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Challenges facing students to adopting the blackboard system: The case study of the University of Ha'il in Saudi Arabia

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ABSTRACT

This study seeks to identify the challenges facing students through the adoption of a blackboard system at the University of Ha'il in the KSA. Though the blackboard system has an effective role in the educational context, the adoption of the learning system in educational institutes is still in its infancy. However, students face various types of challenges that could affect their adoption and usage of the blackboard system. The previous researches on blackboard systems produced general rules, and studied a lot of common factors, did not consider the specific human factors. This study uses a quantitative research method. An online survey questionnaire was employed for data collection. For data analysis, SPSS was used for descriptive analysis; Structural equation modeling using AMOS software was applied. The results confirmed that the user's LMS experience leaves a positive effect on the perception of the usefulness of the Blackboard system, but not computer anxiety. In addition, user's LMS experience has a moderating effect on the relationship between self-efficacy and their perception of the usefulness of the Blackboard system. This moderating effect reflects that the more student's LMS experience is the more affected their computer self-efficacy to perceive the Blackboard system more useful. This study produces theoretical and practical implications, and recommendations for the University of Ha'il should move forward with a learning platform.

1. Introduction

Many opportunities and inventions have arisen within the university learning context because of the recent developments in Information and Communication Technologies (ICTs). The efficient and effective use of ICTs offers new-fangled learning opportunities for learners (Öztürk, 2019). One of such technologies is Electronic-Learning (E-learning), which is a Web-based learning platform containing practical frameworks offered for supporting both lecturers and learners. Knowledge can be shared through E-learning, using numerous tools and systems such as discussion groups, Internet, Intranet, email, chat, blogs, wikis, etc. E-learning facilitates the delivery process of learning and teaching. E-learning offers different services which can be adjusted in conformity with the experience, requirements, knowledge, and competency of the students (AlKurdi et al., 2020). However, the value of E-learning would not be exploited unless learners use the system. Therefore, research should focus on the learners' perception of e-learning (Muniasamy et al., 2014).

In educational contexts, many online activities can be achieved using Learning Management Systems (LMSs). Blackboard is one of the main widespread LMSs adopted by universities across the globe (AlMeajel and Sharadgah, 2018). However, students are facing various types of challenges that could influence their intention to use and adopt blackboard. For example, Contrado (2016) reported that the infrastructure reliability, lack of students' awareness and readiness, lack of support, and ease of access to the technology are the main challenges inhibiting the adoption of the blackboard in universities. Blackboard systems are linked to technology; thus, it is essential for deliverers to understand the users' attitudes toward such systems. This can provide a good understanding of the way blackboard approaches can be developed and offered. Blackboards need to be made more

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accessible and manageable for learners to handle such challenges.

Universities seeking higher motivational and competitive environments that convoy technology evolution; whilst, many challenges could inhibit the blackboard adoption. Merely offering a blackboard learning system does not guarantee that it would be accepted and used by students, nor not promise its learning success. Though the energetic role of the blackboard in the educational context has been confirmed, its adoption is still in its infancy (Shin and Kang, 2015; Han and Shin, 2016). That is, the blackboard system was adopted within many universities, but the successful adoption of such a system can be determined only by the university student's adoption. The blackboard reaches the success level of adoption only if students consider it as a slice of their routine learning process.

There are two levels of technology adoption that might be examined, i.e. at both the individual and organizational levels. This study concentrated on the individual level (AlKurdi et al., 2020). The importance of individual factors in e-learning was confirmed by recent researches. For example, Salloum et al. (2019) developed a comprehensive E-Learning acceptance model on a literature review comprising 120 significant published studies for the last 12 years. Their model classified factors into two groups: system characteristics, and individual factors (i.e., computer self-efficacy, subjective/social norm, perceived enjoyment). AlMeajel and Sharadgah, (2018) called for discovering what limits the use of the blackboard system; also Shin and Kang (2015) reported the need for further studies to determine challenges facing students' acceptance of blackboard. A recent study by AlMeajel and Sharadgah (2018) conducted a study exploring challenges to using the blackboard system at King Saud University in Saudi Arabia. They ranked the student challenges category the third among other types of challenges. Also, they classified students' lack of skills on the use of blackboard as a top challenge. This was confirmed by Margaryan et al. (2011). Therefore, the research question required to be answered is, what are the individual factor challenges facing students to adopting the blackboard system from different perspectives?

1.1. A review of blackboard adoption in universities in Saudi Arabia

Though the technology infrastructure is advanced, E-Learning systems are still in the early stages of adoption in developing countries (Jawad and Hassan, 2015). Mtebe (2015) asserted that the LMS has mostly failed adoption in developing countries because of inefficient and limited utilization and engagement among students, but it has successfully been adopted in developed countries (Abdel-Jaber, 2017). The literature reported reasons from different perspectives. For example, some studies (Kaliisa and Picard, 2017; Asiimwe and Gronlund, 2015; Binyamin et al., 2019) have stated that the technological infrastructure challenges are the critical issues on the LMS adoption, although most of them had positive attitudes towards LMS as reported by Asiimwe and Gronlund (2015). Similar findings were reported by Kaliisa and Picard (2017), who reviewed E-Learning literature in universities and concluded that the core limitations were associated with technological infrastructure issues, such as lack of internet accessibility. In Saudi Arabia, (Binyamin et al., 2019) reported that content quality, system navigation, ease of access, system interactivity, learning support, instructional assessment, and system learnability were significant to affect the use of LMS in Saudi higher education.

LMS has been commonly adopted in higher educational contexts worldwide, including Saudi Arabia. In Saudi Arabia, 87% of universities have adopted LMS where blackboard is the leading system. However, the users' engagement of LMS in Saudi Arabia is limited. Previous studies (Alharbi and Drew, 2014) have reported that students in Saudi universities use E-learning ineffectively. In addition, most LMS research in Saudi Arabia investigated technical usability, functions of LMS, and users' attitude toward the system (Binyamin et al., 2018).

Alenezi and Karim (2010) have surveyed 402 governmental university students through the extended Technology Acceptance Model (TAM). They discovered that the effect of enjoyment, computer anxiety, and computer self-efficacy were significant predictors of E-learning, while the Internet experience was not. An early study conducted by Alharbi and Drew (2014) stressed that researchers have disregarded using TAM to examine LMS in the educational context of Saudi Arabia. AlMeajel and Sharadgah (2018) conducted a study exploring challenges to using the blackboard system at King Saud University in Saudi Arabia, the students' challenges category was among those challenges. Also, Muniasamy et al. (2014) used the TAM by evaluating the relationships among perceived ease of use, perceived usefulness, attitude towards using, and behavioral intention to use the E-learning in King Khalid University in Saudi Arabia. Binyamin et al. (2018) determined the use of blackboard among university students in King Abdulaziz University in Saudi Arabia by extending the TAM model. They reported that students' computer self-efficacy can positively affect their perceived ease of use, but not perceived usefulness. In the same way, Binyamin et al. (2017) has extended TAM to discover the determining factors affecting students' use of LMS in the King Abdulaziz University in Saudi Arabia. They found that students' prior experience of LMS, satisfaction, social influence, and computer self-efficacy leave a positive influence on the use of LMS; they added that the TAM is valid to understand the students' use of LMS in Saudi Arabia. Yet, Binyamin et al. (2018) affirmed that further studies should employ TAM to evaluate Saudi students' adoption of LMS.

Other studies have investigated the factors affecting faculty member's intent to use e-learning systems using TAM, some of such is the study by AlMeajel and Sharadgah (2018) about the blackboard system at King Saud University, also Ahmed (2016) in Najran University in Saudi Arabia; and Alsuwailem (2018) about E-Learning in the King Faisal University in Saudi Arabia, and the study conducted by Alharbi and Drew (2014) about LMS at Shaqra University in Saudi Arabia. They are all confirmed the significant effect and correlation of the TAM core factors (e.g., perceived ease of use, perceived usefulness, and attitude) alongside the external factors added (e.g., prior experience), where several challenges were facing academic staff reported as well. If this the case for academic staff, it is expected that students are facing more challenges and this emerging the need to determine their perceptions indeed.

Other studies such as Alshammari et al. (2016) claimed that the predictive factors are self-factors, such as self-efficacy and enjoyment. These factors were commonly measured in different contexts, and their effects were verified. Similarly, Han and Shin (2016) found that psychological determinants (i.e., self-efficacy, innovativeness, perceived usefulness, and perceived ease of LMS use) shape students' perception are significant to affect their LMS acceptance. No doubt, different countries, settings, and universities likely face different challenges (Mtebe, 2015). The serious challenge of blackboard system implementation is determined by addressing students' perceptions (Alkhaldi and Abualkishik, 2019). As LMS can grow students' performance in their courses, hence, LMS acceptance and usage are vital (Mtebe, 2015). Unfortunately, according to the recent study by Alkhaldi and Abualkishik (2019) about the University of Ha'il in Saudi Arabia, the limited number of students actively accept and use the blackboard system. Therefore, the success of blackboard system adoption must be examined from the students' perspective in Saudi Arabia, as asserted by Al-Hujran et al. (2014). To this end, this study aims to answer the following two research questions. What are the challenges that affect students' intention to adopt the blackboard system at the University of Ha'il in Saudi Arabia? How do users perceive such challenges? To fill this gap, this study examined the potential challenges that might affect the students' intention to adopt the blackboard system at the University of Ha'il in Saudi Arabia.

2. Literature review

A recent study by Alkurdi et al. (2020), argued as to why students prefer an e-learning system could include their perceptions associated with their skills, as well as their capacity to be engaged in independent learning.

Abdullah et al. (2016) showed that the best predictor of student's perceived ease of use of e-Learning is experienced, followed by enjoyment, self-efficacy through TAM. Hanif et al. (2018) extended the TAM to examine students' use of e-learning systems by digital learners (those who have higher levels of computer literacy and experience). These emerging the importance of determining the computer literacy and experience in e-learning. AlKurdi et al. (2020) studied E-Learning in the United Arab of Emirates (UAE) using TAM. They reported that E-learning computer self-efficacy, computer anxiety, social influence, enjoyment, system interactivity, technical support, perceived usefulness, perceived ease of use, attitude, and behavioral intention to use E-Learning are predictive to change users' decision to implement e-learning system. AlKurdi et al. (2020) added that TAM is a suitable theory to understand the acceptance of E-Learning from a user's perspective.

Alokluk (2018) discussed the usage of the blackboard system among students. The results showed that the more students work together with their peers via the blackboard system tend to use it frequently than those who didn't. Other studies such as Badwelan et al. (2016), reported that performance expectancy, effort expectancy, lecturers' influence, personal innovativeness, and self-management of learning were substantial variables that can influence behavioral intention to use the MLS. Salloum et al. (2019) developed a comprehensive e-learning acceptance model through extending the TAM after conducting the e-learning acceptance on literature review comprising of 120 significant published studies for the last 12 years. Their model classified factors into two groups: system characteristics, and individual factors. As the current study focuses on users (i.e., students), the individual factors are the interesting factors, these are computer self-efficacy, subjective/social norm, perceived enjoyment, and computer playfulness were the most common external factors of TAM associated with an individual. Afterward, the model was tested in five different universities in the UAE. The results showed that computer self-efficacy and computer playfulness have a significant impact on perceived ease of use of E-Learning system, and perceived enjoyment and accessibility were found to have a positive influence on perceived ease of use and perceived usefulness of E-Learning system.

Depends on the above, several studies conducted empirical examination to discover users' challenges of acceptance of e-learning systems from different perspectives and with no focused view. Some studies determined factors that influence students, others, academics. Most studies have studied E-learning acceptance in general, or from Mobile-Learning (M-learning) (i.e., mobile services), limited research has focused on the blackboard (i.e., LMS). Some studies have a cover boundless area of research, which covers various natural factors or domains, these are technical use and infrastructure, and social influencing (e.g., subjective norms, social influence, lecturers' influence), economic influencing, and system characteristics. As Salloum et al. (2019) comprehensive E-Learning classified factors into two groups: System characteristics, and individual

factors. The current study argues that examining the individual, (i.e., knowledge about abilities, human limitations, and other human characteristics) from students' perspective need to be measured to provide a better understanding of the LMS acceptance, as their acceptance is a serious challenge and attaining the success of blackboard system implementation (Alkhaldi and Abualkishik, 2019).

3. Conceptual model and hypotheses

There are many models that have been extended or used to examine the users' acceptance of technologies. TAM is one of the most common models that has been used to explain the acceptance of various technologies and was empirically tested in various E-learning studies (AlKurdi et al., 2020; Ramírez Anormaliza et al., 2016; Yoon, 2016; Mohammadi, 2015), and specifically in the context of Saudi Arabia (Alenezi and Karim, 2010; Muniasamy et al., 2014; Binyamin et al., 2018). AlKurdi et al. (2020) concluded that adding users' satisfaction factor to their E-learning model to determine the users' adoption of E-Learning; TAM would be understood more sufficiently in higher education, and the role played by the faculty members in the users' adoption of E-Learning system should be determined by future studies. TAM clarifies the user's acceptance of the technologies by assessing the relationship between technologies and users. TAM is one of the acceptance models that succeed in combining factors from psychological and technical constructs aspects; however, the majority of other acceptance models have failed in this (Binyamin et al., 2017).

A systematic literature review on TAM in an educational context was conducted by Granić and Marangunić (2019) have discovered trends and various gaps in existing knowledge. First, TAM application in the educational context lack in addressing the diversity of learning domains, learning technologies, and types of users. Second, provide evidence on the predictive validity of the models in an educational context based on TAM. Third, TAM is a leading credible model for facilitating the examination of various technological distributions in an educational context. Ultimately, the core determinants of TAM (i.e., perceived ease of use and perceived usefulness) have been proven to be antecedent variables that can affect acceptance of learning technologies.

The applicability of TAM is resulting from three reasons. First, TAM focuses on users' beliefs, as it takes users' perspective as a base in considering the success of technology acceptance. Second, TAM has the flexibility to examine various types of external factors to determine the use of different technologies. Finally, TAM has been used widely to examine the acceptance of many technologies (Yoon, 2016). Alharbi and Drew (2014) stated that researchers have ignored using TAM to estimate the acceptance of LMS in the context of Saudi Arabia. Binyamin et al. (2017) added that TAM is valid to understand the students' use of LMS in Saudi Arabia. Yet, Binyamin et al. (2018) called for more theoretical research, which is based on TAM to evaluate Saudi students' adoption of LMS.

A conceptual model of BLMS acceptance on the basis of TAM is conceptualized and measured in the current study, based on previous literature that extended TAM in the educational context.

3.1. Computer self-efficacy

Self-efficacy is "the degree to which an individual believes that he or she has the ability to perform a specific task/job using the computer." The literature of e-learning has reported a significant effect of computer self-efficacy on user's perception of usefulness (Haryanto and Kultsum, 2016; Chang et al., 2017; Fathema et al., 2015; Tran, 2016; Kanwal and Rehman, 2017), and positive influence on the perception of the usefulness of LMS (Binyamin et al., 2017).

Differently, Salloum et al. (2019) found no significant effect. Previous studies on e-learning also generated a significant effect of users' computer self-efficacy on their perception of ease of e-learning use (Fathema et al., 2015; Alia, 2017; Boateng et al., 2016; Mahmodi, 2017; Abdullah et al., 2016), whilst, Hanif et al. (2018) reported that its non-significance. In Saudi Arabia, Binyamin et al. (2017; 2018) found that the King Abdulaziz University students' computer self-efficacy leaves a positive influence on the ease of use of LMS. Hence, the current study is synthesized the following hypotheses:

H1a: Computer self-efficacy has a positive effect on the users' perception of the usefulness of the Blackboard system.
H1b: Computer self-efficacy has a positive effect on the users' perception of ease of Blackboard system use.

3.2. Computer anxiety

Computer anxiety is an individual's fear when she/he is faced with the possibility of using computers (AlKurdi et al., 2020). The e-learning literature has reported that users' computer anxiety has a significant effect on their perception of usefulness (Chang et al., 2017; Kanwal and Rehman, 2017; Al-Gahtani, 2016). In the same direction, users' computer anxiety has a significant effect on the users' perception of ease of use (Chang et al., 2017; Kanwal and Rehman, 2017; Al-Gahtani, 2016; Alenezi and Karim, 2010). Therefore, the following hypotheses are proposed:

H2a: Computer anxiety has a positive effect on the users' perception of the usefulness of the Blackboard system.
H2b: Computer anxiety has a positive effect on the users' perception of ease of Blackboard system use.

3.3. Self-management

Self-management of learning was defined by Badwelan et al. (2016) as "the extent to which an individual feels sufficiently self-disciplined to engage in autonomous learning". Self-management of learning is the level to involve in self-governed learning. The related works give a jumbled view of the role of "self-management" in Mobile learning adoption, with positive outcomes obtained by Liu et al. (2008) and negative results by Lowenthal (2010). For this reason, it's very essential to explain the role of the self-management factor in E-learning adoption. In Saudi Arabia, Alkhaldi and Abualkishik (2019), and Badwelan et al. (2016) users' ability to self-management learning has a significant impact on the desire to adopt the m-learning system. Masrek and Samadi (2017) mentioned that much researches were reported a positive result of self-management of learning on the intention to adopt m-learning. Upon that, researchers hypothesize that:

H3a: Self-management has a positive effect on the users' perception of the usefulness of the Blackboard system.
H3b: Self-management has a positive effect on the users' perception of ease of Blackboard system use.

3.4. Personal innovativeness

Personal innovativeness is an individual's willingness to try out any new information technology (Badwelan et al., 2016). Turan et al. (2015) observed a gap in the integration of ICTs acceptance and personal issues, such as personal innovativeness. They proposed a model that extends earlier research about the relationship between ICTs acceptance and personal innovativeness. Turan et al. (2015) assumed that highly innovative people accept new ICTs easily; also highly innovative people might turn in considerable useful as using the ICTs. Han and Shin (2016) found a significant positive impact of students' innovativeness on students' adoption of MLMSs in Korea. Similar findings were reported by Badwelan et al. (2016), direct effect on students' behavioral intention to use M-learning in Saudi Arabia. However, Turan et al. (2015) added that the results of innovativeness are depended on systems use and whether it is easy to use or not. Upon that, researchers hypothesize that:

H4a: Personal innovativeness has a positive effect on the users' perception of the usefulness of the Blackboard system.
H4b: Personal innovativeness has a positive effect on the users' perception of ease of Blackboard system use.

3.5. System interactivity

System interactivity refers to "the interactions between faculty and students, and the collaboration in learning that results from these interactions" (Abbad et al., 2009). In previous E-Learning research, the significant influence of system interactivity on perceived usefulness was confirmed (Abbad et al., 2009; Moreno et al., 2017) and particularly in blackboard (Lin et al., 2014). Also, previous E-Learning studies have proved that system interactivity has a significant effect on users' perception of ease of E-Learning use (Abbad et al., 2009; Moreno et al., 2017), and particularly in blackboard (Lin et al., 2014). Thus, this study hypothesized the following:

H5a: System interactivity has a positive effect on the users' perception of the usefulness of the Blackboard system.
H5b: System interactivity has a positive effect on the users' perception of ease of Blackboard system use.

3.6. Enjoyment

Enjoyment is "the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Alharbi and Drew, 2014). Sarrab et al. (2017) confirmed the significance of users' enjoyment in various MLMs. Prior studies (Chang et al., 2017; Abdullah et al., 2016) have reported that enjoyment has a significant effect on the perceived usefulness of e-learning practically in Saudi Arabia (Al-Gahtani, 2016). The same findings were reported by several studies (Chang et al., 2017; Kanwal and Rehman, 2017; Elkaseh et al., 2015; Abdullah et al., 2016).

H6a: Enjoyment has a positive effect on the users' perception of the usefulness of the Blackboard system.
H6b: Enjoyment has a positive effect on the users' perception of ease of Blackboard system use.

3.7. Lack of technical support

Technical support refers to people helping the users of the computer, using online support and hotlines, machine-readable support knowledge bases, automated telephone voice systems, and other assistance facilities (AlKurdi et al., 2020). An early study conducted by Louw et al. (2009) to examine practices of distribution of tasks and ICTs resources among students from South African universities. They concluded that the students, in most cases, are not resistant to the adoption of ICTs, but feel constrained by practical issues such as the lack of support. According to Boshielo (2014), blackboard systems present barriers that diminish access to resources like lack of support for students who are residing outside the campus, and lack of online support and training for blackboard-learn systems for students.

Several e-learning studies produced findings of the significant impact of the technical support on users' perception of usefulness (Abbad et al., 2009;

Alia, 2017; Sánchez et al., 2013). In the same way, some studies found that e-learning studies found that technical support is significant to increase users' perception of ease of use (Alia, 2017; Sánchez et al., 2013). Therefore, the following hypothesis is formulated:

H7a: Lack of technical support has a positive effect on the users' perception of the usefulness of the Blackboard system.
H7b: Lack of technical support has a positive effect on the users' perception of ease of Blackboard system use.

3.8. Users' LMS experience

Abdullah et al. (2016) showed that the salient predictor of student's perceived ease of use of e-learning is their experience of use. In Saudi Arabia, Binyamin et al. (2017) found that the King Abdulaziz University students' prior experience of LMS leaves a positive influence on the use of LMS. Past online learning experience shapes the perceived usefulness of online learning programs which motivates intentions for using online learning resources (Asiimwe and Gronlund, 2015).

Alharbi and Drew (2014) reported that there is no support of the hypotheses stating that LMS usage experience negatively influences the non-user group's perceived ease of use, usefulness, and user's intention to use LMS. They reported that inexperienced users indicated a higher degree of positivity towards LMS adoption. Hanif et al. (2018) examined students' use of e-learning by digital learners (those who have higher levels of computer literacy and experience). They found that self-efficacy does not influence the perceived ease of e-learning system use. This finding is contrary to the findings reported by Chang et al. (2014) and Al-Gahtani (2016). Hanif et al. (2018) clarified these findings' inconsistency by the fact that students in these studies have high system experience and computer efficacy.

H8a: Users' LMS experience has a positive moderating effect on the relationship between users' self-efficacy and their perception of the usefulness of the blackboard system.
H8b: Users' LMS experience has a positive moderating effect on the relationship between users' self-efficacy and their perception of ease of blackboard system use.

3.9. TAMs' factors

From the TAM standpoint, the adoption of technology is decided mainly to the extent to which users' perceptions of usefulness, as well as, perceptions ease of use. These factors were synthesized to determine users' behavioral intention to use a technology, which then can decide their actual technology use (Davis, 1989). Several e-learning studies have reported the significant effect of perceived ease of use and perceived usefulness on the users' behavioral intention to use E-learning, either directly or indirectly (Haryanto and Kultsum, 2016; Kanwal and Rehman, 2017; Boateng et al., 2016; Mahmodi, 2017; Alharbi and Drew, 2014). A significant positive effect of users' perceived usefulness on their intention to use the E-learning system was also reported by Haryanto and Kultsum (2016) and Boateng et al. (2016), no effect reported by Hanif et al. (2018). It has been also shown by many studies (Haryanto and Kultsum, 2016; Boateng et al., 2016; Mahmodi, 2017; Alharbi and Drew, 2014) that attitude has a direct effect on behavioral intention. Therefore, to determine the way the students' attitude impacts their use of e-learning system, some studies in e-learning reported that behavioral intention to use can affect the actual system use of e-learning (Fathema et al., 2015; Abbad et al., 2009; Mahmodi, 2017; Al-Gahtani, 2016). As a result, this study has the assumption of the hypotheses specified below:

H9: Perceived ease of use has a positive effect on the Perceived Usefulness of the Blackboard system.
H10a: Perceived ease of use has a positive effect on attitude towards the use of the Blackboard system.
H10b: Perceived usefulness has a positive effect on the attitude towards the use of the Blackboard system.
H11a: Perceived ease of use has a positive effect on the behavioral intention to use the Blackboard system.
H11b: Perceived usefulness has a positive effect on the behavioral intention to use the Blackboard system.
H12: Attitude towards use has a positive effect on the behavioral intention to use the Blackboard system.
H13: Behavioral intention to use has a positive effect on the actual use of the Blackboard system.

The proposed research model (Fig. 1) shown below is formulated from the hypotheses specified above, keeping in view the extended TAM model for Blackboard system acceptance by students.

4. Methodology

A quantitative method using a survey questionnaire technique with closed questions was used for data collection. The questionnaire was deemed necessary to facilitate the respondents' understanding in answering the questionnaire questions (Sekaran and Bougie, 2016), to test the hypotheses formulated in the research model of the study. The survey questionnaire was employed to collect data from students at the University of Ha'il in Saudi Arabia, who are accessible to the blackboard system. This study conducted a cross-sectional survey for data collection, as user perceptions need a long period to change.

4.1. Measurement

The questionnaire consists of questions with two types of response options: Multiple choice and a 5-point Likert-type scale. It begins with multiple choice questions about demographics, followed by questions formulated to test the hypotheses. The questions used to assess variables were adapted from previous studies. Some modifications were made to adapt these questions for use in the current study, as the questions were initially formulated in English. As this study was conducted in Saudi Arabia, it was necessary to translate the questionnaire into Arabic (see Appendix A, Table A1). Prior to the survey, a pilot study was conducted to assure the reliability and validity of the questionnaire. An expert panel evaluated the instrument's validity. The reliability of measures is acceptable when Cronbach's alpha value is greater than 0.7 for the entire instrument (Sekaran and Bougie, 2016). As such, the survey instrument demonstrated enough reliability and validity to be distributed to participants. The questionnaire is shown in Appendix A, Table A1.

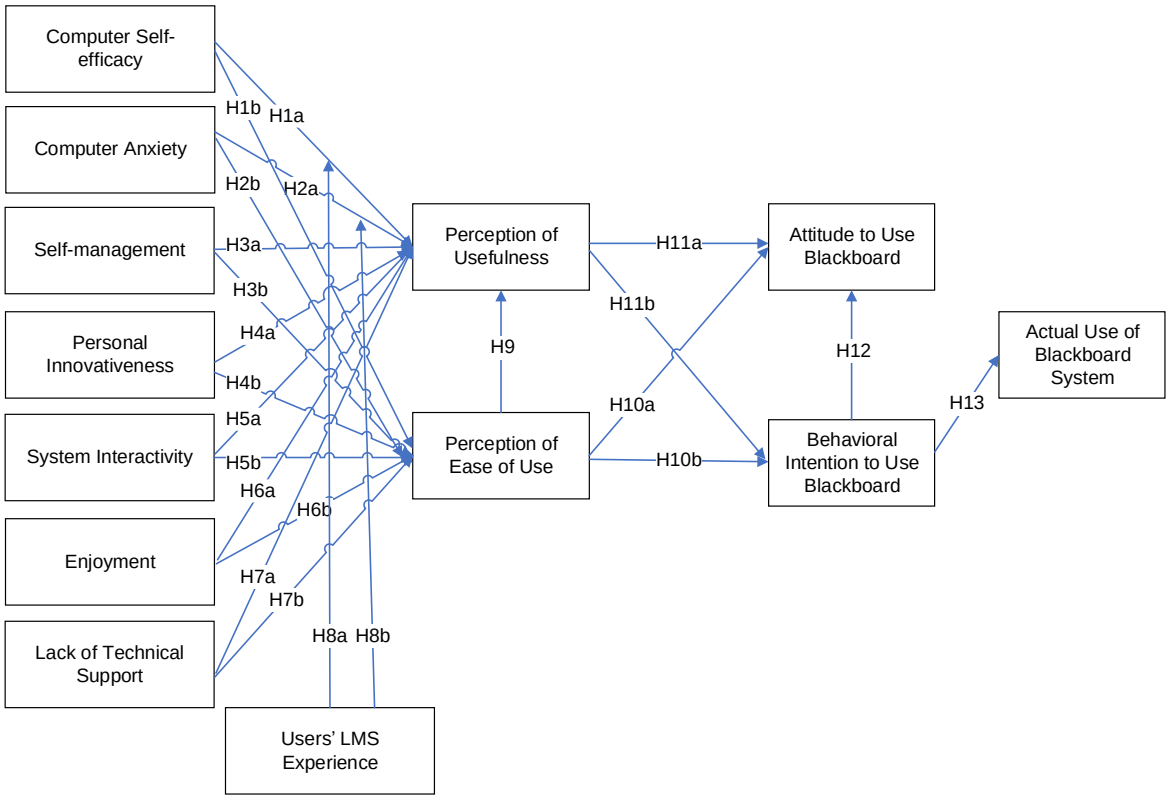

Fig. 1: The proposed research model

4.2. Data collection and sampling

A random stratified sample was targeted at certain respondents (i.e., students at the University of Ha'il in Saudi Arabia). An online-based questionnaire was conducted using Google forms and distributed via WhatsApp to reach a greater number of students. As a result, 427 responses were received, only 370 were usable responses, and thus submitted for further data analysis.

5. Data analysis

SPSS version 17 and structural equation modeling (SEM) using AMOS 16 were used to analyze the data. The SPSS software was used to obtain the demographic profile of the respondents, descriptive statistics, reliability testing of scales, and exploratory factor analysis. AMOS was used for the measurements and structural models, including testing hypotheses.

5.1. Demographic profile of respondents

As shown in Table 1, females were dominant (61.9%) of the sample. Most of the respondents were Bachelor's degree students (56.8%), because the majority of the University of Ha'il students in this program level, followed by diploma and master respectively. The respondent's sample was distributed normally according to their majors (humanist, applied, natural, and medical science (30.5%, 29.2%, 21.9%, 18.4%) respectively. Most of the responses were from students who were registered from 2016 to 2019, (80.5%), according to students' priority the respondents have ranked ascendingly. Respondents' experience of using blackboard was concentrated in the middle range of experience, (39.7%, 35.9%) were from 1 to years of experience, and less than 1 year, only (5.1%) have not used, and (19.2%) were experts. 32.2% of the sample were reported that they using a blackboard system via smartphone or tablet, only (7.6%) via computer, the rest (60.3%) via both.

5.2. Descriptive statistics and reliability

Cronbach's Alpha values were all reliable (0.7 or above) except for the self-learning management was 0.69. Therefore, the item SLM1 was removed from the data set to increase the Cronbach's Alpha value to 0.74. Cronbach's Alpha value for technical support was 0.78, which is within acceptable reliability. Cronbach's Alpha values for computer self-efficacy, computer anxiety, personal innovativeness, system interactivity, perceived ease of use, intention to use blackboard system, and actual use of blackboard were 0.89, 0.80, 0.81, 0.84, 0.87, 0.88, and 0.81 respectively, are within the preferable level of reliability. Cronbach's Alpha values for enjoyment, perceived usefulness, and attitude were 0.90, 0.92, and 0.93 respectively, reflects excellent reliability. Consequently, all the variables are reliable, as Cronbach's Alpha value of every single variable is more than 0.7.

Table 1: Sample's demographic profile

Number	Demographic Factor	Category	Frequency	Percent
1	Gender	Male	141	38.1
		Female	229	61.9
2	Program Level	Diploma	146	39.5
		Bachelor	210	56.8
		Master	14	3.8
3	Major	Medical and health science	68	18.4
		Humanist and social science	113	30.5
		Applied science	108	29.2
		Natural science	81	21.9
4	Priority	2008 to 2011	10	2.7
		2012 to 2015	62	16.8
		2016 to 2019	298	80.5
5	Experience in using Blackboard	Have not used it	19	5.1
		Less than 1 year	133	35.9
		1 – 3 years	147	39.7
		More than 3 years	71	19.2
6	Using blackboard system via	Smart Phone or Tablet	119	32.2
		Computer	28	7.6
		Both	223	60.3

5.3. Exploratory factor analysis

For testing constructs validity, the Varimax rotation method was executed. The Kaiser-Meyer-Olkin (KMO) is 0.95, reflects the acceptable value, and Bartlett's Test of Sphericity (BTS) was 0.00, which is a significant value (>0.05). This guarantees the appropriateness of EFA analysis and thus the significance of the sample. Therefore, EFA is considerable for this study.

The results show that no items with low loading (<0.50) commonalities extraction were detected, as ranged from 0.506 to 0.839 and thus removed from the analysis. The rotated component matrix shows several double loading items (i.e., CSE4, SI2, ENJ1, ENJ2, ENJ3, PEU1, PEU2, PEU3, and INT1) were detected (i.e., computer self-efficacy 4, system interactivity 2, enjoyment 1, enjoyment 2, enjoyment 3, perceived ease of use 1, enjoyment 2, enjoyment 3, and intention to use blackboard system 1), and removed. The variables enjoyment and perceived ease of use were not submitted for further analysis as all of its items were removed. The other variables are valid and thus were submitted for further data analysis.

5.4. Structural equation modeling

5.4.1. Measurement model using CFA

The CFA was used to provide empirical evidence for the fit of the whole model and its construct validity. The results show that all the indicators were loaded significantly on their factors. As shown in Table 2, the AVE values were all above 0.5, ranging from 0.55 to 0.82, as suggested by Bagozzi and Yi (1991). The standardized factor loadings were all significant and higher than the recommended value (<0.5). The discriminant validity was verified for some latent variables since the AVE for each construct was lower than all the squared correlations among any two constructs except for CSE, CA, and PU. Thus, only these three latent variables are submitted for further analysis. Table 3 shows the results of the measurement model fit evaluation, reflecting that the whole model was fit.

The indices are: CMIN (minimum discrepancy), chi-square ($\chi 2$), df (degree of freedom), root mean square error approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), incremental fit index (IFI), and the Tucker-Lewis index (TLI).

5.4.2. Structural model

The structural model was examined through testing the proposed model using AMOS 16.0 software. To estimate fit indices with all the parameters, the maximum likelihood method was operated. The results showed that normed x2 was significant 1.55, which reflects a good level. The RMSEA was 0.04, which is within an excellent fitness level. The GFI, IFI, TLI, and CFI were 0.95, 0.98, 0.96, and 0.98, respectively which is greater than the threshold of 0.95, reflects an excellent fit. The AGFI was 0.86, this reflects an acceptable fit. Therefore, the hypothesized structural model fills the criteria of fit for the data.

As shown in Table 4, H1a has posited that users' computer self-efficacy will positively influence their perception of the usefulness of the Blackboard system. In other words, the students' computer self-efficacy could increase their perceptions of the usefulness of the Blackboard system. As shown in Table 5, as expected in H8a, the user's LMS experience leaves a positive moderating effect on the relationship between self-efficacy and their perception of the usefulness of the Blackboard system. This moderating effect reflects that the more student's LMS experience is the more affected of their computer self-efficacy to perceive the blackboard system more useful, since the coefficient for the paths were less than 0.05, with a coefficient estimate of 0.57, 0.70, 0.78, and 0.96, respectively, for those students have no LMS experience to those experts.

Table 2: Convergent and discriminant validity

Indicator variables	Latent variables	Standardized loadings	Square of Standardized loadings	Sum of the Squared of Standardized loadings	AVE	Square root of AVE
CSE3	CSE	0.85	0.73	2.00	0.66	0.81
CSE2		0.78	0.60			
CSE1		0.82	0.67			
CA3	CA	0.92	0.84	1.81	0.60	0.77
CA2		0.72	0.52			
CA1		0.67	0.45			
SLM3	SLM	0.82	0.66	1.19	0.59	0.77
SLM2		0.73	0.53			
PI3	PI	0.62	0.38	1.81	0.60	0.77
PI2		0.84	0.70			
PI1		0.85	0.73			
SI3	SI	0.72	0.52	1.13	0.56	0.75
SI1		0.78	0.61			
TS3	TS	0.76	0.58	1.66	0.55	0.74
TS2		0.81	0.65			
TS1		0.66	0.43			
PU3	PU	0.92	0.84	2.42	0.80	0.89
PU2		0.88	0.77			
PU1		0.90	0.80			
ATT3	ATT	0.87	0.76	2.46	0.82	0.90
ATT2		0.92	0.84			
ATT1		0.93	0.86			
INT3	INT	0.85	0.72	1.33	0.66	0.81
INT1		0.78	0.61			

Table 3: Criteria and results of measurement model fit

Fit indices	Criteria	Reference	Result	Comment
χ2/df (CMIN/df)	<3 is a good fit; <5 is an acceptable fit.	Hair et al. (2010) and Byrne (2010)	2.52 (Sig, 0.000)	Good fit
RMSEA	<0.05 is an excellent fit; <0.08 is a good fit; <0.1 is an acceptable fit.	Byrne (2010)	0.06	Good fit
GFI	>0.95 is an excellent fit; > 0.90 is a good fit; > 0.80 is an acceptable fit.	Hair et al. (2010)	0.89	Acceptable fit
AGFI			0.84	Acceptable fit
IFI			0.94	Good fit
CFI			0.94	Good fit
TLI			0.93	Good fit

Table 4: The results of direct hypotheses testing

No	Hypothesis statement	Direction	Estimate	S.E.	C.R.	P	Result
H1a	Computer self-efficacy has a positive effect on the users' perception of the usefulness of the Blackboard system	Positive	0.640	0.092	3.280	0.000	Accepted

Table 5: The results of moderating hypotheses testing

No	Hypothesis statement		Direction	Estimate	S.E.	C.R.	P	Result
H8a	Users' LMS experience has a positive moderating effect on the relationship between users' self-efficacy and their perception of the usefulness of the Blackboard system.	Users' has no LMS experience	Positive	0.57	0.14	3.87	0.000	Accepted
		Users' has low LMS experience	Positive	0.70	0.09	7.28	0.000	Accepted
		Users have meddled LMS experience	Positive	0.78	0.10	7.87	0.000	Accepted
		Users has high LMS experience	Positive	0.96	0.16	5.84	0.000	Accepted

6. Discussion and implications

A handful of studies were examined students' use of LMS. This study comes to investigate the challenges facing students in adopting the Blackboard system at the University of Ha'il from the perspectives of students. This study aims to discover what predictive factors can inhibit learner's proper utilization of the Blackboard system by examining the association between the students' actual use of

the Blackboard system and external variables were reviewed by related studies in the literature, these are computer self-efficacy, computer anxiety, self-management, personal innovativeness, system interactivity, enjoyment, lack of technical support, and users' LMS experience. Therefore, this study is one of a few types of research to investigate the influence of factors on students' adoption and use of LMS in the context of Saudi Arabia.

This study enriches the literature by reviewing, comparing, and analyzing the related previous studies. This study provided evidence of the reliability of TAM in investigating the acceptance of E-learning, through the use of Cronbach's alpha measure, this is consistent with the findings reported by AlKurdi et al. (2020) and Ramírez Anormaliza et al. (2016). The Findings demonstrate the applicability of the TAM constructs in Saudi Arabia, this supporting the findings reported by (Binyamin et al., 2017; Alharbi and Drew, 2014).

Several factors were eliminated for being not valid, and not submitted for hypothesis testing. A justification could be that examination of the effect of such factors on the users' perception of ease of blackboard use, as well as, their usefulness, not in general as previous studies. Another reason that the respondents' sample probably misunderstood the meaning of the factors' questionnaire questions. This requires further investigation. The results prove that Saudi students' perceive self-efficacy can positively affect their perception of the usefulness of the blackboard system. As previous studies on e-learning were reported a significant effect of users' computer self-efficacy on their perception of ease of e-learning use, not investigated the same relationship on the perception of usefulness in Saudi Arabia, such as Hanif et al. (2018) reported that self-efficacy has non-significance. Also, Binyamin et al. (2017; 2018) found that King Abdulaziz University students' computer self-efficacy leaves a positive influence on the ease of use of LMS. This study is the first to prove such a hypothesis in Saudi Arabia. These results are consistent with what was reported by Haryanto and Kultsum (2016), Chang et al. (2017), Fathema et al. (2015), Tran (2016), and Kanwal and Rehman, (2017); also the positive influence on the user's perception of the usefulness of LMS (Binyamin et al., 2017).

Also, this study is the first to investigate the effect of self-efficacy on students' perception of usefulness by considering the moderating effect of their systems experience, particularly in Saudi Arabia. As suggested by Hanif et al. (2018), who studied e-learning by digital learners (those who have higher levels of computer literacy and experience), and found that self-efficacy does not influence perceived ease of e-learning system use. It's worth mentioning that, the findings reported by Hanif et al. (2018) were contrary to findings reported by Al-Gahtani (2016). This study discovered that the more student's LMS experience is more affected by their computer self-efficacy to perceive the Blackboard system more useful. Such an issue should be taken into account by decision-makers in academic institutes.

7. Conclusion, limitations, and recommendations

The study has some limitations. The sample of the experiment was dominated by female students' respondents (61.9%). Furthermore, the sample was taken from students at the University of Ha'il. Consequently, further studies might expand the sample to contain more male students; alongside students from different universities in Saudi Arabia. This study has extended the TAM. Other researchers are advised to employ other recent technology acceptance models after the required justification. This study has focused on individual factors from the student's perspective. Next researchers are advised to study individual factors from a different perspective, as stated by Salloum et al. (2019) and Sarrab et al. (2017), the social influence is significant to be investigated in e-learning acceptance, the same was reported by AlKurdi et al. (2020) and Binyamin et al. (2017) in Saudi Arabia. Finally, this study investigated only the perception of students. Later, teachers and administrators can be added to the scope of the study. Therefore, the impact of lecturer influence should be explored by the next studies as stated by Badwelan et al. (2016). The produced research model can be employed in different institutes, countries, and technologies. This study called for more research aiming to address the effect of student's LMS experience on their level of self-efficacy perception towards blackboard usefulness, as these have not been clarified by the existing research on E-Learning.

Appendix A: Study questionnaire

Table A1: Questionnaire

Computer Self-efficacy	
I feel confident in the utilization of the blackboard system even when no one is there for assistance. I have sufficient skills to use the blackboard system. I feel confident when using the blackboard system even if I have only the online instructions. I feel confident when using the online learning content in the blackboard system.	Salloum et al. (2019)
Computer Anxiety	
I feel apprehensive about using computers. It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key. I hesitate to use a computer for fear of making mistakes I cannot correct.	Saadé and Kira (2009)
Self-Management of Learning	
When it comes to learning and studying, I am a self-directed person. I am able to manage my study time effectively and easily complete assignments on time. In my studies, I set goals and have a high degree of initiative.	Badwelan et al. (2016)
Personal Innovativeness	
I like to experiment with new information technologies. When I hear about a new information technology I look forward to examining it. Among my colleagues, I am usually the first to	Chang et al. (2017)

try out a new innovation in technology.	
System Interactivity	
The blackboard system enables interactive communication between instructors and students. The blackboard system enables interactive communication among students. The communicational tools in the blackboard system are effective (e-mail, chat, etc).	Moreno et al. (2017)
Enjoyment	
My imagination is stimulated by using the blackboard system The blackboard system environment is enjoyable. The use of the blackboard system arouses my curiosity.	Salloum et al. (2019)
Lack of Technical Support	
The plate-form provides assistance when you have technical problems	Sánchez et al. (2013)
The technical support staff is available for consultation at any time There is a designated person that I can call or e-mail when I need help with using the blackboard system.	Moreno et al. (2017)
Perceived Ease of Use	
There are clarity and understanding in my interaction with the blackboard system. The blackboard system is easy to use for me. Interacting with the blackboard system does not require a lot of my mental effort.	Salloum et al. (2019)
Perceived Usefulness	
The blackboard system enhances my learning performance. My productivity is elevated through the utilization of the blackboard system in my study. Using the blackboard system enhances my learning effectiveness.	Salloum et al. (2019)
Attitude towards use Blackboard System	
I like the idea of using a blackboard System Using a blackboard is a good idea	Alharbi and Drew (2014)
The blackboard system provides an attractive learning environment	Salloum et al. (2019)
Intention to use Blackboard System	
I intend to use the blackboard system for educational purposes I will prefer the blackboard system over another medium of learning I will recommend other colleagues to use blackboard system	Alkhaldi and Abualkishik (2019)
Actual Use of Blackboard	
I use the blackboard system frequently. I use the blackboard on a daily basis.	Salloum et al. (2019)

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Compliance with ethical standards

Conflict of interest

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References

Abbad M, Morris D, and Al-Ayyoub AE (2009). Students' decisions to use an elearning system: A structural equation modelling analysis. International Journal of Emerging Technologies in Learning, 4(4): 4-13. https://doi.org/10.3991/ijet.v4i4.928

Abdel-Jaber H (2017). Experimental analysis of students' satisfaction factors in e-learning environment: A case study on Saudi Arabian university. Journal of Information and Knowledge Management, 16(02): 1750018. https://doi.org/10.1142/S0219649217500186

Abdullah F, Ward R, and Ahmed E (2016). Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios. Computers in Human Behavior, 63: 75-90. https://doi.org/10.1016/j.chb.2016.05.014

Ahmed AYM (2016). Using technology acceptance model in understanding academics' behavioral intention to use blackboard learning management system. European Journal of Business and Management, 8(33): 170-178.

Alenezi AR and Karim A (2010). An empirical investigation into the role of enjoyment, computer anxiety, computer self-efficacy and internet experience in influencing the students' intention to use e-learning: A case study from Saudi Arabian governmental universities. Turkish Online Journal of Educational Technology-TOJET, 9(4): 22-34.

Al-Gahtani SS (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. Applied Computing and Informatics, 12(1): 27-50. https://doi.org/10.1016/j.aci.2014.09.001

Alharbi S and Drew S (2014). Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. International Journal of Advanced Computer Science and Applications, 5(1): 143-155. https://doi.org/10.14569/IJACSA.2014.050120

Al-Hujran O, Al-Lozi E, and Al-Debei MM (2014). Get ready to mobile learning: Examining factors affecting college students' behavioral intentions to use m-learning in Saudi Arabia. Jordan Journal of Business Administration, 10(1): 111-128. https://doi.org/10.12816/0026186

Alia A (2017). An investigation of the application of the technology acceptance model (TAM) to evaluate instructors' perspectives on e-learning at Kuwait University. Ph.D. Dissertation, Dublin City University, Dublin, Ireland.

Alkhaldi AN and Abualkishik AM (2019). The mobile blackboard system in higher education: Discovering benefits and challenges facing students. International Journal of Advanced and Applied Sciences, 6(6): 6-14. https://doi.org/10.21833/ijaas.2019.06.002

AlKurdi B, Alshurideh M, Salloum S, Obeidat Z, and Al-dweeri R (2020). An empirical investigation into examination of factors influencing university students' behavior towards e-learning acceptance using SEM approach. International Journal of Interactive Mobile Technologies, 14(2): 19-41. https://doi.org/10.3991/ijim.v14i02.11115

AlMeajel TM and Sharadgah TA (2018). Barriers to using the blackboard system in teaching and learning: Faculty perceptions. Technology, Knowledge and Learning, 23(2): 351-366. https://doi.org/10.1007/s10758-017-9323-2

Alokluk JA (2018). The effectiveness of blackboard system, uses and limitations in information management. Intelligent Information Management, 10(6): 133-149. https://doi.org/10.4236/iim.2018.106012

Alshammari SH, Ali MB, and Rosli MS (2016). The influences of technical support, self-efficacy and instructional design on the usage and acceptance of LMS: A comprehensive review. Turkish Online Journal of Educational Technology-TOJET, 15(2): 116-125.

Alsuwailem RI (2018). Factors affecting faculty's intent to use e-learning systems at a university in the Kingdom of Saudi Arabia. Ph.D. Dissertation, Eastern Michigan University, Ypsilanti, USA.

Asiimwe E and Gronlund A (2015). MLCMS actual use, perceived use, and experiences of use. International Journal of Education and Development Using ICT, 11(1): 101-121.

Badwelan A, Drew S, and Bahaddad AA (2016). Towards acceptance m-learning approach in higher education in Saudi

Arabia. International Journal of Business and Management, 11(8): 12-30. https://doi.org/10.5539/ijbm.v11n8p12

Bagozzi P and Yi Y (1991). Multitrait-multimethod matrices in consumer research. Journal of Consumer Research, 17(4): 426-439. https://doi.org/10.1086/208568

Binyamin S, Rutter M, and Smith S (2017). Factors influencing the students' use of learning management systems: A case study of King Abdulaziz University. In the International Conference on e-Learning, Academic Conferences International Limited, Orlando, USA: 289-297. https://doi.org/10.21125/inted.2017.2205

Binyamin SS, Rutter M, and Smith S (2019). Extending the technology acceptance model to understand students' use of learning management systems in Saudi higher education. International Journal of Emerging Technologies in Learning (IJET), 14(03): 4-21. https://doi.org/10.3991/ijet.v14i03.9732

Binyamin SS, Rutter MJ, and Smith S (2018). The influence of computer self-efficacy and subjective norms on the students' use of learning management systems at King Abdulaziz University. International Journal of Information and Education Technology, 8(10): 693-699. https://doi.org/10.18178/ijiet.2018.8.10.1124

Boateng R, Mbrokoh AS, Boateng L, Senyo PK, and Ansong E (2016). Determinants of e-learning adoption among students of developing countries. The International Journal of Information and Learning Technology, 33(4): 248-262. https://doi.org/10.1108/IJILT-02-2016-0008

Boshielo A (2014). The impact of blackboard learn as a learning management system (LMS) for University of Limpopo students. M.Sc. Thesis, University of Limpopo, Limpopo Province, South Africa.

Byrne BM (2010). Structural equation modeling with AMOS: Basic concepts, applications, and programming. 2nd Edition, Routledge Taylor & Francis Group, New York.

Chang CS, Liu EZF, Sung HY, Lin CH, Chen NS, and Cheng SS (2014). Effects of online college student's Internet self-efficacy on learning motivation and performance. Innovations in education and teaching international, 51(4): 366-377. https://doi.org/10.1080/14703297.2013.771429

Chang CT, Hajiyev J, and Su CR (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? The general extended technology acceptance model for e-learning approach. Computers and Education, 111: 128-143. https://doi.org/10.1016/j.compedu.2017.04.010

Contrado J (2016). Five potential barriers to LMS usage. M.Sc. Thesis, University of Massachusetts, Boston, USA.

Davis FD (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3): 319-340. https://doi.org/10.2307/249008

Elkaseh AM, Wong KW, and Fung CC (2015). The acceptance of e-learning as a tool for teaching and learning in Libyan higher education. International Journal of Information Technology, 3(4): 1-11.

Fathema N, Shannon D, and Ross M (2015). Expanding the technology acceptance model (TAM) to examine faculty use of learning management systems (LMSs) in higher education institutions. Journal of Online Learning and Teaching, 11(2): 210-232.

Granić A and Marangunić N (2019). Technology acceptance model in educational context: A systematic literature review. British Journal of Educational Technology, 50(5): 2572-2593. https://doi.org/10.1111/bjet.12864

Hair JF, Black WC, Babin BJ, and Anderson RE (2010). Multivariate data analysis: A global perspective. 7th Edition, Pearson Education, Upper Saddle River, USA.

Han I and Shin WS (2016). The use of a mobile learning management system and academic achievement of online students. Computers and Education, 102: 79-89. https://doi.org/10.1016/j.compedu.2016.07.003

Hanif A, Jamal FQ, and Imran M (2018). Extending the technology acceptance model for use of e-learning systems by digital learners. IEEE Access, 6: 73395-73404. https://doi.org/10.1109/ACCESS.2018.2881384

Haryanto H and Kultsum HU (2016). E-learning program adoption: Technology acceptance model approach. In the International Conference on Teacher Training and Education, Surakarta, Indonesia, 2(1): 616-622.

Jawad HHM and Hassan ZB (2015). Applying UTAUT to evaluate the acceptance of mobile learning in higher education in Iraq. International Journal of Science and Research, 4(5): 952-954.

Kaliisa R and Picard M (2017). A systematic review on mobile learning in higher education: The African perspective. TOJET: The Turkish Online Journal of Educational Technology, 16(1): 1-18.

Kanwal F and Rehman M (2017). Factors affecting e-learning adoption in developing countries–empirical evidence from Pakistan's higher education sector. IEEE Access, 5: 10968-10978. https://doi.org/10.1109/ACCESS.2017.2714379

Lin SC, Persada SF, and Nadlifatin R (2014). A study of student behavior in accepting the blackboard learning system: A technology acceptance model (TAM) approach. In the IEEE 18th International conference on computer supported cooperative work in design, IEEE, Hsinchu, Taiwan: 457-462. https://doi.org/10.1109/CSCWD.2014.6846888

Liu Z, Zhao G, Zheng W, and Jin J (2008). The research and exploration of mobile-learning based on web2.0. In the International Symposium on Knowledge Acquisition and Modeling, IEEE, Wuhan, China: 520-524. https://doi.org/10.1109/KAM.2008.173 **PMCid:PMC2678875**

Louw J, Brown C, Muller J, and Soudien C (2009). Instructional technologies in social science instruction in South Africa. Computers and Education, 53(2): 234-242. https://doi.org/10.1016/j.compedu.2009.02.001

Lowenthal JN (2010). Using mobile learning: Determinates impacting behavioral intention. American Journal of Distance Education, 24(4): 195-206. https://doi.org/10.1080/08923647.2010.519947

Mahmodi M (2017). The analysis of the factors affecting the acceptance of E-learning in higher education. Interdisciplinary Journal of Virtual Learning in Medical Sciences, 8(1): e11158. https://doi.org/10.5812/ijvlms.11158

Margaryan A, Littlejohn A, and Vojt G (2011). Are digital natives a myth or reality? University students' use of digital technologies. Computers and Education, 56(2): 429-440. https://doi.org/10.1016/j.compedu.2010.09.004

Masrek MN and Samadi I (2017). Determinants of mobile learning adoption in higher education setting. Asian Journal of Scientific Research, 10(2): 60-69. https://doi.org/10.3923/ajsr.2017.60.69

Mohammadi H (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. Computers in Human Behavior, 45: 359-374. https://doi.org/10.1016/j.chb.2014.07.044

Moreno V, Cavazotte F, and Alves I (2017). Explaining university students' effective use of e-learning platforms. British Journal of Educational Technology, 48(4): 995-1009. https://doi.org/10.1111/bjet.12469

Mtebe J (2015). Learning management system success: Increasing learning management system usage in higher education in sub-Saharan Africa. International Journal of Education and Development Using ICT, 11(2): 51-64.

Muniasamy VD, Eljailani IM, and Anandhavalli M (2014). Prediction of learner perception and acceptance of e-learning system for learning with TAM (technology acceptance model)

in King Khalid University, Kingdom of Saudi Arabia. International Journal of Emerging Technology and Advanced Engineering, 4(9): 94-99.

Öztürk L (2019). Functions and role of social media networks in learning a foreign language: A case study. International Journal of Advanced and Applied Sciences, 6(6): 66-69. https://doi.org/10.21833/ijaas.2019.06.010

Ramírez Anormaliza RI, Sabaté i Garriga F, and Llinàs Audet FJ (2016). The acceptance and use of the e-learning systems among the university teachers in Ecuador. In the International Conference on Education and New Learning Technologies, "EDULEARN16 Proceedings", Barcelona, Spain: 3666-3674. https://doi.org/10.21125/edulearn.2016.1836

Saadé RG and Kira D (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. Journal of Information Technology Education: Research, 8(1): 177-191. https://doi.org/10.28945/166

Salloum SA, Alhamad AQM, Al-Emran M, Monem AA, and Shaalan K (2019). Exploring students' acceptance of e-learning through the development of a comprehensive technology acceptance model. IEEE Access, 7: 128445-128462. https://doi.org/10.1109/ACCESS.2019.2939467

Sánchez RA, Hueros AD, and Ordaz MG (2013). E-learning and the University of Huelva: A study of WebCT and the technological acceptance model. Campus-Wide Information Systems, 30(2): 135-160. https://doi.org/10.1108/10650741311306318

Sarrab M, Al-Khanjari Z, Alnaeli S, and Bourdoucen H (2017). Human factors considerations in mobile learning management systems. In: Auer M and Tsiatsos T (Eds.), Interactive Mobile Communication, Technologies and Learning: 372-383. Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-319-75175-7_38

Sekaran U and Bougie R (2016). Research methods for business: A skill building approach. John Wiley and Sons, Hoboken, USA.

Shin WS and Kang M (2015). The use of a mobile learning management system at an online university and its effect on learning satisfaction and achievement. International Review of Research in Open and Distributed Learning, 16(3): 110-130. https://doi.org/10.19173/irrodl.v16i3.1984

Tran KNN (2016). The adoption of blended e-learning technology in Vietnam using a revision of the technology acceptance model. Journal of Information Technology Education, 15: 253-282. https://doi.org/10.28945/3522

Turan A, Tunç AÖ, and Zehir C (2015). A theoretical model proposal: Personal innovativeness and user involvement as antecedents of unified theory of acceptance and use of technology. Procedia-Social and Behavioral Sciences, 210(2015): 43-51. https://doi.org/10.1016/j.sbspro.2015.11.327

Yoon HY (2016). User acceptance of mobile library applications in academic libraries: An application of the technology acceptance model. The Journal of Academic Librarianship, 42(6): 687-693. https://doi.org/10.1016/j.acalib.2016.08.003