Factors Affecting Students' Continued Usage Intention of E-Learning During COVID-19 Pandemic: Extending Delone & Mclean IS Success Model

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Abstract—Due to COVID-19 pandemic, electronic learning (e-learning) has been considered as a main tool for delivering education all over the world. The study aims at identifying the factors affecting students' continued usage intention of e-learning during COVID-19 pandemic and the mediating role of student satisfaction. To achieve that, a research model has been developed through combining Delone & McLean model, diffusion of innovation theory, and COVID-19 perceived risk and self-efficacy as contextual factors. The data was collected through surveying students around the country, (542) questionnaires were collected, (525) responses are accepted for data analysis from the total questionnaires that were distributed electronically. Smart PLS 2 was used to assess the proposed model. The results showed that compatibility, Relative advantage, COVID-19 Perceived Risk, and satisfaction have a direct significant influence on students' continued usage intention. However, all the factors have been found to have an indirect significant impact on students' continued usage intention when the factor "satisfaction" mediated the relationships.

Keywords—eLearning, COVID-19, satisfaction, Delon and Mclean model, Jordan

1 Introduction

The development of Information and Communication Technologies (ICT) has provided unlimited opportunities for learners to explore and improve new ways of learning. The comprehensive readiness of internet technology and applications has changed the learning environment, paving the way for digital learning environments and emerging new teachers and learners [1]. Student satisfaction with e-learning is one of the main indicators of these systems' effectiveness in helping students and faculty members. In the past ten years, e-learning has become a requirement in terms of academic development and implementation institutions. Moreover, e-learning has been used to describe a learning model that can be implemented through websites. In other words, e-learning is a new flexible learning method [2] .

Therefore, exploring the variables that affecting individuals' satisfaction for a system will lead to increase their intention to use the system again [3] which in turn will affect students' continued usage intention [4]. In addition, the existence of unusual circumstances such as COVID-19 pandemic might have a role in motivating users to use the systems [5]. Therefore, examining a combination of factors extracted from the literatures [6]–[9] and the effect of COVID-19 Perceived Risk might provide significant results for the policy makers in higher education in Jordan. In addition, there is a lack of models that have investigated the use of both the DeLone & McLean model and innovation diffusion theory together in satisfaction with e-learning and how it affects intent to continue using e-learning in Jordanian higher education.

The importance of this study is emerged from the high potential of continue using e-learning as a formal and organized part of the learning system (the ministry of higher education and scientific research, 2019). Therefore, it is vital to determine the factors that affect students' intention to continue using e-learning during and after Corona pandemic.

This study might provide decision-makers with initial road map that present set of important factors that might be influence on students' continued intention to use e-learning. In addition, this study will participate theoretically in the body of knowledge of the literature by combining Delone & McLean and innovation diffusion theory. Therefore, there is a need to continue research to develop and test a coherent and comprehensive model for the success and continuity of use of the e-learning system.

1.1 Innovation diffusion theory

Innovation is an idea, practice, or thing that is perceived as new by an individual [10] . An innovation generates uncertainty, and uncertainty influences an individual or another element of adoption for more information about options. On the other hand, diffusion is the process by which an innovation is communicated over time among the members of a social system through specific channels [10]. IDT includes five important innovation features: relative advantage, compatibility, complexity, trialability, and observability. It has been widely applied in disciplines such as learning, sociology, communication, promoting, etc.

The competitive advantage refers to how many people feel the new invention is superior to old innovation. According to Rogers [11], it does not matter if innovation has objective merits or not. The degree to which people believe that Innovation aligns with the traditional idea in terms of "current values, past experiences, and needs of potential adopters" is referred to as compatibility". Complexity is the extent to which people find it difficult to use innovation and understanding. According to [11], some innovations are easier for people to understand, while others, if they require a higher level of knowledge, are more difficult. Viability of the experience is the extent of people's belief that opportunities to experience innovation before deciding on its adoption or not. A trialable innovation means less uncertainty for the person considering it for adoption, as they can learn by doing. The level at which ‘‘the results of the innovation are visible to others" is referred to as observability. Prior research, on the other hand, found that

only relative advantage, compatibility, are consistently associated with innovation adoption. [12].

On the other hand, research on Innovation Diffusion Theory (IDT) has shown that innovative people are more open to new ideas and can cope with high levels of uncertainty for years [11], [13]. The implementation of e-learning is a unique case of innovation diffusion in higher education. In addition, (IDT) can be considered one of the most popular theories attempting to explore the factors that influence individuals' satisfaction [14].

1.2 Delone & McLean model

D & M model has received great interest from researchers in the field of information systems. In 1992, the model was developed [15] initially to measure the approved structure for the success of IS. The information success model has discussed the six dimensions, (as shown in Figure 1) such as information quality, system quality, system use, user satisfaction, individual impact, and organizational impact.

Many researchers have changed or extended the model in the years since, while others have adapted it for specific applications like knowledge management and e-commerce systems. Therefore, D&M adjusted their model. The updated model is shown in (Figure 2). [16] also modified their model to address some of the original model's limitations. The IS success model was simplified by adding 'quality of service' based on previous readings. Therefore, the updated model contains six classes. System quality, information quality, service quality, user satisfaction, net benefits, and intent to use. However, according to[15], [16], a successful information system should possess good information quality and system quality. Although the model has been updated, it clearly needs more verification before it can serve as a basis for selecting appropriate IS metrics[17]. In this research study, we adopted [15] IS Success model as part of the proposed framework to create a tool for evaluating the success of e-learning Systems.

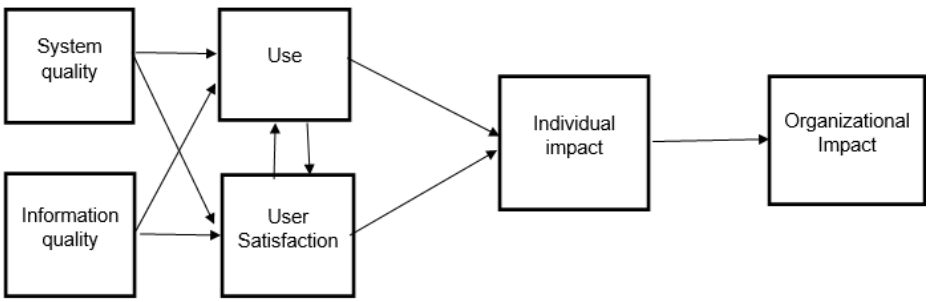

Fig. 1. Delone & Mclean original IS Success model

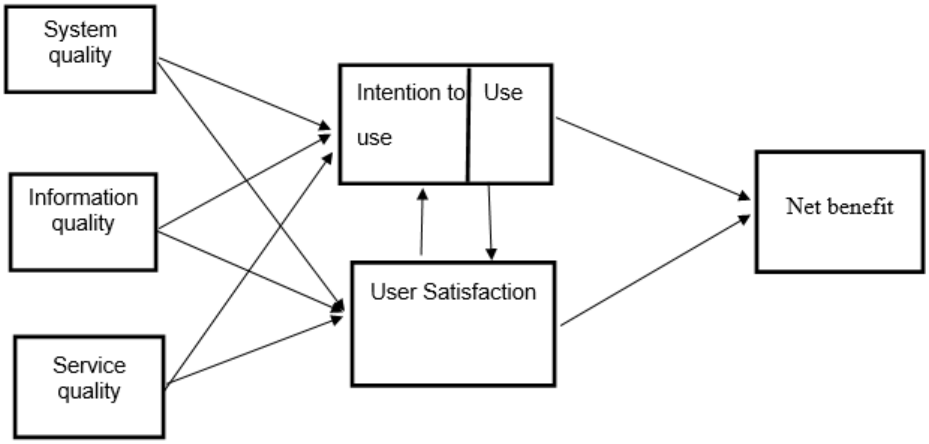

Fig. 2. Delone & Mclean updated IS Success model

1.3 E-learning and COVID-19 pandemic

E-learning, distance learning and online education are all different terms for e-learning .E-learning can be described as a tool that can make the teaching and learning process more student-centered, more innovative, and more flexible [18]. According to [19], access to lectures at any time, several times required, lets students to better remember the information required for traditional education. Certainly, like many other aspects of normal life, COVID-19 has had a serious effect on students, instructors, and educational organizations around the globe[20]. Causing the epidemic in the closure of schools, colleges and universities all over the world campus so students can follow the social separation procedures [21]. However, a smooth transition from the traditional education environment to distance learning and virtual learning cannot happen overnight. Nevertheless, since no one knows when the pandemic will disappear completely, Jordanian educational institutions have decided to use the technical resources already available to create online educational materials for students from all academic fields.

In response to school closures, UNESCO recommended that schools and teachers use distance learning programs, educational applications, and open platforms to gain access to distance learners and reduce disruption of education [22]. According to UNESCO monitoring, as of July 7, 2020, nearly 1,067,590,512 learners have been affected by school closures in response to the pandemic, 110 countries have implemented nationwide closures, affecting about 61% of students in the world. Local lockdowns have been implemented in a number of other countries, affecting millions of additional students. With the increase in use of online methods during COVID-19, it is essential to identify factors that affect student satisfaction and their continued intention to use e-learning [23].

2 Research model and hypotheses development

2.1 Research model

Nevertheless, there is important to explore the factors that not only affect e-learning adoption but also the student continued usage intention. In a study by[24]–[27], they demonstrated intent for the student to continue using e-learning. Moreover, [28]–[30]demonstrated the intention of continuous use and satisfaction of e-learning. [5] Examined COVID-19 Perceived Risk on the intention to continue using e-learning, however; it ignored the role of student satisfaction. Thus, the current study attempts to fill the gap by investigating a set of integrated variables from Delone & McLean and IDT models, as well as self-efficacy, and COVID-19 Perceived Risk that affect continued usage intention.

It has been found in previous studies a lack of examining these two theories in the same model[8], [31], [32]. [31] used both (IDT) and technology acceptance model (TAM) integration to examine potential factors affecting students' intentions to use an e-learning system. Moreover, (IDT) has been merged with (TAM) in the study of [33] to examine the factors that influence employees' intention to use the e-learning system. Furthermore, the Technological Readiness Index (TRI) and Dismantled Expectations Dismantling Theory (DEDT) were used as factors of satisfaction and intent for continued use in e-learning services [34]. Adding to that, [32], was examined using both the (TAM) and (D&M) model. Furthermore [35] they depend on (TAM) and (D&M) model, and social cognitive theory to predict student satisfaction with e-learning. Thus far, a few studies used [15] model and Innovation diffusion theory in the same model in the e-learning system between universities after the spread of COVID-19. Therefore, from the perspective of this study, it appears that it is important these two theories be examined in the context of e-learning.

The ICT adoption literature has highlighted the important role of perceived risks to the intention to use the technology. Psychological risk, product output risk, time/convenience risk, and financial risk are all factors that adversely influence the intention to use ICT [36]. However, in case the pandemic COVID-19 outbreak is likely to lead to the perceived risk affecting the continued use of ICTs in general, and e-learning in particular, in a positive direction. Recently, two studies looked at the impact of COVID-19 Perceived Risks, the first on intent to use an e-wallet [37] , and the second on students' continued intent to use e-learning [5].

The study also includes self-efficacy as determinants of satisfaction and intent of continued use, several studies have found SE to be an important element that directly impacts the user's satisfaction and intention in using IT, as well as a clear positive impact between self-efficacy and students' satisfaction with e-learning [38]–[40]. Based on that, this factor will be tested on a sample of new students to make sure of its effect.

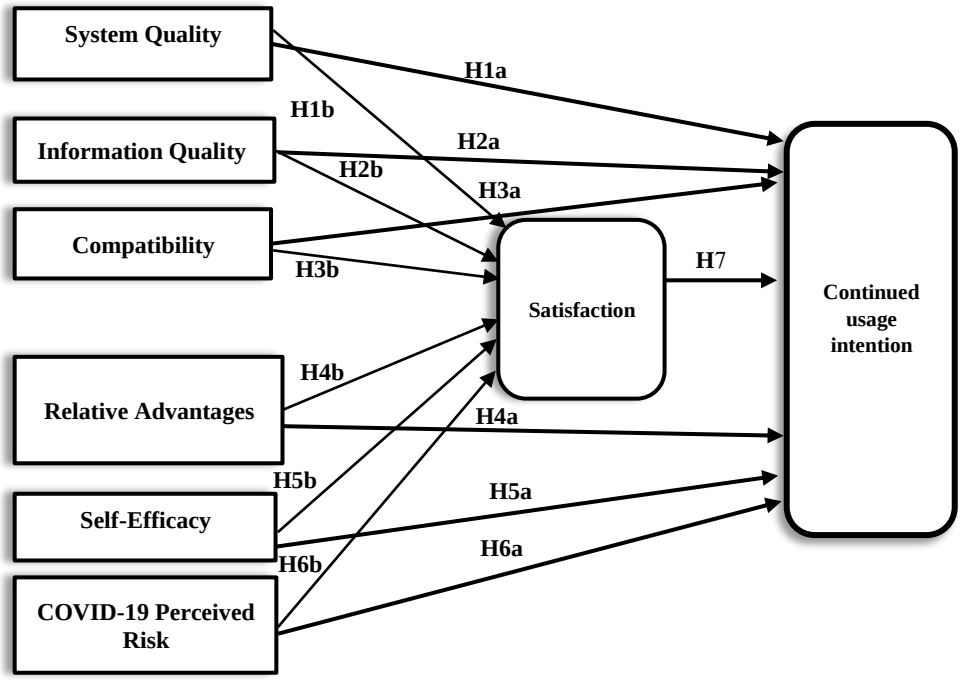

Fig. 3. Research model

3 Literature review and hypotheses development

3.1 System quality

System quality, based on [15] model, is a core influence of users' satisfaction. Moreover, [41] state that system quality is a level which users of the system reflect that the system is easy to learn, to use, to communicate, while it is considered by [42] an important precedent for technology use and user satisfaction . Similar, [43] says that system quality greatly influences user satisfaction . [5] found that the quality of the system greatly and positively affected end-user computer satisfaction. Furthermore, [28] found that the quality of the system is one of the main factors to enhance the continued user satisfaction with e-learning .Moreover, [32] found System quality the main aspect drive users' intentions and satisfaction to use of e-learning. [44] found that System quality has not supported system usage. Based on that, we assume the following hypothesis:

H1a: System quality has significant effect on continued usage intention.

H1b: Satisfaction mediates the relationship between system quality and continued usage intention.

3.2 Information quality

The information quality is another dimension of the DeLone & McLean model, which is related to the information that a system produces and delivers. Previous researchers consider the quality of information to be a factor that influences the decision-making process in terms of user's behavior and satisfaction towards the system [15], [16]. Moreover. Studies have found that information quality is closely related to user satisfaction [45]. Information quality is an important construct affecting student satisfaction with the use of e-learning platforms [46]. Furthermore, [47] discovered that higher information quality increases user satisfaction. [48] emphasized the importance of information quality in determining the relevance of online environments, which is critical to trainer satisfaction with technology. Information quality is frequently seen as a key antecedent for user satisfaction [49], [50], and intention to use an e-learning system [30], [51], [52] This leads us to say that when the quality of system information is high, user satisfaction will increase and thus increase the intention to continue using e-learning. As a result, it is assumed that content and information quality have a big influence on students' intentions to use. On the other side, the study of [53], [54] found that information quality has a significant effect on satisfaction but has no effect on system usage. We, therefore, suggest the following hypothesis:

H2a: Information quality has significant effect on continued usage intention.

H2b: Satisfaction mediates the relationship between information quality and continued usage intention.

3.3 Compatibility

Compatibility, according to [13] is the degree to which an innovation is perceived to be consistent with the existing values, prior experiences, and needs of potential adopters. According to [9] compatibility refers to how well it aligns with current values from previous experiences as well as the needs of potential end-user innovation.[55] were also of the same view stating that if the e-learning system goes in line with the learners' values, requirements and capabilities, then the level of perceived compatibility is considered to be high. Previous literature has often used compatibility as a variable affecting students' intention to use [56]. Prior studies have considered compatibility from different sides, resulting in support for its impact on Perceived ease of use, Perceived usefulness, and intention to use [57]. Moreover, [58] found that compatibility have significant impact on e-learning adoption intention. This research uses this factor to show students views on their intention to continued use of the system. Based on these, we will assume this hypothesis.

H3a: Compatibility has significant effect on continued usage intention.

H3b: Satisfaction mediates the relationship between compatibility and continued usage intention.

3.4 Relative advantage

The Relative Advantage is another motivation factor in the diffusion process., as defined in the IDT is the level at which people assume that the new innovator is better than the old innovator [11]. Also, it can defined as the degree to which an innovation is considered better than the idea that replaces it [9]. The result that intent to use an e-learning system is positively affected by perceived relative advantages has been reported in the relevant literature[33], [59]. Thus, this factor will be used in the current study to show the degree of students' satisfaction and their continued usage intention to the system. Depending on [31] in the study conducted it was found that all students, use the e-learning system because of its advantages and benefits in learning.. We therefore suggest the following hypothesis.

H4a: Relative advantage has significant effect on continued usage intention.

H4b Satisfaction mediates the relationship between Relative advantage and continued usage intention.

3.5 Self-efficacy

Self-efficacy, based on [35] as the self-belief that the user has the ability to perform certain tasks through e-learning, as well as users who have a strong belief in their knowledge and skills in interacting with e-learning have a more good attitude towards the use of the system, therefore, is expected to be satisfied. Self-efficacy was found to be a crucial factor that affects learners' satisfaction with e-learning in a study conducted by [60]. Based to [38] Self-efficacy is People who manage and perform an activity that needs to do a specific job does not include the skills they possess but their judgment of what they can do using the skills they possess. It has also been suggested that self-efficacy will enhance users' beliefs about their ability to use technology, which is the main driver of intent to use when use is mandatory [61]. [62] state that the positive influence of self-efficacy is based on the idea that people are more likely to engage in tasks that they think they can accomplish and to avoid tasks that they cannot do. [63] they found that individual features play an important part. Thus, there are studies that indicate that individual self-efficacy can be a factor influencing the continued use of technology. As such [64] he found that self-efficacy has positive effects on the acceptance and use of technology. [40] considered that Self-efficacy were critical factors for students' intention to use e learning. Based on that, we assumed this hypothesis:

H5a: Self-efficacy has significant effect on continued usage intention.

H5b: Satisfaction mediates the relationship between self-efficacy and continued usage intention.

3.6 COVID-19 perceived risk

The outbreak of the Coronavirus in the world prompted researchers to think of an alternative method of teaching, and that paved the way towards online learning, i.e., e learning. According to [65], e-learning will continue to grow after the coronavirus pandemic. [66] assumed that online learning could be supported by technologies such as

the Internet, telephone, radio, television, telephone, messaging, or e-mail communication during a virus crisis. Although universities and schools are closed due to the Corona epidemic, they can still continue the learning process through e-learning, according to [67] founder of Byju Online Education App, says, "Outbreak significantly increases the online education application.". On the other hand, several studies have shown that although there is a strategy to use online learning during a pandemic, there are countries that have limited technologies and are not ready to fully implement online learning across the country[68], [69] . Based on the study [70] conducted on COVID-19 virus, it is expected to have a negative but positive effect on e-learning. COVID-19's spread was unforeseen, and Peking University was forced to introduce live online programs [71]. COVID-19 is clearly going to be a major cause of a large-scale digital shift. We therefore suggest the following hypothesis:

H6a: COVID-19 Perceived Risk has significant effect on continued usage intention.

H6b: Satisfaction mediates the relationship between COVID-19 Perceived Risk and continued usage intention.

3.7 Satisfaction

Satisfaction is one of the components of a [15] model that has been defined as a recipient response to the use of an information system output. [45] also defined satisfaction as a subjective assessment of various outcomes that were assessed on pleasant and unpleasant conditions. [72] assert that satisfaction is influenced by information quality and system quality. Based to [73] Satisfaction can be defined as the level of achievement and pleasure of the students about various aspects of the learning programs they have received online. Previous researchers have recognized that satisfaction would be a suitable dependent variable in studies of online service [68] as well as an appropriate measure of the success of online services [74], [75]. According to[76], the primary explanation for a product's or services continued usage is customer satisfaction. Numerous studies in the literature show a connection between satisfaction and the intention to use an e-learning system [8], [60], [77]. Moreover, [78] found that User satisfaction is significant to continued intention to use. In this study, satisfaction will be measured as a variable that affect the continued usage intention of e-learning and as a mediator between the independent variables and dependent variable. We therefore suggest the following hypothesis:

H7: Satisfaction has significant effect on continued usage intention

4 Research design

In the current research, the quantitative method was used to measure the factors that affect the continued usage intention of e-learning during the COVID-19 pandemic, as the researcher developed a questionnaire and used it in the context survey. Accordingly, the quantitative research focuses on the statistical method of data collection and analysis, while qualitative research does not include numerical measurement.

4.1 Population and sampling design

The population consisted of students from various Jordanian universities. The first stage was a simple random sampling technique for choosing the universities in which the questionnaires will be distributed. The second stage adopted a convenient sampling technique with students from selected universities. The questionnaires were distributed using self-managed and online technology. The data for this study were collected in January 2021. The total number of collected questionnaires was (542) respondents. (17) questionnaires were excluded since they were not completed correctly and (7) had a standard deviation equal to zero. Finally, (525) questionnaires were approved for statistical analysis purposes. (60.2%) are female and (39.8%) were males. Most of the respondents were baccalaureate students.

4.2 The sample characteristics

The following table shows the sample distribution according to its demographic variables.

Table 1. Sample characteristics

NO	variables	categorization	Frequency	Percent
1.	Gender	Male	210	40
		Female	315	60
2.	Scientific Qualification	Diploma	14	3
		Bachelor's degree	434	83
		Higher education	77	15
3.	Academic Program	Scientific	229	44
		Humanitarian	208	40
		Medical	88	17
4.	Region	South	168	32
		Central	269	51
		North	88	17
5.	University	Governmental	350	67
		private	175	33
		Total	525	100

4.3 Data collection instrument design

A web-based questionnaire was distributed over a period of one month within the context of Facebook. The research survey consisted of three sections: A) demographic information (Gender, Scientific qualification, Academic programs, Region, and University); B) The research variables include (System Quality, Information Quality, Compatibility, Relative Advantages, Self-Efficacy, and COVID-19 Perceived Risk, as independent variables; C) Satisfaction as a mediator variable; D) continued usage intention as a dependent variable. The questionnaire used the 5-point Likert scale ranging from

strongly disagree (1) to strongly agree (5) to measure the factors affecting continued usage intention of e-learning.

4.4 Instrument validity and reliability

Validity means the ability of the instrument used to make sure the purpose for which it was designed [79]. The tool was verified by sending the questionnaire to a group of professors, academic experts for their comments, and suggestions regarding the items of the questionnaire, as many amendments were submitted, and all were taken into consideration.

Reliability refers to the ability of the research instrument to provide the same results if applied many times with a marginal error not exceeding (5%) [79]. In this research, reliability of the instrument was tested using the reliability coefficient of Cronbach's Alpha, which includes (525) respondents representing the sample of the target population. Table (2) shows Cronbach's Alpha coefficients.

Table 2. Reliability test

Construct	Cronbach's Alpha	CR Value
System Quality	0.838	0.892
Information Quality	0.871	0.912
Compatibility	0.909	0.936
Relative advantage	0.914	0.936
Self-efficacy	0.855	0.900
COVID-19 Perceived Risk	0.903	0.933
Satisfaction	0.947	0.959
Continued usage intention	0.946	0.958

Cronbach Alpha coefficient was applied to test the scales' internal reliability. It is the most popular technique for testing the internal reliability of multiple indicator variables [80]. According to the analysis results, Cronbach Alpha for values ranged from (0.838 - 0.947), Which is considered an acceptable degree of reliability [81].

Moreover, composite reliability (CR) test was also applied to test internal reliability and it indicated a good internal reliability if CR value was greater than 0.7 [79]. In this research, the values of CR ranged from (0.892) to (0.959). Were higher than 0.7 [82]. As shown in Table (2), this adequately indicates that composite reliability has been achieved. As a result, the Cronbach's alpha, and coefficient of determination for all constructs were deemed sufficiently error-free.

4.5 The scale's validity

Validity refers to the extent to which the indicator truly measures the contracts, which it is intended to measure [83]. we applied two type of construct validity: discriminant and convergent validity [84]. Examine the validity of the discriminatory level, where variable reflects a phenomenon that is not captured by another variable in the

same measurement model [84]. Correlation testing was applied to test the validity of discrimination.

Table 3. Correlations of research variables

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
COVID-19 Perceived Risk (1)	1							
Compatibility (2)	0.541	1						
Continued usage intention (3)	0.637	0.715	1					
Relative advantages(4)	0.582	0.856	0.776	1				
Satisfaction (5)	0.657	0.780	0.843	0.835	1			
Self-efficacy (6)	0.433	0.650	0.625	0.699	0.664	1		
information quality (7)	0.490	0.772	0.639	0.745	0.705	0.633	1	
system quality(8)	0.399	0.605	0.558	0.611	0.624	0.661	0.752	1

To check and confirm discriminant validity, the Fornell-Larcker criterion was used [83]. Table (3) shows the implications of this criterion. To have discriminant validity, the diagonal values must be lower than the non-diagonal values. The results show that all diagonal values are higher than non-diagonal values; this means that no discriminatory validity issue was found in the model.

Convergent validity means the degree to which the indicator of specific variable converge or share among variance and are highly in correlated among each other [84]. Factor loadings and average variance extracted can be used to calculate it (AVE). Firstly, convergent validity was check by determining if the loading was large and exceeds the recommended minimum level (0.5) [84].In this research, all item loadings more than (0.6).

Second, as a convergent validity test, AVE determines the sum of variance explained in measures by their respective variables in relation to unjustified variance due to measurement error [85]. [84] The agreed value for greater than the AVE (0.5) demonstrates a high degree of convergent validity. In this research, all AVE values are greater than the acceptable value, and thus the scale is of convergent validity. As shown in Table 4.

Table 4. Properties of the Measurement model

Constructs	**Items**	**Factor Loading**	**Mean**	**SD**	**CR**	**AVE**
System Quality	SQ1	0.800	3.830	1.190	0.892	0.675
	SQ2	0.810	3.566	1.246		
	SQ4	0.758	3.756	1.240		
	SQ5	0.862	3.627	1.334		
Information Quality	IQ1	0.841	3.263	1.385	0.912	0.721
	IQ2	0.810	2.857	1.307		
	IQ3	0.874	3.307	1.222		
	IQ5	0.843	2.794	1.283		
Compatibility	COM1	0.817	2.987	1.351	0.936	0.786
	COM2	0.919	2.893	1.422		

	COM3	0.916	2.733	1.439		
	COM4	0.890	2.811	1.416		
Relative advantages	RA1	0.748	3.461	1.291	0.936	0.748
	RA2	0.826	3.135	1.353		
	RA3	0.914	2.625	1.368		
	RA4	0.910	2.629	1.344		
	RA5	0.912	2.79	1.409		
Self-efficacy	SE1	0.800	2.836	1.29	0.900	0.693
	SE2	0.823	3.339	1.325		
	SE3	0.829	3.758	1.208		
	SE4	0.875	3.491	1.285		
COVID-19 Perceived Risk	COVID1	0.898	3.082	1.597	0.933	0.776
	COVID2	0.885	2.941	1.609		
	COVID3	0.905	3.236	1.568		
	COVID4	0.834	3.545	1.452		
Satisfaction	SA1	0.911	3.149	1.413	0.959	0.825
	SA2	0.916	2.99	1.447		
	SA3	0.908	3.000	1.295		
	SA4	0.883	2.901	1.378		
	SA5	0.922	2.872	1.404		
Continued usage intention	CUI1	0.882	2.857	1.481	0.958	0.822
	CUI2	0.913	2.695	1.472		
	CUI3	0.886	2.924	1.487		
	CUI4	0.925	2.855	1.516		
	CUI5	0.926	2.832	1.500		

The convergent validity was tested using factor loading. The structure's high loads mean that the indicators associated with it have a lot in common, which is captured by the structure [79]. Factor loadings of more than 0.5 are regarded as extremely important [84]. In the research the loadings for items exceeded the recommended value elements by a 0.5 except for two items (System Quality (SQ3) and Information Quality (IQ4), which was deleted because it is less than 0.05.

In this study, the average variance extracted (AVE) was used to assess convergent validity, and all AVE values were higher than the recommended value of 0.50 [84], ranging from (0.675 to 0.825).Therefore, the convergent validity for all constructs was successfully achieved and sufficient convergent validity was shown as shown in Table 4.

The present outcome delineates evidence of convergent and discriminant validity for the proposed model construct, indicating that the researcher can go ahead with the future analysis.

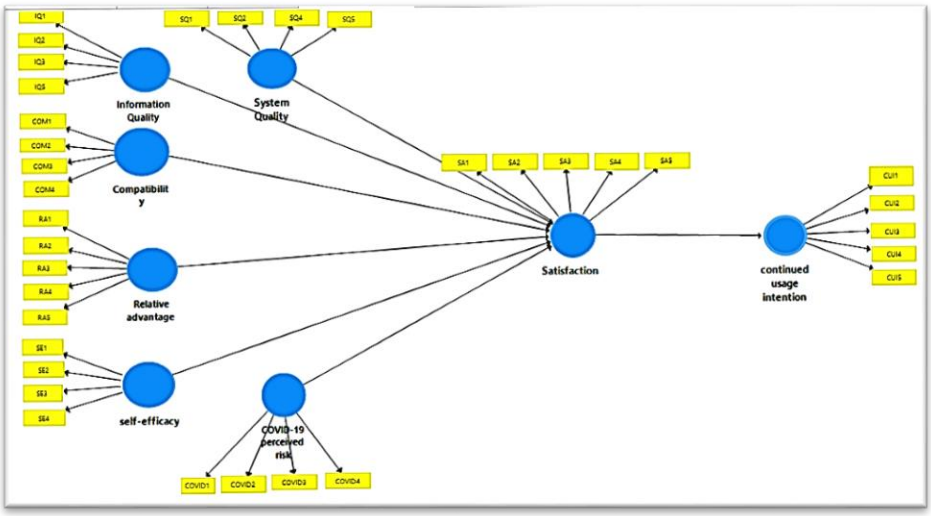

Fig. 4. Results

Table 5. The final results

	Path (Hypothesis)	Standard Deviation	T Statistics	P Values
H1a:	System Quality -> Continued usage intention	0.034	1.939	0.053
H1b:	System Quality -> Satisfaction-> Continued usage intention	0.034	15.024	0.000
H2a:	Information Quality -> Continued usage intention	0.041	0.613	0.54
H2b:	Information Quality ->Satisfaction-> Continued usage intention	0.028	19.811	0.000
H3a:	Compatibility -> Continued usage intention	0.042	3.082	0.002
H3b:	Compatibility -> Satisfaction-> Continued usage intention	0.034	16.579	0.000
H4a:	Relative advantage -> Continued usage intention	0.046	8.076	0.000
H4b:	Relative advantage -> Satisfaction-> Continued usage intention	0.045	11.921	0.000
H5a:	Self-efficacy -> Continued usage intention	0.028	1.574	0.116
H5b:	Self-efficacy -> satisfaction-> Continued usage intention	0.031	16.125	0.000
H6a:	COVID-19 Perceived Risk -> Continued usage intention	0.027	7.839	0.000
H6b:	COVID-19 Perceived Risk -> satisfaction-> Continued usage intention	0.027	18.174	0.000
H7:	Satisfaction-> Continued usage intention	0.016	51.617	0.000

5 Discussion

5.1 System quality

Through the previous presentation of the statistical analysis, the results of this research showed that system quality has no statistically significant effect on the continued usage intention, so hypothesis H1a was rejected. Additionally, this result is agreed with previous findings of a research conducted by [86], which stated that system quality had no significant relationship to continued usage intention. Therefore, students' continued usage intention is not based on the quality of the system. Whereas when satisfaction mediated the relationship between system quality and continued usage intention, the results showed a statistically significant effect. This means that the system quality in this study is not enough to make the students continued to use e-learning systems.

5.2 Information quality

Moreover, the results of the analysis also indicated that the information quality has no significant effect on continued usage intention, so hypothesis H2a was rejected. The no significant influence between the information quality on continued usage intention can be caused by the existence of the mandatory nature of the system, as expressed by [87], [88]. However, when the satisfaction mediated the relationship between information quality and continued usage intention, the results showed a statistically significant effect. This is also confirmed by [89] where information quality had indirectly affected actual use through satisfaction as a mediator. Furthermore, [90] stated that there are indirect effects of information quality through user satisfaction on the use. Similarly, results of [89] showed that information quality has a significant indirect effect on use via user satisfaction. The indirect influence of information quality on intended use has been demonstrated in research on other types of systems [91]. It appears that the students still have problems in using the system, especially quality problems. Delone and McLean (2003) stated that when the information system is not available in quality aspects, these might affect students' acceptance of the system. In the e-learning system, quality factors play an important role in teaching and learning. These results confirm the need for further research on how quality affects continued usage intention with the mediation of (but not limited to) user satisfaction.

5.3 Compatibility and relative advantages

Furthermore, the results of this study found that compatibility, and relative advantages, had significant effects on the continued usage intention, so hypothesis H3a, H4a were accepted. These findings supported existing researches that there existed relationships among these innovative characteristics and the continued usage intention [9], [17], [42], [57]. In order to promote the students' intention to continue using the e-learning systems, e-learning systems inventors should pay attention to the development

of innovative characteristics and content of e-learning systems for potential users. Furthermore, with satisfaction as a mediator between these two variables, their influence on continued usage intention has increased.

5.4 Self-efficacy

Regarding to self-efficacy, the result of the analysis indicates that there is no effect on continued usage intention, so hypothesis H5a was rejected. Unlike the results of other studies [92], [93].This results of the current study indicates that students who have not the ability to use the e-learning system do not have the intention to continue using it in the future. Self-efficacy will need to be enhanced, perhaps through means to foster the sense of success by completing various assigned tasks provided by the e-learning platform, so that they will be more willing to sustain their motivation to learn. While when satisfaction mediated the relationship between self-efficacy and continued usage intention, the results showed a statistically significant effect.

5.5 COVID-19 perceived risk

Interestingly, the effect of COVID-19 Perceived Risk on continued usage intention was found to be significant, so hypothesis H6a was accepted. The results showed that COVID-19 pandemic has made students dreaded about being infected by Coronavirus during attending their lectures at the University, therefore; use the alternative approach of learning represented by distance learning. Besides, [94] advised and encouraged strongly the adoption of distance learning method. In Jordan, [78] issued a list of regulations to adopt the distance learning approach, fully or partially, depending on the epidemiological situation. The results of this study that confirms the positive effect of COVID-19 Perceived Risk on continued usage intention is consistent with the result of [5], [94] who found that there is a significant relationship between COVID-19 Perceived Risk and continued usage intention.

5.6 Satisfaction

Lastly, the results of the analysis also indicate that satisfaction has impact on continued usage intention. It had the greatest positive impact on continued usage intention. This result was consistent with most of the research that was conducted [32], [95]–[97]. The more satisfied students, the continued usage intention of the system will also increase.

6 Conclusions

This study examined the factors that affect students' continued usage intention of e-learning during the COVID-19 pandemic. The results showed that are desirable outcomes while at the same time expecting rewards and desirable outcomes.

Satisfaction is an important factor that affecting students continued usage intention of e-learning. Additionally, this factor plays a positive role in encouraging students to continue using e-learning. Therefore, it is important to study the factors that affect the intention of continuous use of e-learning during the COVID-19 pandemic. Moreover, the results showed that the perceived risk of COVID-19 increased the need for the use of e-learning platforms. In general, the results of this study enhanced the understanding of why students are satisfied and continue to use e-learning during and after the Corona pandemic.

7 Research contribution

7.1 Practical contributions

After investigating the most important factors affecting the students' continued usage intention of e-learning, the current study contributes to increasing the knowledge related to continued using the e-learning during and after COVID-19 Pandemic. This study is the first of its kind in Jordan that addresses the Delone & McLean model and innovation diffusing theory while adding two more factors self-efficacy and COVID-19 perceived Risk to investigate the impact of these factors on the continued usage intention of e-learning among the students in the Jordanian universities. In addition, it is one of a few studies that consider the variable "COVID-19 Perceived Risk ".

7.2 Theoretical contributions

The results of the study provided more coverage and understanding of the factors that affect students' continued usage intention of e-learning and the extent of the impact of each factor. The study also contributed to an increasing focus on the importance of e-learning, especially after the emergence of the COVID-19 pandemic that forced students and universities to use e-learning platforms. The results of the study will motivate and guide governments and decision-makers to pay more attention to the topic of e-learning even after the COVID-9 pandemic.

Furthermore, the current study was applied in all the regions of Jordan, where the kingdom was divided into three parts; north, south, and Middle to cover governmental and private universities. Which included seven factors to investigate the degree to which these factors affect the students continued usage intention.

From a scientific point of view, the statistical results advocate the critical role of the following factors " compatibility, Relative advantage, COVID-19 Perceived Risk, Satisfaction", which also has scientific importance due to the events witnessed by Jordan and the world during the past period which led to moving towards using e-learning in the light of the existence of Corona crises, where e-learning played a prominent role in the educational process at all the levels.

8 Recommendations

Through the results of this study that were consulted from the theoretical framework and the results of statistical analysis, the following recommendations reached. Also, Higher education should take the results of this research into account.

The Ministry of Higher Education and decision-makers should seek to achieve student satisfaction because of its great role in their continued use of e-learning. It was also found in the results that the system quality and information quality do not have a significant impact, but if universities improve the quality of these systems, they will have a direct impact on the student's continuity to use the e-learning system.

These factors should be taken into consideration by universities and decision-makers in order to promote and increase student's intention to continue usage of e-learning.

9 Future research

These results confirm the need for further research on how factors affect continued usage intention with the mediation of (but not limited to) students' satisfaction. It is necessary to do more research to verify the results of this study, and more studies should be conducted on the factors that affect students' continued usage intention of e-learning during the COVID-19 pandemic in different cultures and contexts. Therefore, future research could examine this topic with a large sample to obtain a more substantial portion. The results of this study showed that the importance of certain factors varies from one group to another, and therefore future research can study the factors affecting the continued usage intention of e-learning in various Jordanian Universities in an executive way. As we know, that User behavior is dynamic and continuously changing. Therefore, Long-term research may provide insights into how students continued to use e-learning over time. e-learning in Jordan is still in its early stages. Our results may not cover other countries, where e-learning is more widely available. This study could be tested in future research on other countries. In addition, educational institutions, educational managers, and teachers must continue to push for continuous learning through online learning to make students more familiar with studying online.

10 References

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