



# Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic

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## Abstract

The provision and usage of online and e-learning system is becoming the main challenge for many universities during COVID-19 pandemic. E-learning system such as Blackboard has several fantastic features that would be valuable for use during this COVID-19 pandemic. However, the successful usage of e-learning system relies on understanding the adoption factors as well as the main challenges that face the current e-learning systems. There is lack of agreement about the critical challenges and factors that shape the successful usage of e-learning system during COVID-19 pandemic; hence, a clear gap has been identified in the knowledge on the critical challenges and factors of e-learning usage during this pandemic. Therefore, this study aims to explore the critical challenges that face the current e-learning systems and investigate the main factors that support the usage of e-learning system during COVID-19 pandemic. This study employed the interview method using thematic analysis through NVivo software. The interview was conducted with 30 students and 31 experts in e-learning systems at six universities from Jordan and Saudi Arabia. The findings of this study offer useful suggestions for policy-makers, designers, developers and researchers, which will enable them to get better acquainted with the key aspects of the e-learning system usage successfully during COVID-19 pandemic.

**Keywords** E-learning system · COVID-19 pandemic · Success factors · Challenges of E-learning system

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## 1 Introduction

As we see now in the world, the COVID-19 pandemic is forcing educational institutions such as universities to shift rapidly to distance and online learning. COVID-19 has forced the universities around the world to adopt online learning. We are now in a state of emergency and must react with different and available ways of learning such as e-learning systems and mobile learning applications. Online learning is not new to learners, nor is distance learning. However, COVID-19 is reviving the need to explore online teaching and learning opportunities.

According to UNESCO (2020) confirms that universities and schools closure have several adverse consequences on students such as interrupted learning which results in students and youth being deprived of opportunities for growth and development. Therefore, online digital learning systems can address this problem with easily access to these systems and offer fast internet connections.

In fact, e-learning tools are playing a crucial role during this pandemic. E-learning systems can assist learning providers to manage, plan, deliver and track the learning and teaching process. Furthermore, it aims to help instructors, schools and universities facilitate student learning during periods of universities and schools closure. In addition, most of these system are free which can help ensure continuous learning during this Coronavirus pandemic.

However, the provision and usage of online learning materials in e-learning system is becoming the main challenge for many universities during COVID-19 pandemic. E-learning system is an important source of information, due to its ubiquity (availability anywhere and anytime), low cost, ease of use and interactive character. E-learning system such as Blackboard has several fantastic features that would be valuable for use during this Coronavirus pandemic. Using this system in this time might well be more practical. For example, through e-learning system, students may be texting or engaged in some learning activity with teachers on a laptop or mobile device from their home. In addition, students can easily to get learning content into their mobile devices because they can be connected to mobile networks or to local wireless networks. Ülker and Yılmaz (2016) mentioned that one approach to e-learning is the use of learning management system (LMS). Thus, e-learning refers to offer, organize and manage e-learning activities within a system, such as student enrolment, exams, assignments, course descriptions, lesson plans, messages, syllabus, basic course materials, etc. (Haghshenas 2019). By converting from traditional learning, this will enable learner's access to e-learning systems like Blackboard 24 h per day, and presents several benefits such as increase effectiveness and efficiency of learning services through improved connectivity with teachers and better access to learning materials (Idris and Osman 2015).

Since the success of e-learning system depends on students' willingness and acceptance to use this system (Almaiah and Jalil 2014; Almaiah and Alismaiel 2019; Shawai and Almaiah 2018) a lack of e-learning system usage hampers the realisation of benefits (Almaiah et al. 2019a; Almaiah et al. 2019b; Almaiah and Al-Khasawneh 2020). This results in an unsuccessful system and is a waste of universities money (Naveed et al. 2017). Research on this topic is still at its infancy, where the views of the students are not fully studied (Tarhini et al. 2017; Almaiah and Alamri 2018). Studying e-learning adoption can lead universities to better understand their students' needs, and

eventually lead to a successful e-learning system (El-Masri and Tarhini 2017; Alksasbeh et al. 2019). To best of our knowledge, there has not been a thorough analysis of challenges and factors influencing the usage of e-learning system during COVID-19 pandemic; despite that, e-learning systems were introduced in many universities almost 3 years ago. Therefore, this research seeks to investigate the main challenges and factors that affect the usage of e-learning system during COVID-19 pandemic. Hence, we ask the following questions in that respect:

- (1) What are the main challenges that face the e-learning system usage during COVID-19 Pandemic?
- (2) What are the main factors that affect the successful usage of e-learning system during COVID-19 Pandemic?

The rest of this paper is organized as follows: in the first section, we discuss related studies of e-learning system adoption, e-learning system challenges. This will be followed by a presentation of the research methodology, data collection process and data analysis method. Then discussion of the findings and finally, limitations and conclusions.

## 2 Literature review

### 2.1 Related works of E-learning system usage

The success of any information system depends on the usage of the system by users (Almaiah 2018). Thus, in the context of e-learning system, student's acceptance of e-learning is considered as one of the main criteria for the success e-learning system. Several studies in the literature have addressed issues related to e-learning adoption in many countries over the world. For instance, in Malaysia, Al-Rahmi et al. (Almaiah and Man 2016) used the TAM with IDT model to investigate the critical factors that affect the use of e-learning system Malaysian students. The results revealed that relative advantages, observability, trialability, perceived compatibility, complexity, and perceived enjoyment are the factors that play a significant role in students' decision to use e-learning system in Malaysia. Salloum et al. (2019) used UAE as a case study for a quantitative investigation. The results indicated that four factors (innovativeness, quality, trust, and knowledge sharing) were observed to achieve better e-learning system acceptance among students. Al-Gahtani (2016) investigated the factors influencing student acceptance of e-learning based on TAM3. He found the most significant determinants of e-learning acceptance were playfulness, self-efficacy and anxiety, while using computers, perceptions of external control, subjective norms and perceived usefulness. However, in the context of Saudi Arabia, social influence, demonstrability and perceived enjoyment were not related to the acceptance of e-learning systems. Another study conducted by Almaiah and Almulhem (Almaiah et al. 2016a), they proposed new framework using Delphi method to determine the success factors of e-learning system implementation in Saudi Arabia. The results highlighted 11 critical factors grouped into four domains that cover website quality, technology options, top management support, and e-learning awareness by academic faculty and students.

Bellaaj et al. (2015) used the Unified Theory of Acceptance and Use of Technology (UTAUT) model to explore the factors affecting students' use of e-learning systems at the University of Tabuk, Saudi Arabia. They found that expectations regarding performance and effort had a strong influence on e-learning acceptance. In another study in Azerbaijan, Chang et al. (2017) found subjective norms, experience and enjoyment influenced acceptance of e-learning. Abdullah and Ward (2016) also investigated factors influencing e-learning acceptance using TAM. Their findings revealed that self-efficacy; subjective norms, enjoyment, anxiety and experience with using computers had a significant effect on students' acceptance of e-learning. Similarly, Alhabeeb and Rowley (2017) found that academic staff knowledge of learning technologies, student knowledge of computer systems and technical infrastructure, were significant factors in facilitating the successful acceptance of e-learning in Saudi Arabian universities.

Although numerous studies exist on e-learning adoption, the current study aims to add new contribution to the existing literature on investigation of the main challenges and factors influencing e-learning successful adoption in new context, which is Jordan, which may set an example for other developing countries.

## 2.2 Review studies on E-learning system challenges

E-learning usage and adoption among users is a challenging issue for many universities, both in developed and developing countries, but it is likely to be less of a concern in developed countries over the willingness of their students to accept and use the e-learning system, as significant progressive steps have already been taken, according to literatures, in this regard (Almaiah et al. 2016b). Eltahir (2019) indicated that the challenges of adopting e-learning system in developing countries, however, remain a reality due to the digital divide with the developing countries.

Our existing literature review identified several challenges related to adopting the e-learning system. After this review, we noted that these challenges could be classified into four categories namely (1) technological challenges, (2) individual challenges, (3) cultural challenges and (4) course challenges. We found also that these challenges are very different from one country to another country, due to different culture, context and readiness. For example, lack of ICT knowledge, poor network infrastructure and weakness of content development were the main challenges of e-learning system adoption in developing countries (Aung and Khaing 2015). Another study revealed that system characteristics, internet experience and computer self-efficacy were the main issues that impede the successful adoption of e-learning system in Pakistan (Kanwal and Rehman 2017). A similar study conducted in Kenya identified three main challenges of e-learning are inadequate ICT infrastructure, lack of technical skills and financial constraints (Tarus et al. 2015). A study by Kisanga and Ireson (Mulhanga and Lima 2017) identified that poor interface design; inadequate technical support and lack of IT skills are the primary barriers that hinder the successful implementation of existing e-learning projects. Mulhanga and Lima (Kenan et al. 2013) claimed that cultural, political, and economical constraints are the main reasons to fail the e-learning initiatives in Libya. In the same way, Kenan et al. (Chen and Tseng 2012) classified the challenges that affect the actual use of e-learning into four categories: management challenges, technological challenges, implementation challenges and cultural

challenges. Despite these efforts, none of these studies have investigated the actual challenges that face users during the use of e-learning system.

A study conducted by Al-Araibi et al. (2019), which puts the technological issues as the main criteria for the success of e-learning system, indicated that 45% of e-learning projects in developing countries are total failures, 40% are partial failures, while only 15% are successful. Therefore, based on these findings, along with other studies, many researchers in the field of IS/IT have conducted researches in order to look into the challenges to the successful implementation of e-learning system initiatives (Al-Araibi et al. 2019; Esterhuysen and Scholtz 2015; Islam et al. 2015). Table 1 summarizes the common issues that caused the low usage and adoption of e-learning system.

Table 1 presents a comparison between nine studies regarding the main challenges of the e-learning system usage and adoption through conducting empirical studies to identify the issues in developing countries that are affecting low adoption by users, according to literature reviews. Six studies identified that technological challenges such as lack of technological infrastructure, lack of security and privacy concerns are among the most significant reasons for the failures of e-learning adoption, while three studies identified lack of student's awareness as being responsible for the failure of e-learning adoption. Three studies mentioned that universities readiness is one of the most significant reasons for the failures of e-learning adoption. However, the problem of low usage and adoption still exists due to some factors that cause learners' reluctance to use the new technology in Jordan, similar to other developing countries (Al-Khasawneh and Obeidallah 2019) (Almaiah and Al Mulhem 2019). Therefore, empirical researches are important to identify the main challenges that faces the e-learning system usage during COVID-19 pandemic in order to help decision makers in universities to overcome the issue of low usage of e-learning system, which is the objective of this research.

### 3 Research methodology

The research methodology framework in this study consists of three main phases as presented in Fig. 1. In phase one, a review of literature on e-learning adoption factors and challenges has been conducted. In phase two, thematic analysis was used for identifying and classifying of e-learning adoption factors and challenges. The qualitative data obtained during the interview was analyzed using the thematic analysis technique using the NVivo software. For conducting the thematic analysis process for this study, five steps was identified according to Braun and Clarke (2006), namely: familiarization with data, generating initial codes, searching for themes, defining and naming themes, and producing the final report. In the third phase, collecting and determining the main challenges and factors of e-learning adoption. In the following sections, we will describe in details the data collection method, sample of the study and the data analysis technique used in this study.

#### 3.1 Data collection

In this research, a qualitative research is conducted, based on a semi-structured interview method to obtain and analyze data. The qualitative method was designed to

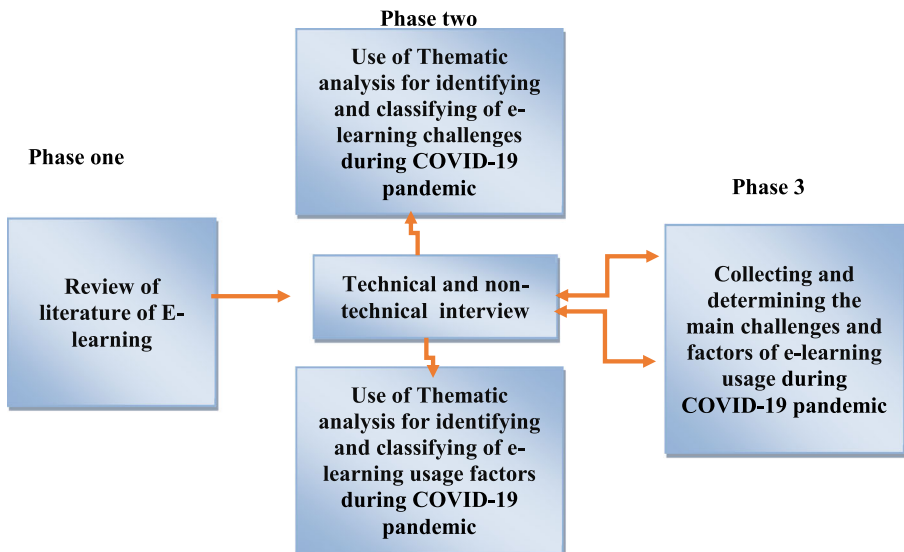
**Table 1** Previous studies about the main reasons of e-learning failures

Reasons of E-learning system failures	Description	Literature
Technological Challenges	Students facing technological difficulty in using e-learning system	Almaiah and Almulhem (2018) Almaiah and Alyoussef (2019), Al-Araibi et al. (2019), Gutiérrez-Santiuste and Gallego-Arruf (Ali et al. 2018a), Mtebe and Raisamo (2014),
Lack of technical support	Unavailability of technical staff and lack support of facilities to perform various activities and (installation, operation, maintenance, network administration and security) Slow speed of internet and high internet traffic during e-learning experience.	Eltahir (2019), Esterhuyse and Scholtz (2015), Islam et al. (2015), Al-Azawei et al. (2016), Nwabufo et al. (2013)
Lack of Awareness	Students lacking awareness of internet skills and reluctance of students in taking responsibility for their own e-learning	Bozkaya and Kumtepe (Bozkaya et al. 2012), Nagunwa and Lwoga (Lwoga and Nagunwa 2012), Alajmi et al., (Ali et al. 2018b), Nwabufo et al. (2013), Al-Araibi et al. (2019), Naveed et al. (2017), Kisanga and Ireson (2015), Al Gamdi and Samarji (2016).
Universities Readiness	Students possessing inconsistent e-learning readiness over time	Al-Araibi et al. (2019), Eltahir (2019), Naveed et al. (2017), Stoffregen et al. (2016), Al-Azawei et al. (2016), Kisanga and Ireson (2015), Al Gamdi and Samarji (2016)
Quality Course Content	Course content having less quality in terms of interactivity	Almaiah and Almulhem (2018), Mtebe and Raisamo (2014), Almaiah and Alyoussef (2019), Almaiah, Jalil and Man (Almaiah et al. 2016a)
Localization of content	Lack of Customization/Adaptability of course content according to students requirements	Voogt et al. (2013), Lester and Perini (2010), Kwofie and Henten (2011), Ozudogru and Hismanoglu (2016), Almaiah and Almulhem (2018), Mtebe and Raisamo (2014), Almaiah and Alyoussef (2019) Almaiah and Man (2016)
Course content	Lack of relevance, accuracy of course content and misalignment of course content with learners' need	Voogt et al. (2013), Lester and Perini (2010), Kwofie and Henten (2011), Ozudogru and Hismanoglu (2016), Almaiah and Almulhem (2018), Mtebe and Raisamo (2014), Almaiah and Alyoussef (2019) Almaiah and Man (2016)
IT skills of Faculty members	Weak IT skills of faculty members	Almaiah and Alyoussef (2019), Iqbal and Ahmad (2010), Radijeng (2010), Nawaz and Khan (2012)
Faculty members acceptance of e-learning systems	Teachers' lacking technology acceptance	Vershitskaya et al. (2020), Teo (2011), Almaiah and Almulhem (2018)

**Table 1** (continued)

Reasons of E-learning system failures	Description	Literature
Low Level of knowledge of faculty members	Instructors lacking grip on course content while delivering an e-learning session	Uppal (2017), Marzilli et al. (2015), Almaiah and Alyoussef (2019)
Faculty member effort	Lack of effort and support being put faculty members in use of e-learning	Pegrum et al. (2013), Teo and Wong (2013), Güllü et al. (2016), Marzilli et al. (2015), Almaiah and Alyoussef (2019)
lack of security and privacy concerns	Openness of e-learning systems challenging security of personal information of students/staff/faculty	Kwofie and Henten (2011), Ozudogru and Hismanoglu (2016), Almaiah and Almulhem (2018), Mtebe and Raisamo (2014), Almaiah and Alyoussef (2019) Almaiah and Man (2016)
Lack of technological infrastructure	Refers to the hardware, software, facilities, and network capabilities within the university	Almaiah and Almulhem (2018), Mtebe and Raisamo (2014), Almaiah and Alyoussef (2019), Almaiah et al. (2016a)

help the researchers to understand the e-learning system adoption from multiple sources as well as multiple perspectives, which is difficult to explain in quantitative terms (Myers and Avison 2002). Qualitative method is the best way to explore more thoroughly the participants' experiences, attitudes and belief, as it does not regard facts as objective, but as a subjective reality related to differences in each individual (Creswell 2014). Moreover, it is a helpful method to achieve the research objectives in a smooth way, as highlighted by (Creswell 2014). One of the advantages of the

**Fig. 1** Research methodology framework

qualitative method in this study is to explore information from participants in order to generate the said case study rather than just list numeric data.

Therefore, this approach allowed the researchers to connect with policymakers, IT experts and faculty members who are currently implementing and supporting the e-learning systems in Jordanian universities. Furthermore, the qualitative approach further allowed the researchers to deeper understanding about the main factors that affect the e-learning system adoption in Jordanian universities, along with the major challenges that the e-learning adoption faces. Thus, this could also yield enough information to answer the research questions.

### **3.2 Semi-structured interview and online interview**

This study applied a semi-structured interview method to collect the data. The semi-structured interview of this study consisted of more specific questions emerging from the main research questions and continue in the same pattern with the selected participants. During the semi-structured interview, the researchers did not follow a formalized list of questions, but instead, they had a list of general topics called an interview guide. Furthermore, the semi-structured interview was conducted in two-way communication by exchanging questions between both the interviewer and interviewees during the interview session. Thus, this method allowed the researchers for a more conversational interaction, permitting them for a greater amount of data to be gathered.

In this study, we conducted an online interview with 30 students who have non-technical backgrounds in order to make more balanced view for this study. The interview was conducted during online-lecture using Blackboard system. The interview focused on several questions emerging from the main research objectives of this study. The interview questions consisted of several aspect about the usage of e-learning system during COVID-19 Pandemic, the main challenges that faced them through using e-learning system during COVID-19 Pandemic, the main factors that affect the successful usage of e-learning system during COVID-19 Pandemic.

### **3.3 Context of the study**

This study was conducted in six public universities, namely University of Jordan (UJ), Hashemite University (HU), Al-Yarmouk University (AU), Jordan of Science and Technology University (JUST), Al-Balqa'a University (BU) and King Faisal University (KFU). These universities are currently implementing the e-learning system to deliver the online learning courses for their students. The interview questions was designed to collect the data from students and experts who are currently using the e-learning system in these universities. Therefore, these universities could help us to achieve the research objective.

### **3.4 Participants**

The interview method was conducted, with a total of 61 participants from both technical and non- technical backgrounds in order to make more balanced view for this study. The study sample included of 30 students, 25 faculty members, 4 IT experts



and developers at five universities and 2 policy-makers at the Ministry of Higher Education of Jordan. The faculty members were from different departments of Information Technology School such as Information Systems and Software Engineering, who are currently using the e-learning system at five universities, as shown in Table 2. Thus, the participants in this study could help us to answer all questions related to the research questions and objectives, in order to obtain more detailed and meaningful understanding of the research problem from the main source at a particular point of time as suggested by Patton (2014). The interviewees were the right persons, who could answer all questions related to the challenges and factors that affect the usage of e-learning system during COVID-19 Pandemic, and they are well familiar with all issues related to the current e-learning initiative.

According to Quick and Hall (2015), the sample size in qualitative research is usually a range (4–50) due to the large volume of data collected. Furthermore, they described the sample is to be selected based on appropriateness (participants) and adequacy (Data collected). Strauss and Corbin (1990) also suggested, 5 or 6 h interview would provide sufficient data to lead to saturation. Furthermore, participants should be well utilized to become the best representatives and have knowledge of the research topic. With regard to data, they should be adequate and provide a rich description of the phenomenon (Howell 2003). Based on that, 30 students and 31 e-learning experts participated in the interview, therefore, it can be said that the sample size in this study adequately satisfies the suggested requirements (Quick and Hall 2015; Howell 2003).

## 4 Data analysis and results

The qualitative data obtained during the interview was analyzed using the thematic analysis technique using the NVivo software. The main purpose of this method is to capture something important from the data collected in relation to the research question. It can be used to generate better insights and findings (Denscombe 2010). For conducting the thematic analysis process for this study, five steps was identified

**Table 2** Composition of the research sample

University	Students	Faculty members	IT experts	Polycymakers	Total
University of Jordan (UJ)	–	6	1	–	7
Hashemite University (HU)	–	4	–	–	4
Al-Yarmouk University (AU)	–	5	1	–	6
Jordan of Science and Technology University (JUST)	–	3	1	–	4
Al-Balqa'a University (BU)	–	7	1	–	8
Ministry of Higher Education	–	–	–	2	2
King Faisal University	30	–	–	–	30
Total	30	25	4	2	<b>61</b>
Technical Background	<b>31</b>				
Non- Technical Background	<b>30</b>				

according to Braun and Clarke (2006), namely: familiarization with data, generating initial codes, searching for themes, defining and naming themes, and producing the final report. The concept of theme represents something important was captured from the data in relation to the research question. In the thematic analysis process, the researcher categorized the data obtained from the interviewees into three elements subjectively, using the NVivo 10. The process of coding through NVivo started by using descriptive coding as described by Morse and Richards (Watts 2008), followed by phrases, words, and sentences from the transcript of data, which were labeled using the relevant words related to the factors and challenges of e-learning. In NVivo, codes are called ‘nodes, for references to code text’ as defined by Jackson and Bazeley (Almaiah 2018), and represent a collection of references regarding a specific theme, category, or areas of interest Jackson and Bazeley (Almaiah 2018). Several sub-themes will be then classified for each specific theme, depending on the research topic.

In the selective coding analysis, the researchers have arranged the interview data into global main classifications namely: (1) specific themes namely, factors affecting e-learning system and challenges facing the usage of e-learning system during COVID-19 Pandemic, and (2) sub-themes, which emerges as new themes and relationships under the specific themes, as shown in Fig. 2.

The interview was audio recorded with the permission from the participants, and their anonymity was maintained. The interview session was audio recorded by the researcher using a recorder application on a Samsung, S8+. After completing the interview, debriefing was performed in order to give opportunity to the practitioners to ask questions, make comments or add any information that was not discussed during the interview session. The material analysed, consists of transcriptions of the interview, and notes taken during the interview. The researcher checked the transcriptions against the mobile application-recorded material more than once, to ensure the exact words spoken by the interviewee, and thereafter making changes, if necessary. This stage was important prior to starting with coding, after reading the whole transcript line-by-line.

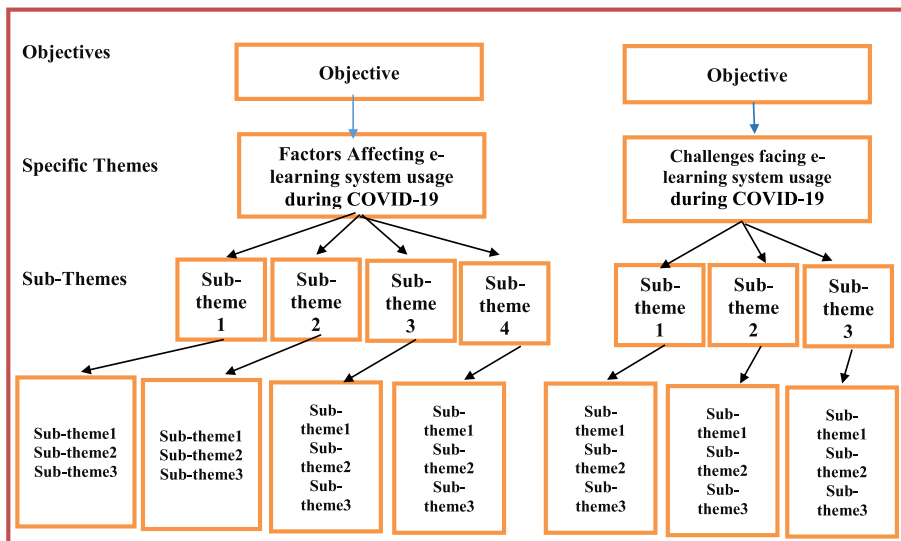


Fig. 2 Themes and sub-themes developed from thematic analysis

Following this stage, the resulting categories are coded according to the interview transcript received from the interviewee.

### 4.1 Findings of the critical challenges facing the usage of E-learning system during COVID-19 pandemic

This section includes the thematic findings that lead to the identification of the main challenges that face the e-learning system usage during COVID-19 Pandemic. Figure 3 shows the analysis findings for the e-learning system adoption framework.

#### (1) Change management issues

As noted by the interviewees, the interviewees agreed that change management is one of the challenging issues, since it touches government policies and legislation, students, and instructors. The interviewees outlined, *“We think it is challenging because the*



Fig. 3 The critical challenges and factors of E-learning system usage framework during COVID-19 pandemic

university will face a huge resistance to changing the existing situation, and that is why it needs to be properly managed, considering all changes that might happen.”

Opposition to change towards accepting e-learning system is an issue since there are students or instructors who prefer the traditional learning and teaching method. The interviewees stated, “*Many students and instructors are still reluctant to utilize the e-learning system and this explains the resistance among them, as many students get suspicious about the learning services processed through the system such as submitting assignments, conducting exams and etc. Besides, the issue does not only affect the students, but includes instructors who might believe the alteration to be a menace to their occupations when the system gets changed from traditional teaching to e-learning system.*”

The interviewees focused on change management from implementation aspects, and they said, “*Change management should be divided into two approaches, one purely for change management dealing with procedures and policies, and another one for the management of resistance to change, focusing on the cultural aspects to manage the resistance to change by students and instructors.*”

## (2) E-learning system technical issues

All interviewees agreed that the e-learning system technical factors is one the critical issues that should be addressed, as it could create an obstacle in adoption of the system by many students. The experts outlined: “*The current e-learning system is experiencing some potential hurdles regarding accessibility, availability, usability and the e-learning website service quality.*”

As stated by the interviewees: “*It is obvious that when students feel that the e-learning system is friendly and easy to use then he believes that the system is useful and would enhance their performance.*” The interviewees also added that the “e-learning system is designed to meet students demands.

The interviewees agreed that the e-learning system must be easier to use in order to ensure the student’s efficacy regarding his/her capacity to use it. They said, “*Due to different levels of education among students, there is an issue that some students find the e-learning system not easy to use, and for this reason the university is considering all solutions to make it easy to use, as this factor plays the key role to improve performance, and hence lead the students to feel its usefulness.*”

## (3) Financial support issues

All interviewees confirmed that financial support is one of the obstacles that faces the e-learning projects, because Jordanian universities have limited resources and have a large budget deficit. The interviewees pointed out that: “*In case of financial troubles such as the current state of budget deficit, many projects could be detained because the Jordanian government is the sole source of universities financial supports.*” But, expert 2 “*did not show any concern about the financial support since the government already reserved the budget for the current e-learning project in order to avoid any failure, especially to achieve the Vision 2025.*”

## 4.2 Findings of the critical factors affecting the usage of E-learning system during COVID-19 pandemic

This section includes the thematic findings that lead to the identification of the critical factors that affect the successful usage of e-learning system COVID-19 Pandemic. Based on the results, the respondents stated that the critical factors that needs to be addressed and should be taken in the future plans, which affect the usage of e-learning system are (1) technological factors, (2) e-learning system quality factors, (3) trust factors, (4) self-efficacy factors and (5) cultural aspects.

### (1) Technological factors

According to the respondents “technological factors is one of the necessary factors that ensure successful implementation of e-learning system”. One of the experts added, “*All technological factors should be taken into consideration during the implementation process. For example, if the universities have the necessary hardware and software for adopting e-learning system; but the universities lack the technical skills that are necessary to use those hardware and software, the result might be failure*”.

In addition, the experts recommended “*The physical equipment such as computers, servers and communication networks that must be available to apply e-learning*”. In addition, “*availability of the software applications and operating systems is very important*”. Experts also stated another important technological factor, which is *technical skills and support* through the knowledge, understanding and abilities that are used to accomplish tasks related to maintenance and upgrading of the infrastructure of computers, networks, communications, as well as providing support to users when they face technical problems.

### (2) E-learning system quality factors

The efficiency and quality of e-learning system was the main topic with the experts as a feasible method for gathering their opinions regarding the main factors that effect on the e-learning system adoption in Jordanian universities.

All respondents agreed that: “*The current e-learning systems are experiencing some potential hurdles regarding accessibility, availability and usability, especially for those who have less knowledge of the internet.*” Other experts shared the same perceptions of this factor and advised the universities to look into it seriously, as it could create an obstacle in its implementation and adoption by many students. Another expert stated: “*The success of the e-learning system should be measured based on student satisfaction and personalization.*”

The respondents also were asked to grasp their views about the current e-learning system and how it is developed as an easy to use system, especially for students who do not have great computer skills. The interviewees confirmed, “*The current system is not easy to use by individuals who do not have PC skills; this will lead to system failure*”.

Expert 3 added, “The current e-learning system is not flexible in terms of its design”.

The interviewees (Expert 1 and Expert 2) also mentioned that: “*There is significant correlation between ease of use and system adoption, as students could lose confidence in the system if they find it difficult to use*”.

The respondents were then asked about the usefulness of the system and whether the current system is efficient in term of its usefulness. The expert 1 started first and said that the usefulness is related to how an individual feels the system is easy to use. *“According to my experience with different IT/IS applications, Usefulness can’t be separated from the friendliness of the system. First, the user needs to feel the system is free from effort in order to feel motivated to use it. Then he /she will try to use it to look at it from its usefulness.”*

The same opinion was agreed upon by Expert 3, who added that the current system could be seen useful if students find it meets its purpose. *“Users will feel more confident in using the e-learning system if it performs the required learning activities and thus he/she will be motivated to use it in future. So it depends on the student’s expectation and satisfaction to assess the system from its usefulness aspect.”*

Experts 2 and 4 mentioned that if the e-learning system is set up to be compatible with students’ needs, then it could be considered useful, and hence adopted and used effectively.

The respondents were asked about how reliable the current e-learning system is in terms of its efficiency, performance and security. The experts) confirmed, *“A lot of work needs to be done to ensure that the current e-learning system is performing efficiently.”* Expert 1 and Expert 3 added: *“We can’t guarantee the efficient performance unless it meets and achieves the two main objectives: ease of use and improved online learning services to students.”*

Finally, the respondents agreed, *“if the e-learning system meets the students’ demands and they feel it is free of any risk then it can be depended and trusted.”*

Expert 2 stated that:

*“Reliability is linked with the system’s friendliness and usefulness from the user’s perspective, and here it is important to mention that the current system can be called reliable when it reaches the maturity level in terms of usefulness and being free of threats.”*

### (3) Culture factors

According to the respondents, culture is a vital factor to increase the rate of e-learning system adoption among students. They stated, *“Cultural aspects is one of the critical factors that needs to be addressed in order to ensure that all students will use the e-learning system largely”*.

ICT literacy is one of the key element that is deliberated by the Higher Education Authority as outlined by the experts:

*“One of the factors that should be implemented to increase the use of e-learning system is to increase ICT literacy and skills of e-learning users”*.

They also outlined in this regard: *“If the Higher Education Authority can’t alleviate the illiteracy level, then it would become a barrier to achieving the strategic goals with respect to implementing e-learning system.”*

Another factor that was extracted relating to the cultural aspects is the plan to transform Jordan to an ‘e-Society’. The experts described this point as a very significant

goal to achieve Jordan's Vision 2025. The experts outlined that *“e-Society should combine all educational institutions together in order to receive a one entity working through e-learning system”*.

Another important factor is to be connected with students through different social media, as it is the main media and application used in Jordan. The experts stated:

*“Social media is the gentlest way to reach students and encourage them to utilize the e-learning system, and also let them use e-learning system directly from the social media applications. Social media can help the universities to better react to students, and will increase students' engagement and improve the e-learning system eventually.”*

#### (4) Self-efficacy factors

As noted by the respondents, self-efficacy is one of the core elements in determining the adoption of e-learning system in educational institutions. The experts stated, *“In order to increase the adoption of e-learning system, it is important to ensure students in Jordanian universities have high self-efficacy in order meet the intended functions, otherwise it's hard to achieve the learning activities through e-learning system if students show low self-efficacy.”*

In addition, the respondents recommended that self-efficacy is one important factor that needs to be considered through “Jordan's Vision 2020”. He outlined *“All Jordanian universities seek to ensure that all students and instructors use the e-learning system and have full self-efficacy and skills to use the system with the end of 2020”*.

The respondents mentioned that: *“Training programs can play a significant role in ensuring high self-efficacy for both students and instructors, and for that reason universities should create some training programs for them to enhance their IT skills, and hence, become more likely to adopt e-learning system”*.

The respondents confirmed that the awareness is key element that motivates the students to use the e-learning system. This factor helps to enhance the self-efficacy for users. They outlined, *“The implementation of e-learning systems can't be carried out smoothly without having regular awareness sessions in order to let students feel confident and motivated in using the e-learning system.”*

#### (5) Trust factors

According to the respondents, *“Trust is a vital factor to increase the rate of e-learning system adoption in Jordanian universities”*. They said, *“Universities are always attempting to assure that the e-learning system is trustworthy”*.

The trust factor includes system protection, information privacy, and system reliability. They added *“In order to increase the adoption of e-learning system among students, it is important that universities are always updating the security systems to keep the system fully secure from any types of viruses, and to assure that all learning activities are legally run based on the applied policies and privacy laws.”*

In this research, the trust of the Internet is the key elements that can play a significant role in ensuring high trust for users. The experts indicated that: *“The adoption of e-*

*learning system relies on that software companies should have the necessary resources to implement electronic services effectively and are capable of securing such systems”*. In addition, they confirmed, *“lack of trust will definitely result into an increase in resistance to adopt e-learning system”*. In addition, one of the important trust factors that lead to increase the use of e-learning system among students is providing efficient, effective and transparent means of e-learning activities through the e-learning system project, and can surely be secure and free of threats.

## 5 Theoretical and practical implications

This research can be considered an added value to the existing literature, through identifying the main challenges that impede the successful usage of e-learning system during COVID-19 pandemic. This study provides some important practical insights into the usage and adoption of e-learning system in developing countries like Jordan and Saudi Arabia. For example, challenges facing the usage of e-learning system are not only limited to the infrastructure issues as mentioned in the previous studies (Almaiah and Almulhem 2018; Almaiah and Alyoussef 2019; Eltahir 2019; Chen and Tseng 2012) but also include other such as e-learning system technical issues, change management issues, course design issues, computer self-efficacy and financial support issues. Therefore, the findings of this study offer useful suggestions for policy-makers, designers, developers and researchers, which will enable them to get better acquainted with the key aspects of the e-learning system adoption successfully. First, the university administration and technical support need to offer the necessary technical resources needed to conduct a constant technical maintenance for e-learning system, because sufficient access to e-learning materials without any technical problem or delay will be significantly associated with increasing the adoption of e-learning system successfully. Second, the university administration needs to provide the necessary hardware, software and internet connection, because if the universities are continuously update the necessary technological resources, then instructors and students would be able to implement the e-learning effectively. Third, the e-learning system designers and developers need to develop the e-learning system to be user-friendly, ease of use and simple, because if students and instructors find the e-learning system is easy to use, then they would be able to implement the e-learning system effectively. Fourth, the policy makers in Jordanian universities need to adopt new policies and regulations to promote the adoption of e-learning system among students and instructors. They also need to make some changes in the educational polices in order to ensure flexible moving from traditional learning to e-learning. These changes can take place through top management support, training programs and instructors’ adherence to the university rules to use the e-learning system in the teaching process. Fifth, the results can guide the university policymakers to focus on increasing the awareness and knowledge of instructors through conducting training programs on how to use the e-learning system, because the instructors have an important role in motivating the students to use the e-learning system, which in turn affects the teaching performance and students’ efficiency. Sixth, the universities need to focus on instilling the culture of e-learning systems among students through training courses about the usefulness of e-learning systems and develop their IT skills. Because if students have sufficient computer skills and positive



attitude towards interact with the e-learning system, this would promote the adoption of e-learning system successfully. Overall, the results of this study offer new insights and suggestions for decision makers to ensure the usage and adoption of e-learning systems successfully during COVID-19 pandemic.

## 6 Conclusions

This paper contributes to critical challenges and factors that influence the e-learning system usage during COVID-19 pandemic. Such process, which covers all factors of e-learning system that have not been previously examined; therefore the findings represent a novel contribution for universities policy makers to review and utilize it for ensuring the successful usage of e-learning system. The findings of this research are based on empirical evidence, which identifies the factors that support the usage adoption of e-learning system, and endorses other researchers' understanding and analysis of the challenges facing the current e-learning system. Furthermore, the combination of factors in the developed framework in this study as shown in Fig. 3, is unique and mostly appropriate for the universities in developing countries. The universities policy makers, designers and developers in these universities can benefit from the findings in this study, which provide the real picture about the current e-learning system, and could be taken as a guideline to improve the usage of e-learning systems among students.

In order to answer the research questions, this study employed the interview approach using thematic analysis through NVivo software. The interview was conducted with students, faculty members, an official in the Jordan Higher Education Authority, along with four specialists in the development of e-learning system. The research findings were structured around the two organizing themes, namely, factors affecting e-learning system, and challenges that the e-learning system faces during COVID-19 pandemic.

Based on the results, the respondents stated that the critical factors that affect the usage of e-learning system and should universities take them into the future plans were: (1) technological factors, (2) e-learning system quality factors, (3) cultural aspects, (4) self-efficacy factors and (5) trust factors. In addition, the results indicated that there are three main challenges that impede the usage of e-learning system, namely, (1) change management issues, (2) e-learning system technical issues and (3) financial support issues.

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