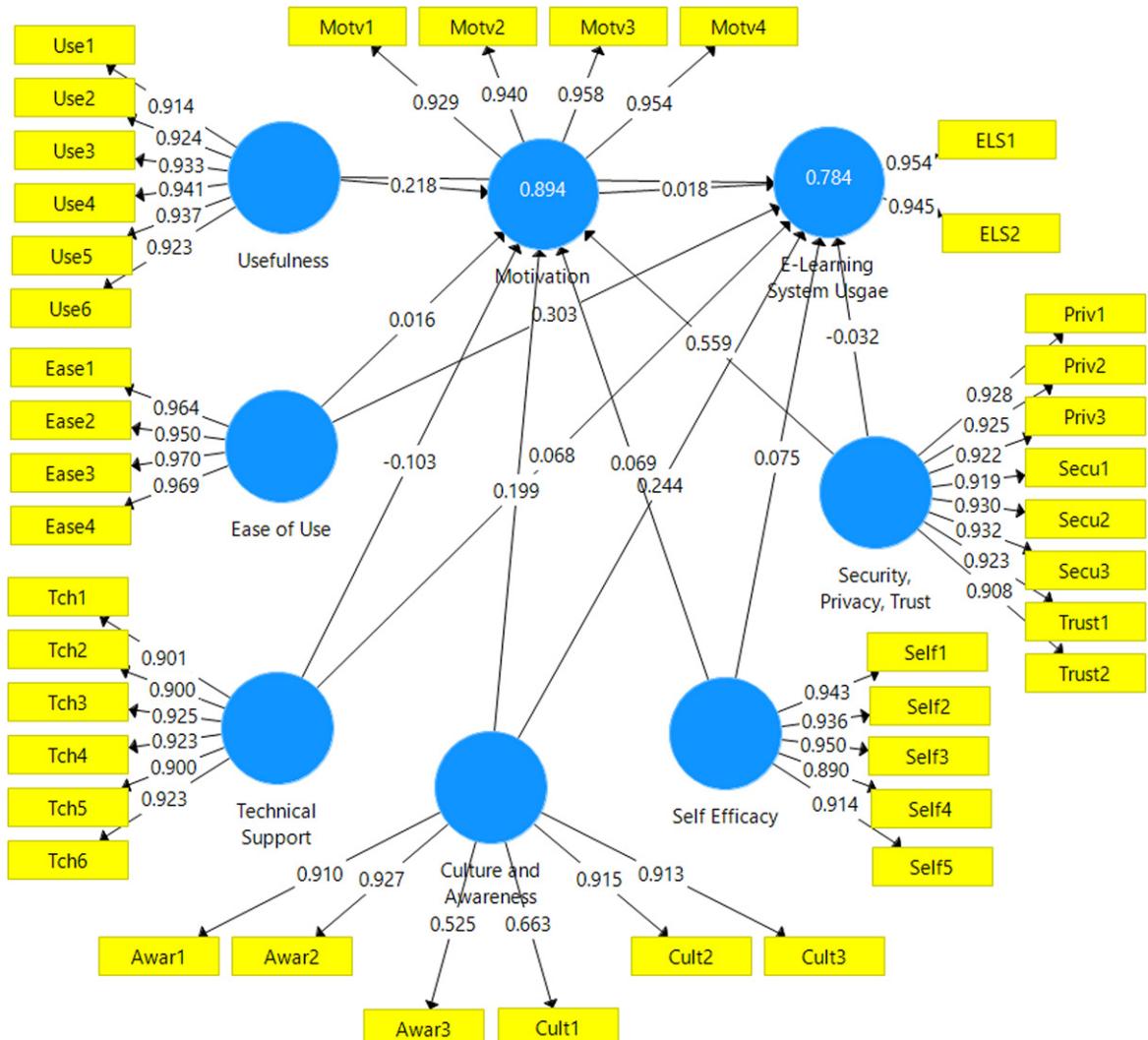


Fig. 2. Path Coefficients Results.

The notable contribution was for the engagement factor as it makes the largest and strongest beta value among other factors, followed by usefulness factors. The participants perceived that the 13 factors are critical factors that help to deliver successful e-learning systems. However, they gave different and unique attention to some factors such as responsibility, technical support, quality, and awareness.

Table 7 presents the summary of hypotheses testing of the relationship between the top 13 critical success factors and the e-learning systems usage. The research outcome was determined to accept all the proposed hypotheses because the 13 factors demonstrate a notable and significant relationship with the e-learning systems successful usage. The unique

and remarkable contribution presented by usefulness, motivation, privacy, trust, culture, engagement, quality, security, self-efficacy, technical support, responsibility, ease of use, and awareness respectively as perceived by the participating students. Figure 3 indicates the results of path coefficients T values of the relation between the constructs. The results reveal a positive and significant correlation between all proposed variables, this outcome supports the proposed research hypotheses, which is also supported by previous related literature.

Moreover, the 10 interviewees also agreed on the importance of the presented 13 critical success factors and they articulated how these factors support them effectively during the usage of the e-learning

systems. The 10 students argued on the importance level of factors and the challenges that have been emerged during the usage of e-learning systems. Some of the challenges identified by the interviewees are readiness related to technology and self-directed learning, assessments, academic misconduct, academic integrity, learning effectiveness, web-based learning resources, technical support, the appropriate usage of all e-learning features, and eventually responsibility to learn.

Table 6  
Multiple Regressions: ( $\beta$ )

CSFs	E-learning Systems
Usefulness	0.796***
Ease of use	-0.229**
Technical support	0.228**
Self-efficacy	-0.126
Culture	-0.012
Awareness	0.006*
Security	-0.014***
Privacy	-0.099
Trust	-0.007
Motivation	-0.298***
Responsibility	0.298
Engagement	0.834***
Quality	0.141*
R	0.919
R <sup>2</sup>	0.845
Adjust R <sup>2</sup>	0.839
F	143.775***

Notes: Significant levels: \*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ;  
\* $p < 0.1$ .

## 5. Conclusion

The overall findings of this study indicate that the top 13 critical success factors are positively and significantly influence e-learning systems usage. The existence of the top 13 critical success factors is highly contributing towards delivering a successful usage of the e-learning systems. This practice, in turn, will streamline the e-learning systems adoption process throughout instant usage and will help many educators and learners to overcome several related challenges to achieve successful e-learning systems adoption. Some of the identified challenges in this research are readiness related to technology and self-directed learning, assessments, academic misconduct, academic integrity, learning effectiveness, web-based learning resources, technical support, the appropriate usage of all e-learning features, and eventually responsibility to learn.

The outcome of this research provides the academic policymakers a deep and better understanding of the educators' and learners' perceptions towards the top 13 critical success factors and the related challenges which effectively direct the adoption of the e-learning systems towards successful usage. Since many educational institutes are rapidly adopting e-learning systems and trying hard to reach a successful usage with minor barriers, it became very crucial to identify the critical success factors that assist HEI in this matter. Moreover, the policymakers must realize the importance of identifying major challenges and the critical success factors prior to the initiation of the system adoption, which will certainly lead them to the right decisions in using

Table 7  
Summary of hypotheses testing

No.	Statement of Hypotheses	Remarks
H <sub>1</sub>	There is a significant relationship between Usefulness and E-learning systems usage.	Positive
H <sub>2</sub>	There is a significant relationship between Ease of use and E-learning systems usage.	Positive
H <sub>3</sub>	There is a significant relationship between Technical support and E-learning systems usage.	Positive
H <sub>4</sub>	There is a significant relationship between Self-efficacy and E-learning systems usage.	Positive
H <sub>5</sub>	There is a significant relationship between Culture and E-learning systems usage.	Positive
H <sub>6</sub>	There is a significant relationship between Awareness and E-learning systems usage.	Positive
H <sub>7</sub>	There is a significant relationship between Security and E-learning systems usage.	Positive
H <sub>8</sub>	There is a significant relationship between Privacy and E-learning systems usage.	Positive
H <sub>9</sub>	There is a significant relationship between Trust and E-learning systems usage.	Positive
H <sub>10</sub>	There is a significant relationship between Motivation and E-learning systems usage.	Positive
H <sub>11</sub>	There is a significant relationship between Responsibility and E-learning systems usage.	Positive
H <sub>12</sub>	There is a significant relationship between Engagement and E-learning systems usage.	Positive
H <sub>13</sub>	There is a significant relationship between Quality and E-learning systems usage.	Positive

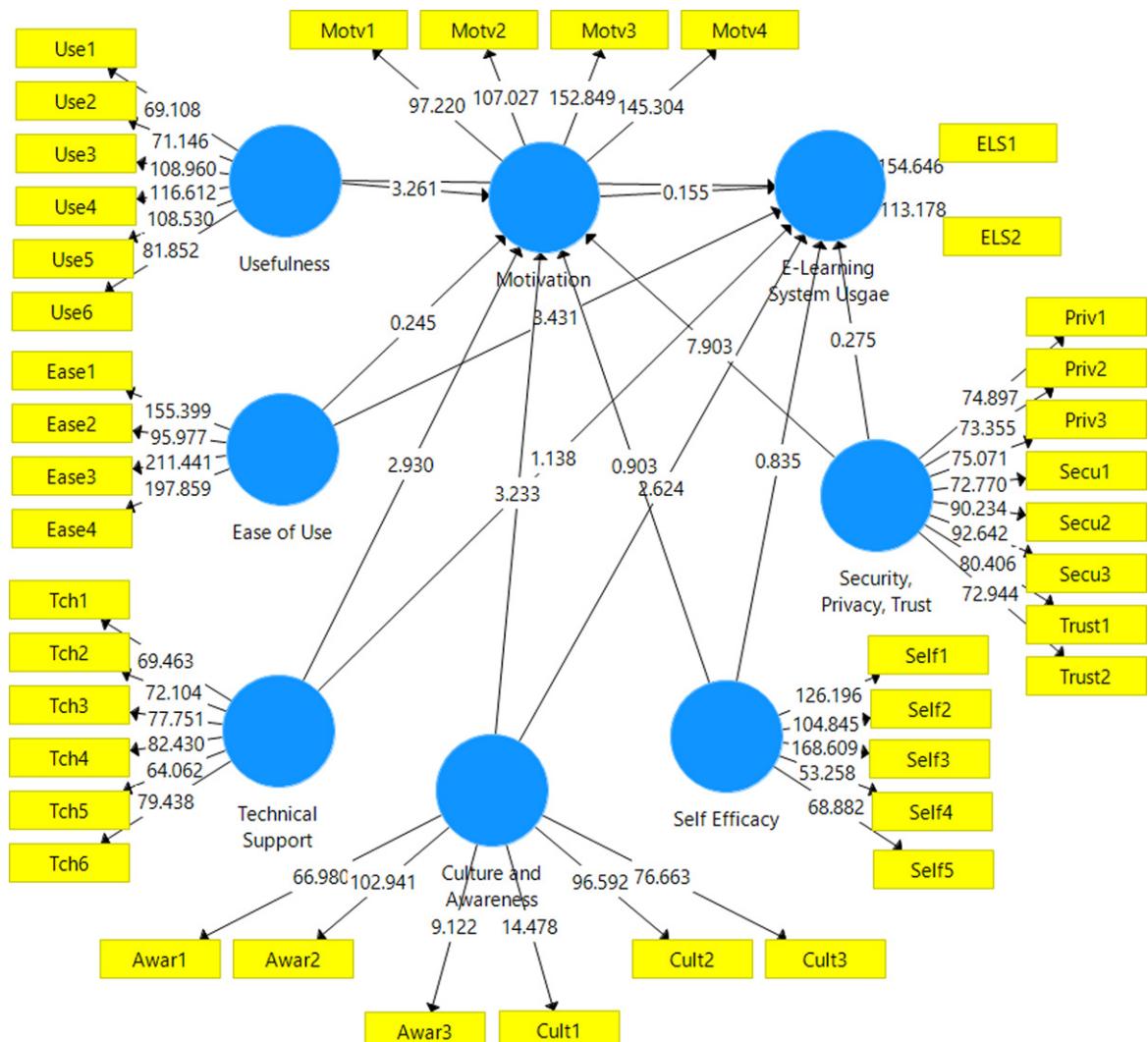


Fig. 3. Path Coefficients T Values.

such a novel solution, especially with the current pandemic.

To better understand the impact of critical success factors on e-learning systems usage, future studies must investigate other factors in other educational institutions in the region to grab more feedback from other universities. Currently, there are many universities that are not fully aware of the CSFs and the related challenges of the e-learning systems, yet some of them are not taking advantage of the existing success factors to end up with effective e-learning systems usage. This is mainly due to the lack of awareness of the most important factors that entirely help in avoiding the likelihood of e-learning systems failure. The continuous and deep understanding of

the success factors and the related challenges will certainly support educational institutions to provide streamlined learning processes during the adoption of the e-learning systems and end up with excellent educational experience supported with the latest technology.

#### Author contributions

CONCEPTION: Ahmad Shatat

METHODOLOGY: Ahmad Shatat and Abdallah Shatat

DATA COLLECTION: Abdallah Shatat

**INTERPRETATION OR ANALYSIS OF DATA:**  
Ahmad Shatat and Abdallah Shatat  
**PREPARATION OF THE MANUSCRIPT:** Ahmad Shatat and Abdallah Shatat  
**REVISION FOR IMPORTANT INTELLECTUAL CONTENT:** Ahmad Shatat and Abdallah Shatat  
**SUPERVISION:** Ahmad Shatat

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