Journal of Infrastructure, Policy and Development 2024, 8(8), 6218.
https://doi.org/10.24294/jipd.v8i8.6218

Article

An evaluation of the determinants affecting students' satisfaction and intention to use e-learning tools: A study based on the technology acceptance model

Jamal M. M. Joudeh[1,2,*], Fandi Omeish[3], Najeeb Awni Issa Haddad[4], Omar N. Badran[5], Ahmad M. Zamil[6], Jassim A. AL-Gasawneh[1,2]

[1] Marketing Department, Faculty of Business, Applied Science Private University, Amman 11937, Jordan
[2] MEU Research Unit, Middle East University, Amman 11610, Jordan
[3] E-Marketing and Social Media Department, Princess Sumaya University for Technology, Amman 11941, Jordan
[4] Management Department, Faculty of Business Economic, Hasselt University, 3500 Hasselt, Belgium
[5] Business Management, Istanbul Aydın University, Istanbul 34295, Turkey
[6] Department of Marketing, College of Business Administration, Prince Sattam bin Abdulaziz University, Al-Kharj 11942, Saudi Arabia
*** Corresponding author:** Jamal M. M. Joudeh, jamaljoudeh@asu.edu.jo

CITATION

Joudeh JMM, Omeish F, Haddad NAI, et al. (2024). An evaluation of the determinants affecting students' satisfaction and intention to use e-learning tools: A study based on the technology acceptance model. Journal of Infrastructure, Policy and Development. 8(8): 6218. https://doi.org/10.24294/jipd.v8i8.6218

ARTICLE INFO

Received: 5 May 2024
Accepted: 3 June 2024
Available online: 22 August 2024

COPYRIGHT

Copyright © 2024 by author(s). *Journal of Infrastructure, Policy and Development* is published by EnPress Publisher, LLC. This work is licensed under the Creative Commons Attribution (CC BY) license. https://creativecommons.org/licenses/by/4.0/

Abstract: The study's goal was to investigate the impact of e-learning determinants on student satisfaction and intention to use e-learning tools. The dependent and independent variables in this study were based on the technological acceptance model. The study examines three determinants, including usefulness, ease of use, and facilitating conditions, as independent variables, while student satisfaction and intention to use were used as dependent variables. Additionally, this study is unique by adding student satisfaction as a dependent variable and a mediator to examine the relationship between e-learning determinants and intention to use. A questionnaire was prepared and distributed to 324 undergraduate students from Jordan's private universities on the basis of a convenience sample. The proposed hypotheses were investigated using the quantitative techniques of regression in SPSS and SEM in AMOS. The findings of this study revealed that student satisfaction and intention to use e-learning were positively impacted by e-learning determinants. It found that intention to use was positively impacted by student satisfaction. Furthermore, e-learning intention to use was found to be positively impacted by e-learning determinants via student satisfaction. Universities and other educational institutions are advised to identify the appropriate e-learning determinants that satisfy students' demands and motivate them to use e-learning tools in light of the study's findings. Private universities can accomplish their goals, stay ahead of the competition, and obtain a competitive advantage by properly understanding e-learning determinants, student satisfaction, and the application of successful e-learning solutions.

Keywords: usefulness; ease of use; facilitating conditions; student satisfaction; intention to use; higher education

1. Introduction

Due to the unexpected COVID-19 epidemic outbreak that lasted from the end of 2019 to mid-2020, many countries-imposed lockdown and curfew policies. These policies led to the closure of all business sectors and educational institutions in many countries across the world. Among the industries most affected by these policies are educational institutions. Subsequently, numerous nations have made requests for educational institutions to transition from traditional classroom activities to virtual ones. Governments in a few nations have mandated that colleges and universities adopt

new teaching methods in place of their outdated ones. As a result, educational institutions began implementing new technological tactics, such as distance learning. This led to a profound shift in the educational landscape and a notable rise in the global adoption of e-learning technologies. Due to these circumstances, the education sector saw a significant upheaval that resulted in a tremendous increase in the use of e-learning technology worldwide. According to Zhang et al. (2021), students were suddenly confronted with the extraordinarily difficult challenge of self-regulating their learning activities at home in the midst of the COVID-19 epidemic. Additionally, as a part of the educational system, students were compelled to abandon traditional learning in favor of e-learning activities. Consequently, e-learning has voluntarily replaced traditional teaching and learning methods in many educational institutions. According to Getuli et al. (2020) and Muthuprasad et al. (2020), these technologies can help us learn and grow our thinking skills in new ways. However, other research has found that developing technologies may have a detrimental impact on cognitive growth, particularly in terms of attention and memory (Small et al., 2022). The transition from offline to online learning during COVID-19 has caused students to lack instructors' guidance and motivation, requiring them to have a greater ability to regulate themselves in their learning (Abbasi et al., 2020; Banihashem et al., 2023; Khan et al., 2021; Nambiar, 2020).

Nowadays, e-learning is a new and fundamental method of teaching in Jordan, and it has emerged as a critical tool for providing learning activities in universities and other academic institutions. Jordan, like other countries, gained from the revolution in information and communication technology, which served as the focal point of the country's efforts to create e-learning programs (Al-Ali et al., 2024; Zamil and Areiqat, 2020). The rapid proliferation of e-learning and communication devices has created an increasing need for e-learning assessments to ensure high-quality e-learning. Therefore, governments and educational institutions should set aside funds and give students the chance to acquire the skills and knowledge necessary to use e-learning technologies (Hammouri et al., 2021; Sahin and Shelley, 2008).

Clearly, there are some gaps that this study attempts to close. As previously stated, there is a lack of studies on the determinants that influence student satisfaction and intention to use e-learning technologies in Jordan's educational sector. This study presents a critical examination to improve understanding of technological acceptance and adoption. Furthermore, to our knowledge, no previous study has examined student satisfaction with e-learning tools in Jordan. Finally, the authors expect that this study will contribute to the body of knowledge on satisfaction and technological acceptance studies in general.

Furthermore, understanding the variables influencing students' system acceptance is critical to the success of e-learning activities. Therefore, the primary goal of this study is to examine the determinants that affect student satisfaction and intention to use e-learning at Jordanian private universities. Therefore, understanding the determinants that affect students' choices to use or not use e-learning technologies is also crucial. Consequently, the following objectives for the research have been established:

- Exploring the relationship between e-learning determinants and student satisfaction.

- Identify the relationship between e-learning determinants and intention to use.
- Investigating the relationship between student satisfaction and intention to use.
- Determine the relationship between e-learning determinants and intention to use e-learning technologies through student satisfaction.

Regardless of the advantages and benefits of e-learning, in order for it to be successfully accepted and embraced by students, we must first discover the determinants that influence their behavior in favor of e-learning. The effectiveness of online learning systems is determined not only by the satisfaction of students but also by their willingness to continue using them. To achieve the stated objectives, the study will address the following questions:

- To what extent do e-learning determinants influence student satisfaction and intention to use e-learning tools?
- To what extent does student satisfaction influence students' intentions to use e-learning tools?
- To what extent do e-learning determinants influence students' intentions to use e-learning tools through student satisfaction?

2. Literature review

The way a student views technology significantly influences whether or not they use it. In this study, we believe that the three determinants that influence the student's satisfaction and intention to use are usefulness, ease of use, and facilitating conditions. The three primary determinants will encourage students to adopt the modern technology systems, modify their behavior, and start utilizing them right away. As a result, knowing why people adopt or reject modern technology is critical.

2.1. Perceived usefulness (PU)

The first and most crucial factor influencing whether technology will be accepted is how valuable people believe it to be. Perceived usefulness is the perception that employing technology may help a person perform better at work (Davis, 1989; Davis et al., 1989). Conversely, Seddon (1997) described it as a sign that an individual believes using a specific system has enhanced the way he, his group, or organization completes work. Increased performance and utility can result from increased perceived usefulness. Alkailani and Nusairat (2022) proposed that a student's attitude towards a modern technology might be influenced by its perceived usefulness, potentially yielding positive or negative outcomes for their performance and productivity. In this context, perceived usefulness refers to how students view the value of the online learning environment. Additionally, the usefulness of an e-learning system has a considerable influence on whether or not to use it (Punnoose, 2012). Al-Fraihat et al. (2020); Jatmikowati et al. (2020); Kaur et al. (2023); Li et al. (2021) and Taat and Francis (2019) found that the utility dimension has a substantial influence on e-learning tool acceptability. Consequently,

H1.1: Student satisfaction is positively influenced by perceived usefulness.

H2.1: Students' intention to use is positively influenced by perceived usefulness.

2.2. Perceived ease of use (PEOU)

The perceived ease of use is the second aspect that influences whether or not people accept technology. Davis et al. (1989) defined ease of use as a person's expectation of easy access to a certain system. To put it another way, PEOU denotes a person's conviction that utilizing technology is easy and does not require any work or difficulty (Lin et al., 2010; Wang and Brookshire, 2018). All difficulties will therefore be managed and resolved without difficulty; otherwise, issues will arise. Researchers Li et al. (2011) and Poong et al. (2016) found that PEOU had an indirect impact on students' intentions to use e-learning technologies for their studies. Consequently, in the context of e-learning, PEOU refers to the student's perception that the technological platform and associated learning activities are user-friendly and less complex. Caffaro et al. (2018) stated that inexperienced users are more likely to face difficulties in using the latest technology and are more likely to complain about it. The ease of using technology predicts the user's desire for technology, subsequent intentions, and actual usage (Devis, 1989). Furthermore, ease of access and user effort while using a particular technology are defined as "perceived ease of use" (Selamat and Jaffar, 2010). Furthermore, Al-Emran et al. (2020); Binyamin et al. (2019); El-Aasar and Farghali (2022); He et al. (2022) and Sakarji et al. (2019) found in their studies that perceived ease of use and perceived usefulness had a significant impact on attitudes toward e-learning. In contrast, Ho et al. (2020) found in their study that e-learning determinants have no significant influence on attitudes about e-learning. Therefore,

H1.2: Student satisfaction is positively influenced by ease of use.

H2.2: Students' intention to use is positively influenced by ease of use.

2.3. Facilitating conditions (FCs)

Facilitating conditions are defined as an individual's judgment of the infrastructure available to facilitate the usage of a technology (Fauzi et al., 2021; Venkatesh et al., 2012). In addition, FCs are perceptions of appropriate assistance to help students use e-learning technologies (Ajzen, 1991; Pelling and White, 2009). Likewise, facilitating conditions are the resources and infrastructure universities and educational institutions allocate to help students perform their tasks and attain their goals (Ogunode, 2020). Therefore, students expected that their universities and academic institutions would be ready to provide the assistance and support required to know how to operate the e-learning technologies. Additionally, students with limited technological abilities should be offered a training course to ensure they learn how to use the system (Giannakos et al., 2021). As a result, universities and educational institutions should allocate resources and build an adequate infrastructure to improve students' technology skills and motivate them to accept the system for e-learning technologies (Hoq, 2020). In this context, Baber (2020); Kalsoom et al. (2022); Sukendro et al. (2020) and Wongwatkit et al. (2020) discovered that facilitating conditions have a significant impact on student satisfaction and acceptance of e-learning, whereas Abbad (2021) and Gautam et al. (2021) discovered that facilitating conditions have a weak positive effect. Therefore,

H1.3: Student satisfaction is positively influenced by facilitating conditions.

H2.3: Students' intention to use is positively influenced by facilitating conditions.

2.4. Student satisfaction (SAT)

The most vital component of e-learning technology is satisfaction. It is the fruit of all the many e-learning tasks that students have been given. According to Wu et al. (2010), satisfaction is often defined as the satisfaction of a student's emotions around the benefits they anticipate from a teaching method. Furthermore, Feng et al. (2022) defined satisfaction as students' assessment of how satisfied they are with their decision to use e-learning and how well it meets their expectations, as well as their plan to continue using e-learning after COVID-19. Satisfaction is described as a crucial indicator of a learning system's effectiveness (Al-Fraihat et al., 2020; Joudeh et al., 2021; Liao et al., 2022; Yukselturk and Yildirim, 2008). Additionally, the student employs satisfaction as an assessment method to compare the outcomes to their expectations. As a result, students show both positive and negative attitudes towards e-learning activities (Giray, 2021). Students who have positive attitudes are more likely to be satisfied with their e-learning activities and encourage others to use them as well. Students who are unsatisfied, on the other hand, are more likely to have negative attitudes toward e-learning activities and to spread unfavorable opinions. Therefore, investigating what satisfies students makes meeting and increasing their e-learning skills easier (Shaiba et al., 2023). According to Joudeh and Dandis (2018), this can boost customer (student) satisfaction, which in turn may increase customer (student) loyalty. Several previous studies investigated the influence of e-learning determinants on student satisfaction and intention to use e-learning tools. Al-Emran et al. (2020) and El-Aasar and Farghali (2022) discovered that perceived ease of use is a significant predictor of the intention to use e-learning, although perceived usefulness and satisfaction were shown to be significant determinants of intention to use. Abdullah et al. (2022) and Kee et al. (2023) found students' satisfaction was a significant mediator between all the e-learning factors and their intention to use them. Other studies, such as those by Bahati et al. (2021) and Li et al. (2021) found that satisfaction had no significant effect on student intention to use. Consequently,

H1: Student satisfaction is positively influenced by e-learning determinants.

H2: Students' intention to use is positively influenced by students' satisfaction.

2.5. Intention to use (IU)

According to Chahal and Rani (2022), intention to use is an individual's desire to engage in a specific behavior. The desire of the learner to decide whether to use technology is indicated by their behavioral willingness to use it (Al-Gasawneh et al., 2023; Al-Mekhlafi et al., 2022; Venkatesh et al., 2012). To determine the barriers that affect intended behavior, intention is thus employed as an indication (Ajzen, 2020; Ajzen, 1991). Moreover, behavioral intention describes a person's inclination to employ technology in the future. Besides, the tendency to use technology in the future is referred to as a behavioral intention. Consequently, adoption of technology is established (Alharbi et al., 2022; Nusairat et al., 2021; Teo, 2011). Robin and Dandis (2022) define "behavioral intention to use" as an individual's desire to use a technology or perform an action. Additionally, according to Ajina et al. (2023) and

Ajzen (1991), "Behavioral intention to use" refers to a person's readiness to participate in a given activity and is regarded as the direct antecedent. Ashrafi et al. (2022), in their study, found that usefulness is the strongest predictor of students' continuance intention and also indicated that students' attitudes and their satisfaction had no significant influence on their continuance intention to use. A study by Al-Emran et al. (2020); Daneji et al. (2019); El-Aasar and Farghali (2022); Mariia and Strzelecki (2020) and Noroozi et al. (2024) revealed that e-learning determinants and satisfaction had a significant influence on continued use of e-learning. Conversely, Chung et al. (2020) and Li et al. (2021) found that e-learning determinants had no effect on intention to use. Consequently,

H3: Students' intention to use e-learning is positively influenced by e-learning determinants.

H4: Students' intention to use e-learning is positively influenced by e-learning determinants through students' satisfaction.

3. Methodology

3.1. Research model

Figure 1 shows the proposed model for this inquiry. The approach evaluated an e-learning tool's usefulness, ease of use, and facilitating conditions in order to gauge student satisfaction and intention to use it. The variables of the technology acceptance models of Davis (1989); Davis et al. (1989); Venkatesh et al. (2012) and Venkatesh and Davis (2000) serve as the basis for our model in this work.

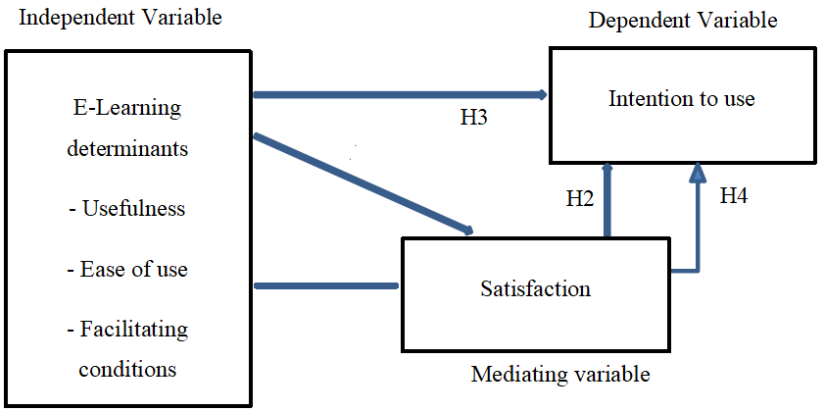

Figure 1. Proposed model.

3.2. Data collection

The current study used a quantitative technique, which is widely recognized as one of the most effective research approaches for contacting the sample and gathering primary data. The current study's instrument is a questionnaire, with questionnaire items developed and modified based on previous research in the same field. A five-point Likert scale was used to estimate each item. In addition, all theoretical data was drawn from trustworthy secondary sources to bolster the research's assertions of data and facts.

3.3. Sampling

The sample for this study was made up of undergraduate students from Jordan's private universities who volunteered to take part. To increase response rates, the questionnaire was provided to students directly, both by hand and online, during the second semester of the 2022–2023 academic year. Data collection was made easier by using a convenient sampling technique. Moreover, 347 questionnaires were collected, and 23 were invalid due to missing information. Therefore, 324 questionnaires were valid for statistical analysis, or 93% of the total.

3.4. Questionnaire

The questionnaire had 23 items and was divided into three sections, as shown in **Tables 1** and **2**. Part A contains information about students' demographic backgrounds (gender, age, and faculty). Part B contains items about the determinants of e-learning, and part C contains items about satisfaction and intentions to use.

4. Research results

SPSS and AMOS were used to analyze the data. Sub-hypotheses and descriptive statistics are analyzed using regression in SPSS, and the main hypotheses were evaluated using the SEM of AMOS. This study employed Cronbach's alpha, confirmatory factor analysis (CFA), and model fit indices to assess the reliability and validity of the suggested model.

4.1. Demographic information

Table 1 shows the participants' demographic characteristics. Most students were female, as shown in **Table 1**, with 207 (64%) female participants and 117 (36%) male participants. 194 (60.6%) are between the ages of 18 and 20, 79 (24.4%) are between the ages of 21 and 23, and 51 (16%) are beyond the age of 24. In terms of faculties, 221 (68%) of students attend scientific faculties, while 103 (32%) attend humanities faculties.

Table 1. Students' information.

Students' information	***F***	**%**
Gender:		
Male	117	36
Female	207	64
Age:		
18–20	194	60.6
21–23	79	24.4
24 and more	51	16
Faculty:		
Humanities	103	32
Sciences	221	68
Total	324	100

4.2. Questionnaire analysis

In addition to Cronbach's alpha, confirmatory factor analysis (CFA), construct reliability (CR), and extracted average variances (AVE), **Table 2** displays the answers to questionnaire statements.

Table 2. Analysis of variables.

Statements	*F*. Loading	CR	AVE	Alpha
Perceived usefulness (PU)				
My performance is improving as a result of using e-learning system.	0.826	0.928	0.742	0.916
E-learning systems is increasing my productivity.	0.765			
E- learning technology enhances my learning activities.	0.737			
I am able to do my tasks faster because to e-learning system.	0.749			
Perceived ease of use (PEOU)				
The use of e-learning activities is straightforward.	0.802	0.934	0.762	0.835
E-learning activities are simple to grasp.	0.754			
It is simple to become skilled at using e-learning system.	0.715			
It takes little effort to interact with e-learning.	0.618			
Facilitating conditions (FCs)				
I have everything I need to get started with e-learning system.	0.753	0.878	0.786	0.844
My university has all the facilities in place.	0.789			
A hotline is available at any time.	0.742			
When there is a problem, it is simple to inquire.	0.814			
A specific group is available for assistance.	0.767			
Satisfaction (SAT)				
I am pleased with my choice to use e-learning.	0.684	0.932	0.841	0.907
I am happy with e-learning's benefits.	0.681			
The services that the online learning activities offer satisfy me.	0.723			
My experience with e-learning has been great.	0.728			
Intention to use (BI)				
I want to use e- learning to finish my degree.	0.783	0.936	0.740	0.876
I plan to include e-learning into my future academic endeavors.	0.838			
I will encourage colleagues to participate in e-learning.	0.781			

4.3. Measurement model

The validity and reliability of the measurement were evaluated. In addition, assessments of validity and reliability were performed to ensure that each variable's items had internal validity and consistency. As shown in **Table 2**, every loading factor rating on every item was higher than 0.50, as advised by Hair et al. (2019). Sarstedt et al. (2021) state that composite reliability (CR) scores should be at or above 0.70, and Gefen and Straub (2005) state that AVE ratings should be more than 0.50. Furthermore, the Cronbach alpha coefficient was more significant than the 0.70 threshold recommended by Sekaran and Bougie (2016). The data shows that all items and constructs were above the threshold. In addition, the validity of the variables was evaluated using the fit model. In **Table 3**, the (χ2/df) value was 2.38, which was less

than the recommended value of 5. The recommended limit of 0.80 is exceeded by the AGFI result of 0.815. The RMSEA value is 0.076, which is less than the required limit of 0.10. The NFI is also 0.937, the CFI is 0.925, and the GFI is 0.921, all of which are greater than 0.90. As a result, all the findings support the questionnaire's reliability and validity.

Table 3. Model fit indices.

Model	AGFI	χ2/df	GFI	RMSEA	CFI	NFI
Recommended	>0.80	<5	>0.90	≤0.10	>0.90	>0.90
References	(Shevlin and Miles, 1998).	(Tabachnick and Fidell, 2007)	(Shevlin and Miles, 1998).	(MacCallum et al., 1996)	(Hu and Bentler, 1999).	(Hu and Bentler, 1999).
Value of model	0.815	2.38	0.921	0.076	0.925	0.937

4.4. Test of sub-hypotheses

Before evaluating the main hypotheses, regression analysis was used to investigate the sub-hypotheses on how e-learning determinants affected student satisfaction and intention to use e-learning tools. The results for the sub-hypotheses are presented in **Tables 4** and **5**. The sub-hypotheses are evaluated as follows:

Table 4. The impact of e-learning's determinants on student satisfaction.

Hypotheses	Variables	R	R^2	β	T	Sig. T
H1.1	Perceived usefulness	0.575	0.491	0.0637	5.514	0.000
H1.2	Perceived ease of use	0.637	0.556	0.0579	4.983	0.000
H1.3	Facilitating conditions	0.532	0.462	0.0428	4.287	0.000

Regression analysis was employed in the study to investigate how e-learning determinants affected student satisfaction, as **Table 4** illustrates. **Table 4** shows that every e-learning determinant significantly and favorably affected student satisfaction: PU (β = 63.7; P = 0.000), PEOU (β = 57.9; P = 0.000), and FCs (β = 42.8; P = 0.000). Furthermore, the correlation coefficient of e-learning determinants revealed a significant relationship between PU (R^2 = 0.491), PEOU (R^2 = 0.556), and FCs (R^2 = 0.462).

Table 5. The impact of e-learning's determinants on intention to use.

Hypotheses	Variables	R	R^2	β	T	Sig. T
H2.1	Perceived usefulness	0.450	0.366	0.470	8.875	0.000
H2.2	Perceived ease of use	0.727	0.263	0.443	9.659	0.000
H2.3	Facilitating conditions	0.443	0.216	0.251	9.826	0.000

Similarly, **Table 5** illustrates how e-learning determinants affect e-learning intention to use. The regression analysis revealed that the PU (β = 47.0; P = 0.000), PEOU (β = 44.3; P = 0.000), and FCs (β = 25.1; P = 0.000) The determinants of e-learning were all significant and positively influenced the intention to use them. Additionally, a strong correlation between intention to use and the e-learning determinants correlation coefficient was shown with PU (R^2 = 0.366), PEOU (R^2 =

0.263), and FCs (R^2 = 0.216).

4.5. Test of main hypotheses

The main hypotheses were assessed, and the relationship between the variables was looked into using the SEM technique. The direct and indirect influences between the variables are exhibited in **Table 6**, where p-values of less than 0.05 are considered statistically significant. The results of the direct and indirect effects are as follows:

The standardized direct impact of e-learning determinants on student satisfaction is β = 64.9, and the hypothesis (H1) results for this influence on student satisfaction indicate that t = 13.516 and P = 0.000 are significant at the 0.05 level. Hypothesis (H2) illustrates how e-learning determinants affect intention to utilize. which reveals that t = 5.677 and the standardized direct effect of e-learning determinants on intention to use, β = 53.7, were significant at the 0.05 level, with P = 0.000. Furthermore, hypothesis (H3) demonstrates that t = 8.753 and the standardized direct effect of students' satisfaction on their intention to utilize, β = 34.5, were significant at the 0.05 level, with P = 0.000. Furthermore, hypothesis (H4) demonstrates the indirect impact of e-learning variables on intention to use through student satisfaction. **Table 6** displays the results, which were significant at the 0.05 level with a P value of 0.000. The standardized indirect effect of e-learning determinants on intention to use through students' satisfaction β = 31.8 and t = 6.495.

Table 6. Direct and indirect results of testing hypotheses.

Hypotheses				**Direct impact**	**Indirect impact**	***T*-value**	***P***	**Decision**
H1	Satisfaction	←	Determinants	0.649		13.51	0.000	Supported
H2	Intention to use	←	Determinants	0.537	-	5.677	0.000	Supported
H3	Intention to use	←	Satisfaction	0.345		8.753	0.000	Supported
H4	Intention to use	Satisfaction	Determinants		0.318	6.495	0.000	Supported

5. Discussion

The aim of the present study was to examine how e-learning determinants affected student satisfaction levels and the intention of use of e-learning tools. Furthermore, as e-learning determinants, usefulness, ease of use, and facilitating conditions were considered. Additionally, student satisfaction moderated the relationship between e-learning determinants and intention to use. The questionnaires (n = 324) were obtained from Jordanian private universities. All the theories proposed had strong and positive influences and relationships. Given this framework, the current study was able to uncover the following conclusions about the primary hypothesis and sub-hypotheses:

When the e-learning determinants are studied separately, the findings significantly impact student satisfaction and intention to use them. Student satisfaction is most impacted by the usefulness outcome. (β = 63.7%; R^2 = 49.1%), followed by ease of use (β = 57.9%; R^2 = 55.6%) and facilitating conditions (β = 42.8%; R^2 = 46.2%). Furthermore, the study discovered that e-learning determinants have a high influence on the intention to use online learning, with usefulness having the highest impact (β = 47%; R^2 = 36.6%), followed by ease of use (β = 44.3%; R^2 = 26.3%), and

facilitating conditions (β = 25.1%; R^2 = 21.6%). The study found that all e-learning determinants significantly affect student satisfaction and intention to use e-learning tools, albeit to different degrees. All these results agree with the studies of Al-Emran et al. (2020); Al-Fraihat et al. (2020); Binyamin et al. (2019); Baber (2020); He et al. (2022); Jatmikowati et al. (2020); Kaur et al. (2023); Kalsoom et al. (2022); Li et al. (2021); Sukendro et al. (2020); Sakarji et al. (2019); Taat and Francis (2019) and Wongwatkit et al. (2020) that the determinants of e-learning proposed in this study—usefulness, ease of use, and facilitating conditions—have a significant positive impact on the satisfaction and acceptance of e-learning tools. Moreover, the results disagree with the studies of Abbad (2021), Gautam et al. (2021) and Ho et al. (2020), who found the determinants of e-learning had no impact on satisfaction or acceptance of e-learning tools.

The study found that all e-learning determinants have a direct and indirect effect on student satisfaction and intention to use e-learning tools. The findings of the statistical study reveal that student satisfaction is directly impacted by e-learning determinants. (β = 64.9%), followed by their intention to use (β = 53.7%). This study's findings agree with those of El-Aasar and Farghali (2022) and Al-Emran et al. (2020), who found that e-learning determinants had a significant impact on student satisfaction but disagree with those of Abdullah et al. (2022) and Kee et al. (2023), who found that satisfaction had no significant effect on student intention to use. Furthermore, our study coincided with Abdullah et al. (2022) and Kee et al. (2023), who found that satisfaction was a significant mediator between all e-learning determinants and intention to use.

Additionally, the results of the study indicated that students' intention to use e-learning is directly influenced by their satisfaction (β = 34.5%). This study discovered that the e-learning determinants have a positive indirect impact on e-learning intention to use through student satisfaction (β = 31.8%) in addition to their direct impacts. Finally, the findings demonstrated that each hypothesis had a significant and advantageous relationship. This study's findings are consistent with those of Ashrafi et al. (2022); Al-Emran et al. (2020); Daneji et al. (2019); El-Aasar and Farghali (2022) and Mariia and Strzelecki (2020), who discovered that e-learning determinants and satisfaction had a significant influence on continued use of e-learning, but inconsistent with those of Chung et al. (2020) and Li et al. (2021), who discovered that e-learning determinants had no effect on intention.

6. Conclusions and recommendations

The findings of this study indicate that e-learning determinants play a significant role in boosting student satisfaction with and intention to use e-learning tools in their coursework. Furthermore, the study demonstrated the importance of usefulness, ease of use, and facilitating conditions when implemented in a manner that leads to student satisfaction and intention to use the e-learning process. Additionally, this study found that the level of satisfaction, the intention to use e-learning, and the suggested e-learning determinants were all correlated in both direct and indirect ways. In light of the study's findings, universities and other educational institutions are advised to determine the proper e-learning determinants that meet students' needs and encourage

them to use e-learning tools. Private universities that have a solid understanding of e-learning determinants, satisfaction among students, and the implementation of effective e-learning solutions can achieve their objectives, stay ahead of the competition, and gain a competitive advantage.

7. Limitations and future studies

Several limitations should be noted in this study. First, the statistical basis indicated that the sample size was sufficient, but it was small, as the authors planned. Future studies should increase the sample size to improve the validity of the results. Second, the sample consisted of students enrolled in private universities; students enrolled in public universities were not included in this study. Future studies should involve studying public universities or better comparing them to private universities. Third, the current study's population was in excess of 64% female, which may have biased the distribution of the results. Therefore, researchers should take this point into consideration when conducting future studies so that the study does not appear biased. Moreover, this point leads us to suggest future studies on the basis of gender, geography, personality traits, or cultural differences. Finally, this study concentrated on three independent factors—usefulness, ease of use, and facilitating conditions—without investigating more variables that may impact satisfaction and intention to use e-learning tools. In future studies, researchers may investigate variables other than those reported in this study. Future studies can include more variables, such as self-efficacy, content quality, and system quality, to gain a more comprehensive understanding of the topic.

Author contributions: Conceptualization, JMMJ and FO; methodology, AMZ; software, FO; validation, JMMJ, ONB and AMZ; formal analysis, JAAG; investigation, NAIH; resources, NAIH; data curation, JAAG; writing—original draft preparation, JMMJ; writing—review and editing, ONB; visualization, NAIH; supervision, JMMJ; project administration, FO; funding acquisition, AMZ. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

Abbad, M. M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. Education and Information Technologies, 26(6), 7205–7224. https://doi.org/10.1007/s10639-021-10573-5

Abbasi, S., Ayoob, T., Malik, A., & Memon, S. I. (2020). Perceptions of students regarding e-learning during Covid-19 at a private medical college. Pak J Med Sci., 3, S57–S61. https://doi.org/10.12669/pjms.36.COVID 19-S4.2766

Abdullah, S. I. N.W., Arokiyasamy, K., Goh, S.L., et al. (2022). University students' satisfaction and future outlook towards forced remote learning during a global pandemic. Smart Learn Environ, 9(15). https://doi.org/10.1186/s40561-022-00197-8

Ajina, A. S., Joudeh, J. M. M., Ali, N. N., Zamil, A. M., et al. (2023). The effect of mobile-wallet service dimensions on customer satisfaction and loyalty: an empirical study. Cogent Business & Management, 10(2). https://doi.org/10.1080/23311975.2023.2229544

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Ajzen, I. (2020). The theory of planned behavior: frequently asked questions. Human Behavior and Emerging Technologies, 2(4), 314–324. https://doi.org/10.1002/hbe2.195

Al-Ali, A., Alsmairat, M. A., Qawasmeh, R., et al. (2024). Exploring the role of digital citizenship and digital empowerment to enhance academic performance of business students. International Journal of Data and Network Science, 8(2), 1275–1284. https://doi.org/10.5267/j.ijdns.2023.11.007

Al-Emran, M., Arpaci, I., & Salloum, S. A. (2020). An empirical examination of continuous intention to use m-learning: an integrated model. Educ Inf Technol, 25, 2899–2918. https://doi.org/10.1007/s10639-019-10094-2

Al-Fraihat, D., Joy, M., Masa'deh, R., & Sinclair, J. (2020). Evaluating e-learning systems success: an empirical study. Computers in Human Behavior, 102, 67–86. https://doi.org/10.1016/j.chb.2019.08.004

Al-Gasawneh, J. A, Hasan, M., Joudeh, J. M. M., et al. (2023). Mediating role of e-word of mouth on the relationship between visual social media marketing and customer purchase intention in Jordanian real estate companies. Quality-Access to Success, 24(193). https://doi.org/10.47750/qas/24.193.21

Alharbi, H. M., Ab Jalil, H., Muhd Khaizer Omar, M. K., & Puad, M. H. M. (2022). Demographic factors of teachers' behavioral intention on Madrasati utilization in Riyadh public schools. Educational Administration: Theory and Practice, 28(4), 13–33.

Alkailani, M., & Nusairat, N. (2022). What motivates Jordanians to adopt mobile commerce? An empirical study of the most relevant factors. International Journal of Data and Network Science, 6(2), 487–496. https://doi.org/10.5267/j.ijdns.2021.12.005

Al-Mekhlafi, A. B. A., Othman, I., Kineber, A. F., et al. (2022). Modeling the impact of massive open online courses (MOOC) implementation factors on continuance intention of students: PLS-SEM approach. Sustainability, 14(9), 5342. https://doi.org/10.3390/su14095342

Ashrafi, A., Zareravasan, A., Rabiee Savoji, S., & Amani, M. (2022). Exploring factors influencing students' continuance intention to use the learning management system (LMS): A multi-perspective framework. Interactive Learning Environments, 30(8), 1475–1497. https://doi.org/10.1080/10494820.2020.1734028

Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID19. Journal of Education and e-Learning Research, 7(3), 285–292. https://doi.org/10.20448/journal.509.2020.73.285.292

Bahati, B., Fors, U., Hansen, P., et al. (2019). Measuring learner satisfaction with formative e-assessment strategies. International Journal of Emerging Technologies in Learning (iJET), 14(07), 61–79. https://doi.org/10.3991/ijet.v14i07.9120

Banihashem, S. K., Noroozi, O., Brok, P. D., et al. (2023). Modeling teachers' and students' attitudes, emotions, and perceptions in blended education: towards post-pandemic education. The International Journal of Management Education, 21(2), 100803. https://doi.org/10.1016/j.ijme.2023.100803

Binyamin, S. S., Rutter, M., & 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, 14(03), 4–21. https://doi.org/10.3991/ijet.v14i03.9732

Caffaro, F., Bisaglia, C., Cutini, M., et al. (2018). A method to evaluate the perceived ease of use of human-machine interface in agricultural tractors equipped with continuously variable transmission (CVT). Spanish Journal of Agricultural Research, 15(4), e0210. https://doi.org/10.5424/sjar/2017154-10726

Chahal, J., & Rani, N. (2022). Exploring the acceptance for e-learning among higher education students in India: combining technology acceptance model with external variables. Journal of Computing in Higher Education, 34(3), 844–867. https://doi.org/10.1007/s12528-022-09327-0

Chung, E., Subramaniam, G., & Christ Dass, L. (2020). Online learning readiness among university students in Malaysia amidst Covid-19. Asian Journal of University Education, 16(2), 45–58. https://doi.org/10.24191/ajue.v16i2.10294

Daneji, A. A., Ayub, A. F. M., & Khambari, M. N. M. (2019). The effects of perceived usefulness, confirmation and satisfaction on continuance intention in using massive open online course (MOOC). Knowledge Management & E-Learning, 11(2), 201–214. https://doi.org/10.34105/j.kmel.2019.11.010

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

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management Science, 35(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

El-Aasar, S. A., & Farghali, G. (2022). Predictive study of the factors and challenges affecting the usability of e-learning platforms in the light of COVID-19. International Journal of Education in Mathematics, Science and Technology, 10(3), 568–589. https://doi.org/10.46328/ijemst.2428

Fauzi, A., Wandira, R., Sepri, D., & Hafid, A. (2021). Exploring students' acceptance of google classroom during the Covid-19 pandemic by using the technology acceptance model in West Sumatera universities. Electronic Journal of E-Learning, 19(4), 233–240. https://doi.org/10.34190/ejel.19.4.2348

Feng, D., Xiang, C., Vongurai, R., & Pibulcharoensit, S. (2022). Investigation on satisfaction and performance of online education among fine arts major undergraduates in Chengdu public universities. AU-GSB E-Journal, 15(2), 169–177. https://doi.org/10.14456/augsbejr.2022.82

Gautam, K. P., Sharma, D., Wangpo, K., & Dema, S. (2021). the acceptance and use of the virtual learning environment (VLE) in higher education: a contextual study of Royal University of Bhutan. Asian Research Journal of Arts & Social Sciences, 20–36. https://doi.org/10.9734/arjass/2021/v13i330215

Gefen, D., & Straub, D. (2005). A Practical guide to factorial validity using PLS-Graph: Tutorial and annotated example. Communications of the Association for Information Systems, 16. https://doi.org/10.17705/1cais.01605

Getuli, V., Capone, P., Bruttini, A., & Isaac, S. (2020). BIM-based immersive Virtual Reality for construction workspace planning: A safety-oriented approach. Automation in Construction, 114, 103160. https://doi.org/10.1016/j.autcon.2020.103160

Giannakos, M. N., Mikalef, P., & Pappas, I. O. (2021). systematic literature review of e-learning capabilities to enhance organizational learning. Information Systems Frontiers, 24(2), 619–635. https://doi.org/10.1007/s10796-020-10097-2

Giray, G. (2021). An assessment of student satisfaction with e-learning: An empirical study with computer and software engineering undergraduate students in Turkey under pandemic conditions. Education and Information Technologies, 26(6), 6651–6673. https://doi.org/10.1007/s10639-021-10454-x

Hair, J. F., Black, W. C., Babin, B. J., et al. (2019). Multivariate data analysis. UK, Cengage Learning, EMEA.

Hammouri, Q. M., Abu-Shanab, E. A., & Nusairat, N. M. (2021). Attitudes toward implementing e-government in health insurance administration. International Journal of Electronic Government Research, 17(2), 1–18. https://doi.org/10.4018/ijegr.2021040101

He, W., Zhao, L., & Su, Y. S. (2022). Effects of online self-regulated learning on learning ineffectiveness in the context of COVID-19. The International Review of Research in Open and Distributed Learning, 23(2), 25–43. https://doi.org/10.19173/irrodl.v23i2.5775

Ho, N. T. T., Sivapalan, S., Pham, H. H., et al. (2020). Students' adoption of e-learning in emergency situation: The case of a Vietnamese university during COVID-19. Interactive Technology and Smart Education, 18(2), 246–269. https://doi.org/10.1108/itse-08-2020-0164

Hoq, M. Z. (2020). E-learning during the period of pandemic (COVID-19) in the Kingdom of Saudi Arabia: An empirical study. American Journal of Educational Research, 8(7), 457–464. https://doi.org/10.55057/ijares.2021.3.4.17

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

Huet, J. M., & Tcheng, H. (2010). What if telecoms - were the key to the third industrial revolution? Pearson Education, France.

Jatmikowati, T. E., Rachman, A. U., & Adwitiya, A. B. (2020). Technology acceptance model in using e-learning on early childhood teacher education program's student during pandemic. Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini, 5(2), 1501–1511. https://doi.org/10.31004/obsesi.v5i2.801

Joudeh, J. M. M., & Dandis, A. O. (2018). Service quality, customer satisfaction and loyalty in an internet service provider. International Journal of Business and Management, 13(8), 108. https://doi.org/10.5539/ijbm.v13n8p108

Joudeh, J. M. M., Khraiwish, A., Ali, N. N., et al. (2021). Evaluating attitudes and intention to use of personal protective equipment (PPE) during the COVID-19 pandemic. Academy of Strategic Management Journal, 20(6), 1–15.

Kalsoom, B. S., Mumtaz, M., Dahir Mohamed, N., et al. (2022). Online education amid COVID-19 crisis. IJERI: International Journal of Educational Research and Innovation, 18, 240–259. https://doi.org/10.46661/ijeri.6429

Kaur, B., Kaur, J., Pandey, S. K., & Joshi, S. (2023). E-service quality: development and validation of the scale. Global Business Review, 24(5), 953–971. https://doi.org/10.1177/0972150920920452

Kee, D. M. H., Liew, J. H. E., Heng, J., et al. (2023). Post pandemic: university students' satisfaction on the use of e-learning. Asian Pacific Journal of Management and Education, 6(3), 1–15. https://doi.org/10.32535/apjme.v6i3.2634

Khan, M. A., Kamal, T., Illiyan, A., & Asif, M. (2021). School students' perception and challenges towards online classes during COVID-19 pandemic in India: An econometric analysis. Sustainability, 13, 1–15. https://doi.org/10.3390/su13094786

Kim, B., & Park, M. J. (2017). Effect of personal factors to use ICTs on e-learning adoption: comparison between learner and instructor in developing countries. Information Technology for Development, 24(4), 706–732. https://doi.org/10.1080/02681102.2017.1312244

Li, N., Zhang, X., & Limniou, M. (2021). A country's national culture affects virtual learning environment adoption in higher education: a systematic review (2001–2020). Interactive Learning Environments, 31(7), 4407–4425. https://doi.org/10.1080/10494820.2021.1967408

Li, Y., Duan, Y., Fu, Z., & Alford, P. (2011). An empirical study on behavioural intention to reuse e-learning systems in rural China. British Journal of Educational Technology, 43(6), 933–948. https://doi.org/10.1111/j.1467-8535.2011.01261.x

Liao, Y. K., Wu, W. Y., Le, T. Q., & Phung, T. T. (2022). The integration of the technology acceptance model and value-based adoption model to study the adoption of e-learning: The moderating role of e-WoM. Sustainability, 14(2), 815. https://doi.org/10.3390/su14020815

Lin, K. M., Chen, N. S., & Fang, K. (2011). Understanding e-learning continuance intention: a negative critical incidents perspective. Behaviour & Information Technology, 30(1), 77–89. https://doi.org/10.1080/01449291003752948

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1(2), 130–149. https://doi.org/10.1037/1082-989x.1.2.130

Marani, I. N., Subarkah, A., & Wijayanto, A. (2020). The use of computer-mediated communication (CMC) in distance learning during COVID-19 pandemic: pros and cons. In: Proceedings of the 6th International Conference on Social and Political Sciences. pp. 95–102. https://doi.org/10.2991/assehr.k.201219.015

Mariia, R., & Strzelecki, A. (2020). Students' acceptance of the COVID-19 impact on shifting higher education to distance learning in Poland. International Journal of Environmental Research and Public Health, 17(18), 6468. https://doi.org/10.3390/ijerph17186468

Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2020). Students' perception and preference for online education in India during COVID-19 pandemic. Social Sciences and Humanities Open, 3, 1–11. https://doi.org/10.1016/j.ssaho.2020.100101

Nambiar, D. (2020). The impact of online learning during COVID-19: students' and teachers' perspective. International Journal of Indian Psychology, 8(2), 783–793.

Noroozi, O., Alqassab, M., Taghizadeh Kerman, N., et al. (2024). Does perception mean learning? Insights from an online peer feedback setting. Assessment & Evaluation in Higher Education, 1–15. https://doi.org/10.1080/02602938.2024.2345669

Nusairat, N. M., Al-Gasawneh, J. A., Aloqool, A., et al. (2021). The relationship between internet of things and search engine optimization in Jordanian tele-communication companies: The mediating role of user behavior. International Journal of Data and Network Science, 163–172. https://doi.org/10.5267/j.ijdns.2021.6.016

Ogunode, N. J. (2020). Nigerian universities and their sustainability: Challenges and way forward. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3695789

Pelling, E. L., & White, K. M. (2009). The theory of planned behavior applied to young people's use of social networking web sites. CyberPsychology & Behavior, 12(6), 755–759. https://doi.org/10.1089/cpb.2009.0109

Poong, Y. S., Yamaguchi, S., & Takada, J. I. (2016). Investigating the drivers of mobile learning acceptance among young adults in the World Heritage town of Luang Prabang, Laos. Information Development, 33(1), 57–71. https://doi.org/10.1177/0266666916638136

Punnoose, A. C. (2012). Determinants of intention to use eLearning based on the technology acceptance model. Journal of Information Technology Education: Research, 11, 301–337. https://doi.org/10.28945/1744

Robin, R., & Dandis, A. O. (2021). Business as usual through contact tracing app: what influences intention to download? Journal of Marketing Management, 37(17–18), 1903–1932. https://doi.org/10.1080/0267257x.2021.2017323

Sahin, I., & Shelley, M. (2008). Considering students' perceptions: the distance education student satisfaction model. Educational Technology & Society, 11(3), 216–223.

Sakarji, S. R., Mohd Nor, K., Mohd Razali, M., et al. (2019). Investigating students acceptance of e-learning using technology acceptance model among diploma in office management and technology students at Uitm Melaka. Journal of Information System and Technology Management, 13–26. https://doi.org/10.35631/jistm.413002

Sarstedt, M., Ringle, C. M., Hair, J. F. (2021). Partial Least Squares Structural Equation Modeling. In: Homburg, C., Klarmann, M., Vomberg, A. E. (editors). Handbook of Market Research. Springer, Cham. https://doi.org/10.1007/978-3-319-05542-8_15-2

Seddon, P. B. (1997). A re-specification and extension of the DeLone and McLean model of IS success. Information Systems Research, 8(3), 240–253. https://doi.org/10.1287/isre.8.3.240

Sekaran, U., & Bougie, R. (2016). Research methods for business. New York. John Wiley & Sons.

Selamat, Z., & Jaffar, N. (2010). Information technology acceptance: from perspective of Malaysian bankers. International Journal of Business and Management, 6(1). https://doi.org/10.5539/ijbm.v6n1p207

Shaiba, H., John, M., & Meshoul, S. (2023). Female Saudi college students' e-learning experience amidst COVID-19 pandemic: an investigation and analysis. Heliyon, 9(1), e12768. https://doi.org/10.1016/j.heliyon.2022.e12768

Shevlin, M., & Miles, J. (1998). Effects of sample size, model specification and factor loadings on the GFI in confirmatory factor analysis. Personality and Individual Differences, 25(1), 85–90. https://doi.org/10.1016/s0191-8869(98)00055-5

Small, G. W., Lee, J., Kaufman, A., et al. (2022). Brain health consequences of digital technology use. Dialogues in clinical neuroscience, 22(2), 179–187. https://doi.org/10.31887/DCNS.2020.22.2/gsmall

Sukendro, S., Habibi, A., Khaeruddin, K., et al. (2020). Using an extended technology acceptance model to understand students' use of e-learning during Covid-19: Indonesian sport science education context. Heliyon, 6(11), e05410. https://doi.org/10.1016/j.heliyon.2020.e05410

Taat, M. S., & Francis, A. (2019). Factors Influencing the Students' Acceptance of E-Learning at Teacher Education Institute: an exploratory study in Malaysia. International Journal of Higher Education, 9(1), 133. https://doi.org/10.5430/ijhe.v9n1p133

Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics. New York, Allyn & Bacon.

Teo, T. (2011). Factors influencing teachers' intention to use technology: model development and test. Computers & Education, 57(4), 2432–2440. https://doi.org/10.1016/j.compedu.2011.06.008

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157. https://doi.org/10.2307/41410412

Wang, B., & Ha-Brookshire, J. (2018). Perceived usefulness and perceived ease of use of new technologies described by Chinese textile and apparel firm owners and managers. Available online: https://lib.dr.iastate.edu/itaa_proceedings (accessed on 11 January 2024).

Wongwatkit, C., Panjaburee, P., Srisawasdi, N., & Seprum, P. (2020). Moderating effects of gender differences on the relationships between perceived learning support, intention to use, and learning performance in a personalized e-learning. Journal of Computers in Education, 7(2), 229–255. https://doi.org/10.1007/s40692-020-00154-9

Wu, J. H., Tennyson, R. D., & Hsia, T. L. (2010). A study of student satisfaction in a blended e-learning system environment. Computers & Education, 55(1), 155–164. https://doi.org/10.1016/j.compedu.2009.12.012

Young, A., & Norgard, C. (2006). Assessing the quality of online courses from the students' perspective. The Internet and Higher Education, 9(2), 107–115. https://doi.org/10.1016/j.iheduc.2006.03.001

Yukselturk, E., & Yildirim, Z. (2008). Investigation of interaction, online support, course structure, and flexibility as the contributing factors to students' satisfaction in an online certificate program. Educational Technology and Society, 11(4), 51–6.

Zamil A. M., & Areiqat, A. Y. (2020). The impact of accreditation of higher education institutions in enhancing the quality of the teaching process. Talent Development & Excellence, 12, 1912–1921.