

## Evaluating E-learning system success in higher education during the Covid-19

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### Abstract

Human lives globally have been affected by the COVID-19 pandemic. The quantitative research method was followed to assess e-learning system success from students' perspectives during the pandemic. ISS and USAT model was adopted to measure it, and a survey was used to collect 632 voluntary students. The regression analysis method presented variations between the quality of factors that anticipate user-perceived satisfaction, system use, and individual performance. While the quality factors suggested the impact of the dependent variable was (collaboration, information, service, System, IATE, DIA, LCAx, and LPIWO). In students' opinion, the study found quality factors significantly positively influence the adopted model, except for the QSer and IATE. The study outcome is expected to help academic staff and learners with further research.

Keywords: E-learning, distance education, students' opinion, DeL& McL model, USAT model

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## 1. Introduction

Education has been affected by the development of information and communication technology and several ICTs. They were being used for educational purposes, including "PCs, tablets, mobile phones and the Internet (Barari et al., 2022; Sabr and Neamah, 2017). Thus, one of the opportunities that ICT bring to the educational setting is E-learning technology (Salloum and Shaalan, 2018). ELS is a state-of-the-art methodology for learning and teaching in digital environments aimed at improving education by enhancing the teaching and learning processes. With the beginning of Covid-19 (Al-Baadani and Abbas, 2020; Kapasia et al., 2020). Despite many steps that governments have taken in most countries, like self-isolation, social distance and physical distance to slow down the spread of the pandemic, higher education institutions have sought to find a solution to the continuity of educational activities in a safe environment for the academic staff and students (Alhumaid et al., 2020; Verawardina et al., 2020; Shahzad et al., 2020; Pelmin, 2020; Maatuk et al., 2022). Learning is an ongoing activity, so significant efforts must be made to provide solutions and confront and reduce the spread of the pandemic (Wang et al., 2022; Verawardina et al., 2020). Since the pandemic outbreak, E-learning platforms have become the official platform for teaching, Interaction, and communication between students and teachers. The E-learning system (ELS) has been adopted as a tool for educational continuity in higher education. Inevitably, the sudden use of ELS by lecturers and learners is likely to lead to errors, and misuse since the effectiveness of ELS lies in students' ability and assent to use this System (Almaiah and Alismaiel 2019). the E-learning system success (ELSS) must be constantly evaluated to ensure that the outcome is suitable for the requirements of the end-users (Wang et al., 2007). Besides, Previous research calls for further research on the adoption of online education in North Cyprus, Iraq and Germany. This study will examine the ELSS by higher education students and applying to the Near East University, Salaheddin University, Duhok Polytechnic University, Lebanese French University, Erbil Technology Institute, Baghdad University in Iraq and Hochschule Emden/Leer in Germany. The study is a quantitative method; an online questionnaire is used to assess the use of ELS by students. The study also examines students' use of the different ELS platforms. Furthermore, the study describes the factors that determine the success of e-learning and examines the relationships between the factors adopted in the study. The main purpose of this research is to evaluate the ELSS by the students during the pandemic.

## 2. Related Research

The vast number of studies regarding E-learning has led to an increasing comprehension of the essential successful impacts, for example, influences of (information systems, services, systems, fulfilment, and use). An inclusive success model is required to achieve various success levels (Eom and Ashill, 2018). Since the remote learning system is an av, the study will describe the factors that determine the success of e-learning in both groups (Al-Fraihat et al., 2020). Several studies have previously assessed the quality of ELS in many countries worldwide (Mohammadi, 2015; Persico et al., 2014). The study of implementing remote education in the system's ability to move and handle Verawardina et al. (2020) uses the literature analysis technique. The researcher found the necessity of planning, clarity in implementing online learning, the instructors' responsibility, the Student's responsibility, the advantage of online learning, and the limitations of online learning. While Al-Baadani and Abbas (2020) discussed the problems and challenges during the pandemic founded in academic schooling institutions in Yemen, recommendations might support the educational sector to overcome the impact caused by Covid-19. Almaiah et al. (2020) discovered in their study the difficulties and challenges faced by online learning, assessing the critical influencing factors that facilitate the use of the system during the period of Covid-19. The research results provided good suggestions that helped designers, developers and scholars comprehend the main aspects of utilizing the system excellently during Covid-19. More research was conducted to investigate the impact of the barriers facing nursing faculty students on their perspective on learning online during

a period of Covid-19. The finding expos that 61.6 per cent of students had a negative perception regarding e-learning. Also, it appears that technology, infrastructure, administrative support, and instructor characteristics are the most popular component that obstructs online learning (Diab and Elgahsh, 2020).

On the other hand, Abbasi et al. (2020) identify students' perceptions of the online System during Covid-19. The researcher found that learners preferred familiar teaching through the closure time instead of teaching remotely. Shahzad et al. (2020) Studied the impact of (information, system and service) quality on user fulfilment and the effect of using an online system on the e-learning portal's success. The researcher also emphasized the collective differences among male and female pupils on online education portals during Covid-19. The research presented by Saleem et al. (2021) reviewed existing literature using gamification and online education and highlighted the documented advantages and challenges of online education gamification applications. Mohammadi (2015) merged the Model of Technology Acceptance (TAM) and (DeL& Mcl) to reveal the affecting on the quality of (educational, information, service, and technical system), and perceived ease of use, perceived usefulness of end-users on the intents and satisfaction of the users of the online schooling system. The result exposed that "intent to use" and "user satisfaction" positively impacted the system's actual usage. The main characteristic affecting users' intentions and fulfilment with online education was the system's quality and information quality. Finally, the correlation between ease of use and user intents has been mediated by 'perceived benefit' after reviewing the prior studies related to the subject of the current study; the authors attempt to fill the gap of previous studies by investigating the significant characteristic that impacts the adoption of the distance schooling system during the period of (COV-19) from the Student's perspective.

### **3. Theoretical Framework**

"E-learning" is the system's ability to move, handle, and track learning and learning resources electronically (Urh et al., 2015). There was considerable discussion regarding an overall description of the e-learning notion. As a system, it addresses various learning techniques, applications, procedures, and educational fields (Rasheed et al., 2022; Bossman and Agyei et al.,2022; Hubalovsky et al., 2019). Hence, A broadly agreed sense of the word "e-learning" is hard to find (Rodrigues et al., 2019). Some studies emphasize technology, while others concentrate on Interaction (Aparicio et al., 2016). E-learning concepts were practised in many ways, by email and computer-based training in the 1960s, before introducing the term e-learning in 1999 (Mulyani et al., 2021). The concept of e-learning is defined as online learning, also known as internet learning, technology-based education, internet-based schooling, and interactive education, as it is carried out using high-technology devices between instructors and learners (Mulyani et al., 2021). Information System Success (ISS) of the Delone & Mclean model (DeL&Mcl) and e-learning satisfaction (ELSAT) models were used to assess the ELSS in the Covid-19 period, and the previous experimental studies confirmed its validity and coherence.

#### **3.1 Delone and Mclean model (DeL&Mcl)**

The practical application of information systems IS and modern technology is an important issue, and the researchers interested in IS have demonstrated this. For this reason, researchers have gone to great lengths to define the success factors of information systems (Almaiah et al., 2016; Zaineldeen et al., 2020; Lashayo and Johar, 2018). Gorla and Somers (2014) indicate that an information system's success is critical to understanding the significance of the information system in institutions. Therefore, determining the ISS is vital to assess the effectiveness of IS, and many works of literature have been conducted earlier to determine the measuring of the success of an information system. In context, the first DeL&Mcl classification depended on the Mason (1978) amendment of the information model derived from the mathematic model coined by Shannon and Weaver (Tam and Oliveira, 2016). DeL &

McL revised the literature in a limited period, 1987-1981, focused on information systems (Tang et al., 2014). Hence, during this review, they studied 180 academic papers on information systems' success (Al-Farihat et al., 2020; Hagos et al., 2016). Accordingly, the authors undertook the original development of the model of (DeL & McL) in 1992. This model has been assumed to be the most well-known and practised (Almaiah and Alismaiel, 2019; Mohammadi, 2015). DeL and McL have formulated based on three levels (technical level) system quality, (Semantic level) quality of information and (level of influence) institutional impression (DeLone and McLean, 2016). Arguably, it is a model that attempts to give a complete comprehension of the ISS by defining and illustrating the relationships between six of the most significant success dimensions that are usually assessed by IS. The dimensions are (user satisfaction (USAT), quality of System (QSys), Individual Impact (IIM), quality of Information (QIN), usage of the system, and impact on the organization (IO). The QSys and the QIN affect the use and satisfaction of IS users. There is an interchangeable influence between usage and USAT. Thus, both influence the personal impact, and personal fluency, in turn, affects the organizational effect (Yakubu and Dasuki, 2018). IS qualities above-mentioned are deemed major indicators of ISS (Hsu et al., 2014). Hence, from 1993 to 2003, the DeL&McL models were cited 285 times; even after time passed, the original model was mentioned 3,164 once (Marjanovic et al., 2016). Figure 1 shows the Del&McL original model and Explains the correlations between the six variables.

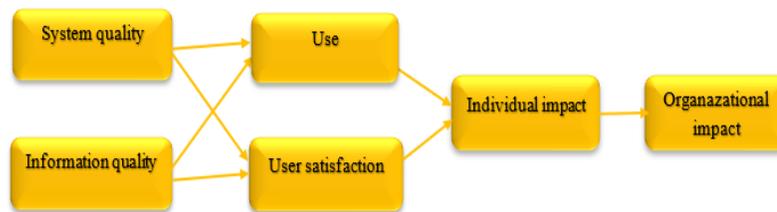


Figure 1. Original DeLoan and McLean model (Stefanovic et al., 2016).

This model was applied to assess IS in the earlier papers, for example (Seddon, 1997; Lin, 2007; Lwoga, 2014; Mohammadi, 2015; Marjanovic et al., 2016; Yakubu and Dasuki, 2018; Al-Farihat et al., 2020; Cidral et al., 2018) And the success of various kinds of IS for instance e-government was assessed by Wang and Liao (2008); Also, in the online shopping system ( Martin et al., 2019). Then, the researchers revised the original model after ten years in response to criticism of other investigators (2003) and restructured the ISS Model to enable it to deal with changeable technology. Thus, the model includes six correlated dimensions of ISS: Use, QIN, QSys, QService, intention to use, USAT, and benefits, shown in Figure 2.

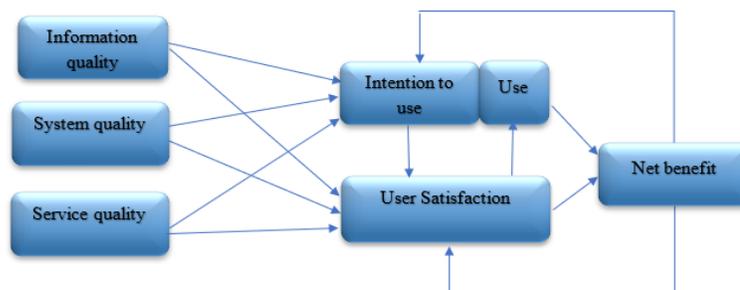


Figure 2. Renovated DeL&McL model (Hasan et al., 2017).

The model has been expanded by dividing the use factor into "use" and "intent to use" for measuring systems' performance when the system's usage is optional or compulsory. Besides, QSer has been appended as a new characteristic to estimate the QSer presented by the IT Center, which is present in various institutions that offer IS services to handlers (Lin et al., 2022; Mtebe and Raphael, 2018; Al-Azawei, 2019; Alzahrani et al., 2020; Sandjojo and Wahyuningrum, 2015). The individual effect and the organization effect construct have been combined in one factor, termed net benefits, defined as the benefits that the individual senses and will have an impression on the firm after utilizing the IS (Seta et al., 2018).

## 2.2 E-Learning satisfaction model (ESAT)

To assess the success of e-learning, distinguished attention may be required for satisfaction (Rahayu et al., 2016). Satisfaction was described as a person's attitude, impression, and feelings associated with many factors that affect a particular condition (Zaheer et al., 2015). Also, satisfaction is the feeling that is fundamentally based on emotion and happiness; It is the period during service delivery and expectations; furthermore, it is the feeling of a person resulting from comparing results to anticipates (Setyowati, 2020). Moreover, satisfaction was adapted from "customer satisfaction" (Cheok and Wong, 2014). Investigators in the IS have found that fulfilment is one of the most significant characteristics for system implementation success and is affected by aspects related to learners, instructors, lesson design, and innovative technologies (Teo, 2014). Furthermore, fulfilment has frequently been used in e-learning research as a dependent construct and often has a positive effect on inspiration (Teo and Wong, 2013).

Nevertheless, from the initial utilization, some learners have stopped learning online. A student's prior satisfaction with learning via the Internet determines whether students will continue to use this learning method (Rizwan and Iftikhar, 2019). The model Sun et al. (2008) presented explores the aspects that impact user Contentment. As well as discussing the significant variables identified in previous studies, the researcher concluded that earlier research mainly focused on the technical side (Chen and Yao, 2016). As well, Sun et al. (2008) built a six-dimensional combined model (ESAT): the learners, instructors, courses, design, and environment (Giannousi & Kioumourtzoglou, 2017; Osman et al., 2018). There were thirteen factors listed within these six dimensions. First, the learner's dimension included a learner's behaviour toward computers, Anxiousness about computers, and subjective efficiency of the Internet. Then, the instructor response's timeliness and attitude towards remote learning were gathered, and the course's resilience and consistency were evaluated via the course dimension. Afterwards, the technology construct emphasized the quality of technology and the quality of the Internet. The design dimension classified perceived utility and perceived ease of use. Finally, the environment's dimension consists of a variety in the evaluation and dealings with others viewed by the learner (Chen and Yao, 2016), as shown in Figure 3.

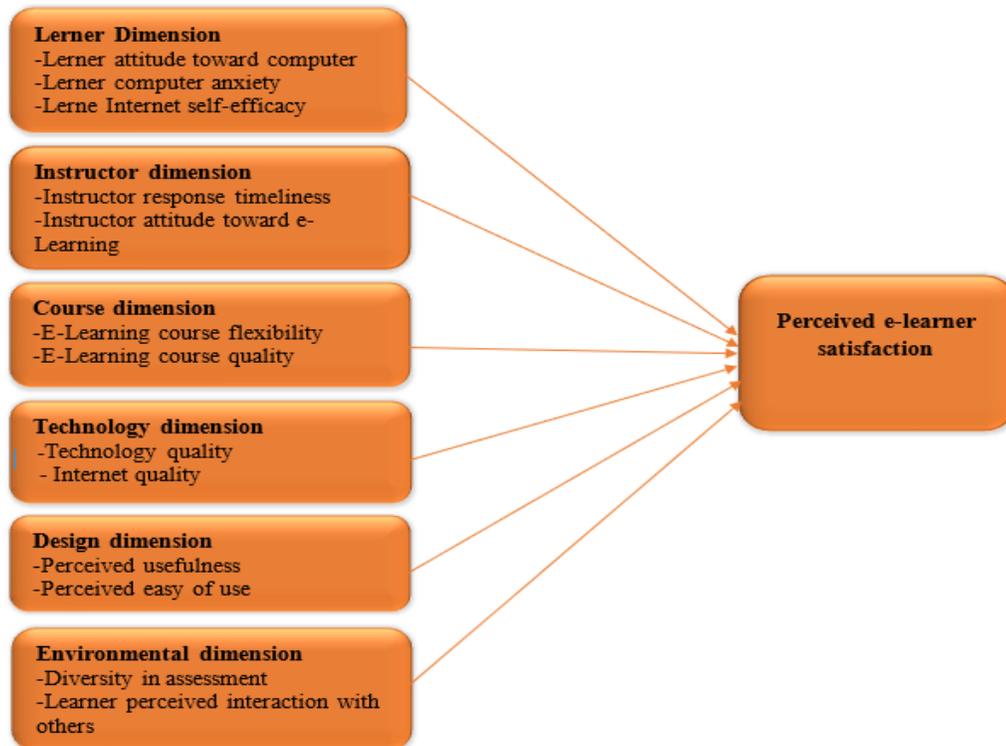


Figure 3. Perceive E-learning dimension (Üstünel, 2016).

Accordingly, Student satisfaction with e-learning drives them to be motivated and more involved in the learning process. Also, to some extent, a teacher's control over learning content leads to Student's satisfaction with the learning experience (Teo and Wong, 2013). So, student satisfaction is defined explicitly as learner perceptions formed from the perceived value of education and skills obtained in academic establishments. It is most thinkable that user satisfaction is a semblance of the emotions gained from communication. The concept of user satisfaction exemplifies compatibility between the information system used by the users and their necessities (Zaheer et al., 2015). In other words, if the users are pleased with the system when they use it, it works correctly (Munap et al., 2018). Hence, the emotional situation occurs as an outcome of several external influences that may affect a person's emotional aspect according to beliefs and principles (Cheok and Wong, 2014). Student satisfaction is the Student's self-perception of the extent to which the educational environment supports better performance.

Student fulfilment's strength indicates that appropriately challenging teaching methods stimulate thoughtfulness and education students, instructors, and Student roles considered vital members of learner satisfaction (Harsasi and Sutawijaya, 2018). According to past studies, Computers, teachers, and technologies are the factors that e-learner satisfaction has been paid attention to (Mohammadi and Fadayian, 2014). Another study was conducted by Costley and Lange (2016). The higher the degree of instructor controller in the ELS, the greater the practical learning. The students' gratification reflects the achievement of the educational program and its continuation or not. The main accomplishment of any educational program is its User satisfaction; For the continuity of e-learning, the students' satisfaction must be obtained (Bahramnezhad et al., 2016).

## 4. Methodology

### 4.1 Research Model

Eleven constructs were chosen for the model to achieve research aims. The study used three constructs as affected variables; system use (U), user-perceived satisfaction (UPSAT), and individual impact (IIM). Moreover, eight constructs as independent variables Quality of Collaboration (QC), quality of service (Qser), quality of information (QIN), quality of the System (QSys), learning computer anxiety (LCAX), instructor attitude toward e-learning (IATE), diversity in assessment (DIA), learning perceived Interaction with other (LPIWO). These constructs were chosen based on their significance in assessing the effectiveness of IS and literature in information systems and ELS. Based on the literature, 19 relationships were assumed in the model. The hypothesis-expressed relationships are illustrated in Figure 4.

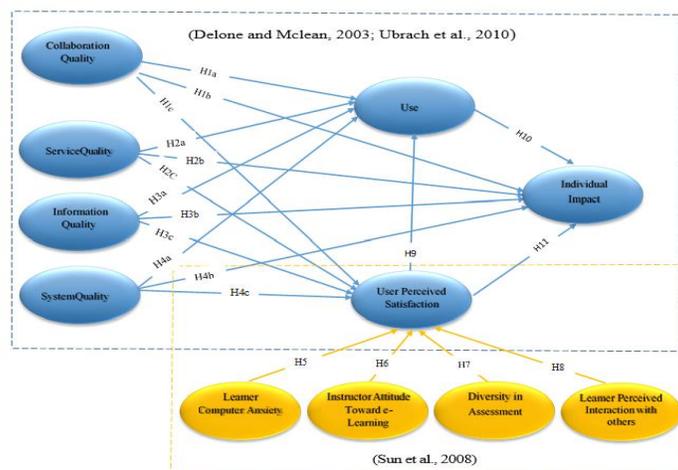


Figure 4. Adopted research model

### 3.2 Hypothesis

This section shows the hypothesis about the relations in the research model with the relevant deliberations, every relation among model constructs is grounded under the supposition described in the success of ELS and IS literature. This study implies that possible relations are positively significant between model constructs. Therefore, the hypothesis was formulated based on (Cidral et al., 2018) as follows:

#### 3.2.1 The quality of collaboration (QC)

Collaboration is defined as exchanging knowledge, making decisions, sharing resources, and integrating well. Cooperation requires at least the participation of two entities, Creating co-working spaces and influx in information (Hambali, 2020; Kurucay and Inan, 2017; Chen et al., 2013), and contact through emails between students and other instructors ( Cheok and Wong, 2015). Hence, students' cooperation has implied Interaction with each other throughout the ELS (Pham and Tran, 2020). The quality of collaboration (QC) has appeared as an essential determinant of system use and user fulfilment (Urbach and Ahlemann, 2010). This study adopted the QC factor to obtain students' opinions through four questions to measure the relationship between QC and (Use, IIM, and UPSAT) in e-learning. While the students are utilizing ELSs during the pandemic outbreak, which in turn will test the following hypotheses:

*H1a:* The QC has a positive impact on the IIM of ELS.

*H1b:* The QC positively impacts the Use of ELS.

*H1c*: The QC has a positive impact on the USAT of ELS.

### *3.2.2 Quality of Service (QSer)*

QSer in the educational field is described as the difference between the expectancies of service produced to students and their awareness (Pham et al., 2020). QSer means the achievement of service delivered to satisfy customers' needs (Ameen et al., 2020). QSer is one of the essential building blocks of the modified (DeLoan and McLean, 2003) model, as the researchers used specific characteristics such as dependability, tangibility, warranty, acceptance, and sympathy to determine the quality of service. At most, QSer is evaluated by sympathy, dependability, and acceptance (Titan et al., 2019; Ameen et al., 2019). In the universities, the faculty's information technology (IT) department is accountable for supporting the ELS (Yakubu and Dasuki, 2018). QSer has the power to influence student conduct. In e-learning, if the service meets the Student's expectations, this will give them the impetus to use it (Aparicio et al., 2017). Therefore the study adopts four indicators to examine the learners' viewpoint during the pandemic, as well as to test the following hypothesis:

*H2a*: QSer has a positive impact on the IIM of ELS.

*H2b*: QSer has a positive impact on the Use of ELS.

*H2c*: QSer has a positive impact on the USAT of ELS

### *3.2.3 Quality of information (QIN)*

The QIN is defined as the information that the system produces. Also, QIN refers to the quality of a system's outputs (Kurt, 2019). Giving users the required and correct information over the Internet at any time is the most crucial purpose of QIN; for the success of the ELS, there are a set of measures complementary to each other for the QIN, such as Suitability, benefits, comprehension, correctness, completeness, timing (Shahzad et al., 2020). Educational institutions must ensure that e-learning applications are of high information quality and must contain the information-mentioned characteristics (Al-Samarraie et al., 2018). Hence, the system's information in higher education institutions to the User must be understandable, not ambiguous, synchronized, up-to-date, easy to obtain, uncomplicated, and available to all, not restricted to a specific group. Providing the required information to the concerned individual must be related to the precise User (Pham and Tran, 2020). The DeL& McL (2003) model identified an association between QIN and USAT and use (Al-Fraihat et al., 2020). Furthermore, QIN has gained significant attention in ELSs (Al-Sabawy et al., 2016). Much research has explored that the QIN positively impacts the use and fulfilment (Kurt, 2019; Machado-Da-Silva et al., 2014; Urbach et al., 2010). Furthermore, some investigators only took QIN's effect on user fulfilment (Normelindasari and Solichin, 2020; Yakubu and Dasuki, 2018). Also, QIN directly affects individual influence (Cidral et al., 2018).

*H3a*: QIN has a positive impact on the IIM of ELS.

*H3b*: QIN has a positive impact on the Use of ELS.

*H3c*: QIN has a positive impact on the USAT of ELS.

### *3.2.4 Quality of System (QSys)*

In the e-learning field, (Delon and Mclen, 2003) have produced the QSys as the most crucial effective factor in the ISS model (Uppal et al., 2018). QSys are the necessary features that system makers specify to be included in the product to maximize system efficiency for an extended period (Dreheeb et al., 2016). The QSys is an essential factor for system users and organization owners. The QSys refer to as contingent and support the users' awareness of the product (Alsabawy et al., 2016). Hence, the QSys is determined by four dimensions: a) completeness: which reflects the degree to which the system gives

all needful information. b) accuracy: Accuracy is the User's belief that the information is precise. d) format: the User's perceptions of how well the information is provided. e) currency: represents the User's perceptions of how up-to-date the information is (Wu and Zhang, 2014). Eom et al. (2012) mentioned that the QSys directly correlated to USAT. Marjanovic et al. (2016) assumed that among the end-users of online learners, improving the QSys will make the ELS more compliant with the necessities of all users. Consequently, this research attempt to test the following suppositions:

H4a: QSys positively influences the IIM with ELS.

H4b: QSys positively influences the Use of ELS.

H4c: QSys positively influences USAT with ELS.

### 3.2.5 *The learners' computer anxiety (LCAx)*

computer anxiety plays a critical role in academic institutions; persons who are more prospective to refrain from implementing e-learning programs are worried about using their computers (Abdullah and Ward, 2016); Hence when using a computer and digital technology, feeling anxious, uneasy, and uncertain is the indication of computer anxiety (Asoodar et al., 2016). Although some students are concerned about adopting e-learning applications, it is possible that this feeling changes for the better when they realize that digital devices and modern technology can be valuable means of simplifying the courses. Thus, the users' anxiety about using computers constitutes an obstacle to learning to use the computer correctly (Schlebusch, 2018). prior articles study the impact of LCAx (Park et al., 2012; Chen and Tseng, 2012). On the other hand, the researcher found out (Mooney) 2007, concluded through a study that he conducted related to feelings of anxiety among students that anxiety in using the computer leads to a weakness in the academic level and leads to an avoidance of using computers for educational purposes. When using modern technology, anxiety about their use is a critical factor (Chang et al., 2017).

Another study by researchers (Piccoli et al., 2001) related student anxiety about computers to learner satisfaction; it is assumed that the learner's anxiety about the computer reflects the negative feeling. An investigation conducted by Sun et al. (2008) showed that the learners' computer anxiety had a significant impact on the learners' satisfaction with the electronic learning system (Ibrahim et al., 2019). The study by Nuri Abdalla (2019) discovered that an increase in the learner's anxiety about computers negatively affects learning computer skills on system use.

H5: The anxiety of the learner toward the computer negatively influences the UPSAT with the User of e-learning

### 3.2.6 *The instructors' attitude toward e-learning (IATE)*

Attitudes are described by Patry and Pelletier (2001) as positive or negative personal feelings towards a specific subject (El Alfy et al., 2017). The tutor's attitudes and ability to implement technology significantly impact students' learning achievements using technology in the lectures (Wichadee, 2015). ELSs' allow learning through their applications at any time, and resources can be modified immediately. For the instructor, implementing ELS in academic foundations is a significant challenge in developing states as tutors are familiar with the traditional approaches to giving lectures. Consequently, it became necessary to focus on raising awareness in adopting education using modern technology and changing the behaviour of instructors for better performance in e-learning (Kim and Park, 2018). Also, when tutors can make online classes, loading courses, homework, projects, and assignments. These procedures will inspire the learner to utilize the ELS and enrollment in online classes, take courses and do homework. These procedures will improve the usage of ELSs (Almaiah and Alyoussef, 2019). The instructor should be able to take advantage of educational technology and be prepared to set up the learning environment in a way that is appropriate to a successful process of learning; Given the growing availability and

advancement of new learning technologies, the use and dissemination in the education of the ICT capacity have not yet been wholly exploited (El Alfy et al., 2017). Therefore, educational institutions must improve their teachers' skills in keeping up with technology development to communicate easily with educational technology by successfully providing training courses to use e-learning platforms (Almaiah and Alyoussef, 2019). As can be seen, the instructor's lack of ICT skills will be significantly impaired, and they will try to avoid its use. If teachers have good behaviour and requisite technical skills compared with others, they may use the e-learning method (Quadri et al., 2017). So the following hypothesis was supposed:

*H6: The IATEL influences the UPSAT of the ELS user.*

### *3.2.7 The diversity in assessment (DIA)*

In the ELS, various assessment methods drove users to believe that interconnection has been formed between them and the teachers, and the Student's educational efforts are appropriately assessed. Research supposes user satisfaction would grow due to the assessment's feedback if the ELS offered one or more distinct special assessment techniques. Diversity in evaluation is characterized by the learners' various evaluation methods (Sun et al., 2008). DIA is defined under the environmental dimension. Students' comprehension assessment like (quizzes, assignments, and projects). Teachers used to see how well the lessons are understood and each Student's level (Asoodar et al., 2016). DIA is adopting different evaluation technics in the curriculum (Cidral et al., 2018). For both students and instructors, evaluation provides a vital role in e-learning. It offers detailed reviews of the ELSS and decides which section of the curriculum can suggest a modification in the teaching technics. The study also supposes that the DIA can positively influence learner fulfilment (Safsouf et al., 2020). Similarly, this study supposes the following hypothesis:

*H7: The Diversity In Assessment positively influences the UPSAT with the User of e-learning.*

### *3.2.8 The learners perceived Interaction with others (LPIWO)*

In an e-learning environment, Interactions among individuals can be divided into three categories: the Student with the student interaction (SSI), the interactivity of the lecturer with the Student (ILS) and the interactivity of the Student with course materials (ISCM). The (ISCM), defined as the interactivity between learners and course subjects, is supported by the tutor. The next type (SII) is the interactivity between students and instructors. In the end (SSI), they are described as the interactivity between students and classmates, exchanging ideas, and discussing topics and lessons. Interactivity only happens if learning and teaching are well-planned and executed (Alqurashi, 2019; Luo et al., 2017; Xiao, 2017). Interaction in the education context is defined as the discussions that take place between students and teachers or students with the Student. Regardless of the environment of these discussions, if they are traditional face-to-face or remote, using a wide range of mediation. It is not a rule that remote Interaction is the same as in the on-campus classroom. Therefore, DE and teaching are likely less effective in DE (Kuo et al., 2014). According to Li et al. (2015), in traditional classrooms; Where Interaction occurs more among students who are close to each other; Peers who are distant from each other in class are rarely contacted. Better Interaction takes place in discussions and student presentations. E-learning is unlikely to be used alone as a successful teaching and learning strategy, as evidenced by the Interaction among teacher, student, and student, classrooms that registered low levels of success in completing e-learning courses (Chen and Yao, 2016). Hence, to increase student learning, students must participate more effectively (Gray and Diloreto, 2016).

Also, in student-student Interaction, contact between the learner and other learners is critical; This type of Interaction makes learners focus on concepts, speak to each other, and test the content presented. Social communication techniques enhance learner communication through exchanging views and

experiences (Gameel, 2017). The satisfaction of Students and perceived learning were greatly influenced by the lucidity of the course proposal, connections with tutors, and compelling conversation between class members; the design of the course, feedback from the teacher, self-inspiration, interactions, learning pattern, engagement, and facilitation of the teacher dramatically impacted student fulfilment of students. The study indicated that students noticed that the feedback provided is more effective in remote Interaction. Moreover, teachers care more about students. (Gray and Diloreto, 2016). According to Arbaugh (2002), user satisfaction increases when students interact more with others. Similar to the current study. Therefore, this study test learner interaction with three types of interactivity described above throughout three indicators. Thus, the current study assumes the following hypothesis:

*H8: The LPIWO positively influences the UPSAT of ELS users.*

### *3.2.9 User-perceived satisfaction (UPSAT)*

It is a critical factor affecting students' use of ELS applications (Disastra and Wahyuningtyas, 2020). Satisfaction is characterized by a person's perception of how responsive the system is to their needs and expectations (Ghazal et al., 2018). The satisfaction of users has been revealed from IS research to be one of the most critical factors in the system implementation success. Students' gratification appears to be a vital feature in the assessment of tutors, tutor courses, and the general quality of university education programs (Teo and Wong, 2013). In the context of ELS services, students are more prospective to practice the service again if they feel satisfied with the services provided (Disastra and Wahyuningtyas, 2020). User gratification is one indicator of the efficient use of an ELS to assist with their activities, such as extracting and publishing information and interacting with others (Seta et al., 2018).

According to Violante and Vezzetti (2015), a high level of satisfaction enhances usage, minimizes learner discontent, and improves student outcomes. Thus, student satisfaction with e-learning is fully linked to their long-term goals. Learner satisfaction is critical because motivation, commitment, learning, implementation, and achievement will ultimately increase (Aftab et al., 2019). In an e-learning environment, variables that affect user satisfaction are usually gathered into six components: learner, tutor, course, technology, system strategy, and the dimension of the environment (Aftab et al., 2019; Zaheer et al., 2015; Al-Qahtani et al., 2013; Teo and Wong, 2013). According to Tam and Oliveira (2016), greater user satisfaction leads to greater intention to use. Hence, Various studies have demonstrated the essential leverage link between users' satisfaction and usage of the ELS (Al-Fraihat et al., 2020; Mohammadi, 2015; Lwoga, 2014; Aparicio et al., 2017; Tam and Oliveira, 2016). The research model shows that user satisfaction was affected by several factors: QC, QSer, QIN, QSys, LCAX, IATE, DIA, and LPIOW. The perception of user satisfaction, in turn, affects usage, as indicated earlier in Figure 4. accordingly, the study assumes the following hypothesis:

*H9: The UPSAT positively influence the use of ELS.*

### *3.2.10 The use*

The (use) is an essential factor; the use of the system is characterized by how users use the IS (Jeyaraj, 2020; Zaineldeen et al., 2020; Fernando et al., 2019). Also, it points to using the ELS to recover information, issue notifications, save and exchange documents, connect with peers, and provide aid for lectures (seta et al., 2018). The ISS model postulates several relationships between the model dimensions (DeLone and McLean, 2003). To measure the performance of the system, the practice of the system is a critical factor; it describes the extent and the rate of utilization; one of the most significant outputs of IS is the appropriateness, quality, and design; If the System is deemed beneficial, then the use of the system is probably to augmentation. Whereas, if the system is considered not meeting the User's needs and useless, then the system usage is perhaps to decrease (Kurt, 2019). Besides, If the perception of usage by e-learners is matched with their requests, students may carry out their homework more

successfully; Pupils' awareness of positive individual influences increases with the increasing use of e-learning applications (Aparicio et al., 2016). In recent research, the correlation between system use and personal effect has attracted extensive interest (seta et al., 2018; Deng et al., 2004). At the same time, other studies did not find a link between system use and individual effect (Iivari 2005; Tong et al. 2015).

In conclusion, the greater the system's utility, the more times is used. In the research model assumptions, the use dimension is influenced by several non-independent factors: QC, QSer, QIN, QSys, and UPSAT. While it is supposed to have a single effect on the personal impact of IIM in the ELS. Therefore, the next hypothesizes was proposed:

*H10: The use has a positive impact on the IIM of ELS.*

### *3.2.11 Individual impact (IIM)*

Individual influence illustrates the influence of e-learning on its adopters by encouraging users to simplify and finish tasks faster, improve efficiency, and successfully and proficiently work; accordingly, the Delone and Mclean (1992) studies have stated the correlation between satisfaction and individual performance. As the researchers indicated in their model, user satisfaction significantly impacts individual performance (seta et al., 2018), similar, To the assumptions of the study of Fernando et al. (2019). Also, Individual acts are significant to the organization and the people working (Tam and Oliveira, 2016). Likewise, Costa et al. (2020) hypothesized the significant influence of learner satisfaction on individual influence. So, the study supposes the following correlation:

*H11: The UPSAT positively influence the IIM of ELS user.*

## *3.3 Research Method*

This study followed a quantitative research method to assess ELS's success. For these purposes, a questionnaire was distributed to examine the students' perspectives regarding ELS.

## *3.4 Research Participants*

This study's voluntary participants were students enrolled in universities in Iraq, North Cyprus and Germany. The participating universities in Iraq are (Salaheddin University, Duhok Polytechnic University, Lebanese French University, Erbil Technology Institute, Baghdad University) and in North Cyprus are (Near East University), and in Germany are (Hochschule Emden/Leer). The research was conducted in the Summer 2020 and Fall 2021 semesters. The online questionnaire link was distributed by email, with a sample size of 632 for students, and an open question addressed to the lecturers was conducted separately, and the link for the online questionnaire was sent by email with a total sample size of 81 for the lecturers, respondents were randomly selected of different ages. The researcher chose the universities above. Due to approachability to the responders. Moreover, the researcher has used the online survey tool to distribute broadly. According to Taherdoost (2016), Research objectives, the type of statistical analysis used in analyzing the data, and the sample size concerning the population are all critical criteria that must be taken into account. On the other hand, the probability of biased results decreases the sample size more significantly. To determine the research sample size for the unknown population, the researcher relied on the Raosoft program, which provided the researcher with estimated values as follows: an error rate of 5%, a confidence of 95%, a response rate of 50%, and 384 preferred sample sizes.

### *3.4.1 Demographic information for students*

The percentage of male students was 49.4%, and of female students, 50.6%. For most students, the age range was between (21- 18), making up 38.6 per cent of the entire study. The demographics of the

students' characteristics (gender, age, and university enrolled), frequency and percentage related to survey participants are described in Table 1.

Table 1: Demographic information for students participants (N=632).

students' Characterization		Frequency	Per cent
Gender	Male	312	49.4
	Female	320	50.6
Age	18-20	168	26.6
	21-23	244	38.6
	24-26	131	20.7
	Older than 27	89	14.1
University	Baghdad University	29	4.6
	Duhok Polytechnic University	197	31.2
	Erbil Technology Institute	36	5.7
	Hochschule Emden/Leer University	90	14.2
	Lebanese French University	90	14.2
	Near East University	95	15.0
	Salahuddin University	50	7.9
Other	45	7.1	

### 3.5 Data Collection Tool

The online questionnaire was built to test the model for the questionnaire distributed to students experimentally. The scale was adapted from (Cidral et al., 2018).

**Section 1 Demographic Information of the Participants:** This section encompasses characteristics of participants such as (age, gender, and The university to which the Student is enrolled).

**Section 2 E-learning (experience and purposes):** This section reveals the participants' experience in using e-learning systems platforms such as (google classroom, Moodle, Edmodo, blackboard, and others) and the purpose of using e-learning systems whether they used for (training or university course).

**Section 3 Factors that affect usage of the e-learning system:** This section assesses ELSS. The whole section contains 37 items, including 11 factors. Each factor comprises a specific item; the factors are (QC, QSer, QIN, QSys, LCAx, IATE, DIA, LPIWO, UPSAT, use, and IIM). Respondents provided answers to the items based on 7 Likert scales strongly agree (7 points), agree (6 points), Somewhat agree (5 points), neither agree Nor Disagree (4 points), Somewhat disagree (3 points), disagree (2 points), and strongly disagree (1 point).

### 3.6 Reliability Test of Survey Dimensions

The aim of conducting and testing the research model is to clarify the interrelationship of factors and their effects. The researcher used reflective indicators of factors to evaluate reliability and validity. Reliability is a measure that provides consistent outcomes with similar values, and it considers to gauge the consistency of research, accuracy, replicability, and trustworthiness (Mohajan, 2017). With research adopting multiple items measurements, internal consistency Cronbach alpha ( $\alpha$ ) is a proper metric; ( $\alpha$ ) is the standard measure for testing internal consistency (Taber, 2018). The ( $\alpha$ ) was computed to evaluate the reliability of the indicators. According to Al-Fraihat et al. (2020), ( $\alpha$ ) should be greater than ( $\alpha \geq 0.70$ ). ( $\alpha$ ) equal to or above 0.8 is commonly referred to be reasonably good, and above 0.9 represents excellent internally consistent (Mohajan, 2017). The finding suggests that the overall measure ( $\alpha$ ) was

0.973 for the items (N = 37). It shows that the measuring instrument has demonstrated good reliability of the items.

### *3.7 Data Analysis Methods*

In this research, the following methods of analysis were used for analyzing the received data from respondents.

Descriptive statistics have been used, regression linear, variance (ANOVA), estimating the research hypotheses whether support or reject proposed hypotheses in the study, analysis correlates Bivariate, validity and reliability testing have been used, further explanation will be provided in chapter four.

Before carrying out the descriptive statistical analysis, it is necessary to pave the data beforehand and validate them to resolve any concerns that may influence the classification of the data and which may drive inaccurate consequences, which will have a significant impact on the assumptions presented in the study. After receiving 632 responses, the researchers imported the responses into an Excel file. Then, converting categorical data into numeric data. Changing data to a numeric form is beneficial (Baarda and van Dijkum, 2019). For measuring factors, the 7-point scale was converted to (1= strongly disagree; 2= disagree; 3= somewhat disagree; 4= neither agree nor disagree; 5= somewhat agree; 6= agree; 7= strongly agree).

The data was matched and revised with the responses in the response sheet by the researcher; As there is no missing data in the dataset due to the Required Answers feature available in the online survey formula; Also, there are no incomplete responses. To realize that the study population from which the samples were taken are distributed normally (Ghasemi and Zahediasl, 2012) normality test was implemented; since the sample size is (N > 300), the skewness and kurtosis method used to test the usual taste of the data distribution. The value of the skewness is between -2 and +2, and for kurtosis between -7 and +7 (Kim, 2013) as the researcher used it as a guide to determine the absolute value of a normal distribution (Appendix 6) shows the skewness and kurtosis test with standard errors for each construct. The QC skewness value is -0.2 (value fall between -2 and +2), and the kurtosis value is -1.341(between -7 and +7); the same with the QSer skewness value is -0.242; the kurtosis value is -1.162 and so on with other constructs. The research found that skewness and kurtosis are located between the absolute value, which means that the study data is distributed normally. Thus, no steps are needed to process the data, and these data will be applied to the next phase of analysis and to validate the research model.

### *3.8 Ethical Considerations*

The study was approved and accepted at Near East University by the Science Research Ethical Committee. Since the research was based on collecting quantitative data, this explains the direct Interaction between the participants. Moreover, the researcher from here requires attentiveness to moral issues during the conduct of quantitative research; several ethical considerations appear that must be taken into account, such as informing them of voluntary participation, Using the information for scientific purposes only, the anonymity of the participant, the confidentiality of information. All these ethical issues were taken into consideration by the researcher.

## **4. Result**

### *4.1 The Students' Viewpoints Toward E-learning Systems*

Statistical analysis was carried out on the dimensions item to inspect the factors affecting the success of e-learning, where the highest mean response obtained from the participants was 4.36, and the lowest mean was 3.49. The results of the mean and standard deviation for each item are presented in Table 2.

Table 2. Mean and standard deviation of study factors (N= 632)

Items	Indicators	Mean	Std. Dev
QC1	Easily and comfortably communicate	4.29	1.94
QC2	Effectively sharing information with colleagues	3.97	1.98
QC3	Comfortably storing and sharing documents	4.18	1.98
QC4	Quickly and easily find college contact information	4.05	2.013
QSer1	Readiness to assist	3.96	1.99
Qser2	Introduce guiding	4.04	1.95
Qser3	Instant feedback	4.13	1.93
QSer4	Fully understanding	4.07	1.91
QIN1	Usefulness	3.89	1.95
QIN2	Easy to understand	3.83	1.98
QIN3	Provide interesting information	3.80	1.93
QSys1	easy to navigate	4.36	1.94
QSys2	easily find the information	4.35	1.92
QSys3	Well designed	3.88	2.063
QSys4	easy to use	4.25	2.017
LCAx1	Nervous feeling	4.02	2.051
LCAx2	uncomfortably feeling	4.02	2.051
LCAx3	Confusedness	3.89	2.059
IATE1	Usefulness	3.77	1.96
DIA1	Diversity in evaluation tools	4.24	1.91
LPIWO1	Students-Students Interaction	3.49	1.98
LPIWO2	Students-Lectures Interaction	3.94	1.92
LPIWO3	Students-course material Interaction	3.92	1.99
UPSAT1	Satisfaction with the system supporting	3.91	1.96
UPSAT2	Satisfaction with the system effectivity	3.80	1.96
UPSAT3	Satisfaction with the system performance	3.80	1.96
UPSAT4	General satisfaction	3.57	2.06
U1	Frequency of the utilization of the system for information retrieval	4.17	1.91
U2	Frequency of the utilization of the system for publishing information	3.93	1.93

U3	Frequency of the utilization of the System for Connect with peers and educators.	4.21	1.96
U4	Frequency of the utilization of the System for Document storage and take part	4.12	1.95
U5	Frequency of the utilization of the system for performing the course task	4.35	1.91
IIM1	Enables completed tasks quicker	4.20	1.95
IIM2	improving productivity.	3.74	1.96
IIM3	simplify tasks	4.06	1.98
IIM4	Effectiveness	3.89	2.02

Where the scale used in the survey was 7 (a point) Likert scale of strongly agree (7) to strongly disagree (1) point. The findings show that the mean value for the first item of QSys, "easy to navigation", was the highest compared to the other mean values,  $M=4.36$ ,  $SD=1.94$ ; the mean value indicates that the students did not give absolute opinions about whether navigating within ELS was easy, this demonstrates students' uncertainty about QSys. The same opinion was obtained from students regarding QSer. Where the lowest mean value was for the first item of LPIWO,  $M= 3.49$ ,  $SD=1.98$ . "I learned more from my peers in the ELS than in other courses" the mean value for this item indicates that students somewhat disagreed that they had learned more than their peers in e-learning from regular courses. Students gave the same opinion regarding UPSAT and IATEL. The total mean value of LCAX was  $3.97$   $SD=1.96$  indicating that students had no problem working on a computer. Regarding system use, students' responses did not show a conclusive decision about whether or not they use the system to perform various activities such as (uploading an assignment, interacting with peers or lecturers, saving courses, etc.). Table 3. show the overall mean value and standard deviation for each dimension of the questionnaire

Table 3. The total mean scores of each factor

Factors	Mean	Std. Deviation
Quality Of Collaboration	4.1210	1.77486
Quality Of Service	4.0781	1.77544
Quality Of Information	3.9446	1.75841
Quality Of System	4.2100	1.74080
Learner Computer Anxiety	3.9773	1.95962
Instructor Attitude Toward E-Learning	3.7674	1.96434
Diversity In Assessment	4.2389	1.91537
Learner Perceived Interaction with Others	3.7827	1.73075
User Perceived Satisfaction	3.7710	1.80252
Use	4.1554	1.68569
Individual Impact	3.9711	1.77382

#### 4.4 Correlation Between the Model Factors

The Pearson correlation ( $r$ ) scale was calculated to specify the direction and strength of the association and to check the relationship between the variables is a statistically significant linear relationship. Correlation is considered strong if the value of  $r$  is between 1 and -1, where 0 indicates no relationship. The results show a positive relationship between QC and QSer as the  $r= .674$ ,  $p= .000$ , as the  $p$ -value, less than 0.05, is considered significant. Also, the results show that the quality of services increases when the QC increases. There is no significant correlation between QC and LCAX as  $r= -.097$ ,  $p= .015$ . Further,

there is a significant relationship between QC, QSer, QIN, QSys and the dependent variables U, UPSAT, IIM; likewise, there was a positive correlation between LIATE, DIA, LPIWO and UPSAT. However, a negative correlation has been found between LCAX and UPSAT as  $r = -.155$ ,  $p\text{-value} = .000$ . Table 4 explain the correlation between study variables.

Table 4. The correlation between study variables

Factors	QC	QSer	QIN	QSys	LCAX	IATE	DIA	LPIWO	UPSAT	U	IIM
QC	1										
QSer	.674	1									
QIN	.779	.640	1								
QSys	.779	.648	.841	1							
LCAX	-.097	-0.056	-.106	-.133	1						
IATE	.517	.446	.508	.501	.087	1					
DIA	.635	.505	.626	.652	0.007	.508	1				
LPIWO	.763	.672	.786	.762	-.108**	.614	.675	1			
UPSAT	.750	.614	.826	.772	-.155**	.533	.626	.821	1		
U	.745	.615	.796	.800	-0.058	.486	.674	.743	.803	1	
IIM	.731	.611	.808	.830	-.164**	.506	.624	.788	.810	0.824	1

#### 4.5 Factors Increase the Internal Consistency of the Scale

The correct item overall correlation has been considered to examine the scale's internal consistency. The results show that the overall correlation of the items is primarily positive and more than .647 which indicates supportive internal consistency; this shows an acceptable score (Omani-Samani et al., 2018). Except for the three items of the LCAX dimension, the corrected item was negative and affected the scale's internal consistency, so deleting this item will improve the scale's internal consistency.

On the other hand, For Cronbach's alpha ( $\alpha$ ) if the item is deleted" (which indicates that the "item" if omitted, the entire scale reliability will increase). From Table 4.4, figure out if LCAX items are deleted, the reliability value of the measurement will increase. In contrast with the other items, the reliability value will become lower if deleted. ( $\alpha$ ) if the item was deleted and the overall correlation of indicators was illustrated in Table 5.

Table 5. Cronbach's alpha if the item deleted

Indicators	Corrected Item-Overall Correlation	( $\alpha$ ) Item Deleted
QC1	.762	.972
QC2	.792	.972
QC3	.770	.972
QC4	.746	.972
QSer1	.694	.972
QSer2	.678	.972
QSer3	.647	.972

QSer4	.722	.972
QIN1	.817	.972
QIN2	.817	.972
QIN3	.819	.972
QIN4	.763	.972
QSys1	.740	.972
QSys2	.772	.972
QSys3	.806	.972
QSys4	.769	.972
LCAx1	-.035	.975
LCAx2	-.035	.975
LCAx3	-.054	.975
IATE1	.595	.972
DIA1	.720	.972
LPIWO1	.752	.972
LPIWO2	.760	.972
LPIWO3	.780	.972
UPSAT1	.801	.972
UPSAT2	.784	.972
UPSAT3	.784	.972
UPSAT4	.800	.972
U1	.787	.972
U2	.782	.972
U3	.764	.972
U4	.766	.972
U5	.742	.972
IIM1	.767	.972
IIM2	.807	.972
IIM3	.774	.972
IIM4	.788	.972

#### 4.6 The factors affecting the success of the e-learning system

It was necessary to test the factors determining the system's success from the student's viewpoint to investigate the ELSS. The results obtained from the statistical analysis showed the factors that affect the ELSS based on the assumptions adopted in the study. Multiple regression analysis was used and the framework formulated with the results of ANOVA was considered significant at ( $p < 0.05$ ). The study also assumed that the dependent factors (system use, UPSAT, IIM) affected by (QC, QSer, QIN, QSys) and (LCAx, IATE, DIA, LPIWO) affecting UPSAT; the results are described in Table 6.

Table 6. Test the hypotheses and the results of the factors that affect the success of the e-learning system

Hypothesis	Factors	Unstandardized Coefficients		Standardized Coefficients	t statistical	P-value	Accepted
		B	Std. Error	Beta			
H1a	QC → IIM	.096	.037	.096	2.613	.009	<input checked="" type="checkbox"/>
H1b	QC → U	.174	.037	.183	4.733	.000	<input checked="" type="checkbox"/>
H1c	QC → UPSAT	.198	.039	.195	5.137	.000	<input checked="" type="checkbox"/>
H2a	Qser → IIM	.046	.029	.046	1.586	.113	<input type="checkbox"/>
H2b	Qser → U	.057	.029	.060	1.958	.051	<input type="checkbox"/>

H2c	Qser →	UPSAT	.058	.030	.057	1.903	.057	<input checked="" type="checkbox"/>
H3a	QIN →	IIM	.322	.042	.319	7.750	.000	<input checked="" type="checkbox"/>
H3b	QIN →	U	.311	.041	.324	7.499	.000	<input checked="" type="checkbox"/>
H3c	QIN →	UPSAT	.515	.043	.503	11.885	.000	<input checked="" type="checkbox"/>
H4a	Qsys →	IIM	.465	.042	.456	11.044	.000	<input checked="" type="checkbox"/>
H4b	Qsys →	U	.334	.042	.345	7.953	.000	<input checked="" type="checkbox"/>
H4c	Qsys →	UPSAT	.166	.044	.161	3.782	.000	<input checked="" type="checkbox"/>
H5	LCAx →	UPSAT	-.078	.021	-.085	-3.721	.000	<input checked="" type="checkbox"/>
H6	IATE →	UPSAT	.044	.027	.048	1.667	.096	<input checked="" type="checkbox"/>
H7	DIA →	UPSAT	.129	.029	.137	4.472	.000	<input checked="" type="checkbox"/>
H8	LPIWO →	UPSAT	.718	.036	.689	20.221	.000	<input checked="" type="checkbox"/>
H9	UPSAT →	U	0.751	0.022	0.803	33.829	.000	<input checked="" type="checkbox"/>
H10	U →	IIM	0.868	0.024	0.824	36.565	.000	<input checked="" type="checkbox"/>
H11	UPSAT →	IIM	.797	.023	.810	34.607	.000	<input checked="" type="checkbox"/>

A level of ( $p > 0.05$ ) explains that variation in the mean is significant

#### 4.6.1 Impact of QC on the IIM, use, and UPSAT with the ELS

the independent variable QC that is predicted to influence individual impact H1a from Student's perception, the coefficient ( $\beta = .096$ ,  $t = 2.613$ ,  $p = .009$ ). Moreover, to use H1b ( $\beta = .183$ ,  $t = 4.733$ ,  $p = .000$ ) to User perceive satisfaction H1c ( $\beta = .195$ ,  $t = 5.137$ ,  $p = .000$ ) can be seen clearly in Table 6, from the students' perception, the p-value for H1a, H1b, H1c was less than 0.05 ( $p < 0.05$ ). As a result, QC is supporting the model. The study indicates that the quality of collaboration positively impacts ELSS, use, personal impact, and User perceived satisfaction. It seems to be a significant success factor.

#### 4.6.2 Impact of QSer on the IIM, use, and UPSAT with ELS

As shown in Table 6 the second dimension in the model (QSer) has been rejected. because the p-value for H2a, H2b, H2c are greater than (0.05). As the hypotheses, H2a is related to Quality of Service to the coefficient below ( $\beta = .046$ ,  $t = 1.586$ ,  $p = .113$ ) and H2b to Use ( $\beta = .060$ ,  $t = 1.958$ ,  $p = .051$ ) finally to UPSAT ( $\beta = .057$ ,  $t = 1.903$ ,  $p = .057$ ). The study indicates that the quality of service has a negative effect on ELS use; the User perceives satisfaction and individual impact.

#### 4.6.3 The influences of QIN on the IIM, use, and UPSAT with the ELS

The statistical analysis result displays that the quality of information positively impacts use, individual impact and user-perceived satisfaction as the H3a, H3b, and H3c are accepted by the students' perspective. The p-value seems to be less than .05. Table 6. demonstrate the coefficient for individual impact ( $\beta = .319$ ,  $t = 7.750$ ,  $p = .000$ ) for use ( $\beta = .324$ ,  $t = 7.499$ ,  $p = .000$ ) and User perceived satisfaction ( $\beta = .503$ ,  $t = 11.885$ ,  $p = .000$ ). The result showed that the ELS provided beneficial, easy and attractive, dependable information to students, which in turn positively affected students' use of the system, satisfaction

#### 4.6.4 The influences of QSys on the IIM, use, and UPSAT with the ELS

The prediction of the impact QIN on IIM, U and UPSAT, received significant support. Because learners have accepted the factor, the hypothesis is accepted by analyzing the coefficient under IIM ( $\beta = .456$ ,  $t = 11.044$ ,  $p = .000$ ) and for the use ( $\beta = .345$ ,  $t = 7.953$ ,  $p = .000$ ) and UPSAT ( $\beta = .161$ ,  $t = 3.782$ ,  $p = .000$ ).

#### 4.6.5 *The influences of LCAX on the UPSAT of the e-learning user:*

Hypothesis H5 predicted LCx to negatively impact User perceived satisfaction on the e-learning user (ELU). The statistical analysis result from Table 6. shows that the coefficient ( $P < 0.05$ ) represents that learner computer anxiety has a negative influence and has been accepted by students. The coefficient ( $\beta = -.085$ ,  $t = -3.721$ ,  $p = .000$ ). Therefore, the hypothesis supports the model.

#### 4.6.6 *The influences of IATEL on the USAT of the ELU*

Hypotheses assumed in the study predicted that the instructor's attitude towards the e-learning system will affect user satisfaction. The statistical analysis showed that the instructor's attitude towards the e-learning system does not affect the User's satisfaction, as the H6 hypothesis was rejected from the students' point of view. Since the H6 coefficient of user satisfaction is ( $\beta = .048$ ,  $t = 1.667$ ,  $p = .096$ ), the p-value is clearly greater than (0.05), as shown in Table 6.

#### 4.6.7 *The influences of diversity in assessment on the User perceived satisfaction of the ELU*

The independent variable DIA that is predicted to positively influence user-perceived satisfaction H7 from Student's perception, the coefficient ( $\beta = .137$ ,  $t = 4.472$ ,  $p = .000$ ). As can be shown in Table 6, p-value was less than 0.05 ( $p < 0.05$ ). As a result, DIA supported the model, which means that a different type of assessment, such as (quizzes, presentations, online exams, etc.) provided by ELS, in turn, affects student satisfaction.

#### 4.6.8 *The influences of LPIWO on the UPSAT of the ELU*

From the students' viewpoint, the results of the statistical analysis show that Learner perceived Interaction with others has a positive impact on user-perceived satisfaction as the coefficient of H8 is ( $\beta = .689$ ,  $t = 20.221$ ,  $p = .000$ ). The P-value is less than (0.05), as shown in Table 6, the H8 is supporting the model.

#### 4.6.9 *The influences of UPSAT on the use, IIM of the ELU*

The expectation of influencing the User's satisfaction on two dependent variables was significant, as seen in Table 6. The two hypotheses H9 and H11 have been accepted by students. The coefficient from students' response for H9 for use ( $\beta = 0.803$ ,  $t = 33.829$ ,  $p = .000$ ). So, the H9 supports the model. The same result was founded in other studies (Urbach et al., 2010; Cidral et al., 2018). Hence, User perceived satisfaction positively influences individual impact, as coefficient ( $\beta = .810$ ,  $t = 34.607$ ,  $p = .000$ ). So, the H11 supports the model.

#### 4.6.10 *The influences of system use on the IIM of the ELU*

Predicting hypotheses regarding system use greatly support the model, as learners accept H10, demonstrating that system use positively affects individual performance. The statistical analysis result is shown in Table 6. The coefficient of H10 from students' perception ( $\beta = 0.824$ ,  $t = 36.565$ ,  $p = .000$ ), Indicates that p-value ( $p < 0.05$ ).

## 5. DISCUSSION

The students' viewpoints towards e-learning were between neither agree nor disagree and somewhat disagree regarding all factors where a positive correlation have found between factors except learner computer anxiety (LCAX) have a negative correlation with user-perceived satisfaction (UPSAT). Also, LCAX negatively affected the internal consistency of the scale, while other factors supported the internal consistency of the scale. Assumed relationships were verified, quality of collaboration QC, QIN and QSys explained the system to use. LCAX, DIA and LPIWO explained UPSAT, which explained system use and individual impact and was considered necessary for user satisfaction. QSer was not a determinant factor

of individual impact, system use and satisfaction. Also, IATEL did not determine user satisfaction. QC, QIN and QSys determine IIM, system use, UPSAT and UPSAT, and system use determine IIM, while LCAX, DIA, LPIWO determine user satisfaction.

The results indicate that the quality of collaboration positively influences (system use, individual impact, and user satisfaction) (H1a, H1b, H1c) students' viewpoint. If students collaborate further in the ELS with their peers, such as (teamwork Assignments and preparing ideas), students can spend lots of time utilizing e-learning, which in turn, may significantly increase the use of the ELS and enhance students' performance. A similar result was found for H1b and H1c with a significant at ( $p < .001$ ) for e-learning system utilization and employee portal utilization (Urbach et al., 2010; Hambali, 2020). Also, the result indicates QSer has no significant influence on individual impact, system use and user satisfaction (H2a, H2b and H2c). It shows that students enrolled in Iraq and the Near East and Emden/Leer university were not satisfied with the services provided by the system, in other words, the IT services centre of the ELS did not provide sufficient services to support students, which in turn affected the use of the System, UPSAT and IIM. This outcome is compatible with the finding conducted by previous research (Urbach et al., 2010). A similar finding for H2c was reported by other researchers (Safsouf et al., 2020). And for H2b (Tam and Oliveira, 2016). Also, the result showed that the QIN positively influences system use, individual impact and UPSAT in ELS H3a, H3b and H3c, ELS provided beneficial, easy, attractive and dependable information to students, which in turn positively affected students' use of the system, satisfaction and individual impact, the parallel finding for H3c was stated by other authors (Kurt, 2019) and for H3b (Freeze et al., 2010) User satisfaction, individual impact and system use significantly influenced by the quality of the system H4a, H4b, H4c, the results reflect the Student's satisfaction with the system's structure and interface, as it facilitates navigation and finding information, which in turn, contributed to the increased use of the system and the individual impact, a contrary result found for H4b and H4c in e-learning system use between male and female in Malaysian Universities, the study examines four factors (QIN, QSys, USAT, use) through an online questionnaire with a sample size of 280 (Shahzad, et al., 2020).

Also, the results indicate learner computer anxiety negatively impacts user satisfaction H5, this shows the students' positive feelings about using the computer in the ELS and negates any pressure or inconvenience for the Student towards using the system and thus had a positive impact on the learner's satisfaction, The same results were found for e-learning in Pakistan institutes (Aftab et al., 2019). H6 the instructor's attitude toward ELS based on the result considered not significantly influence user satisfaction; the result indicates that the learner's satisfaction is not affected by the attitude of the lecturer whether he/she prefers to use the system or not or encourages students to use it or not, Contradictory results are found in other research in e-learning (Giannousi and Kioumourtzoglou, 2017). The results show that DIA and LPIWO positively influence UPSAT H7 and H8; the result indicates that different type of assessment, such as (quizzes, presentation, online exam, etc.) have provided by ELS, in turn, affects students' satisfaction toward ELS. Similar results are found for student satisfaction in online courses (Asoodar et al., 2016). User-perceived satisfaction was a significant factor as it positively influences system use H9 and individual impact H11; the same outcome was predicted (Cidral et al., 2018; Tam and Oliveira, 2017; Urbach et al., 2010). The system used H10 was a significant factor in individual impact in students' viewpoint; the hypothesis result is parallel to the study's results by Aparicio et al. (2016).

## 6. Conclusion

E-learning becomes an intelligent selection for students and lecturers due to its simplicity, flexibility and accessibility through ICT tools. This study analyzed the factors that explain system use, user satisfaction, and the individual impact of ELS. After reviewing the literature, this study is considered to be the first

study evaluating the ELSS in higher education during the Covid-19 pandemic in Cyprus, Iraq and Germany from the students' point of view. Based on the quantitative analysis, the students' results in the past six months were extracted. The study integrated DeL&McL with the ESAT model and QC (Urbach et al., 2010). It can be determined that the Adopted quality of (collaboration, information, system, service) and (DIA, LPIWO, IATEL, LCAX, UPSAT, system use, IIM) from the literature (Cidral et al., 2018) is an important factor. This study aims to assess the success of ELS. This study indicates that during the pandemic, students prefer to use Moodle, Google Classroom and Zoom platforms for university course purpose; the study also showed that the measurement factors are positively correlated with each other except for LCA, as the results proved that LCAX does not correlate with other factors.

In the students' opinion, results indicate that the QSer has a negative impact on system use, the UPSAT, and IIM. Similarly, IATEL, does not significantly influence the UPSA. Thus, the two factors QSer and IATEL did not support the model and did not influence the ELSS. It indicates that learners were unsatisfied with the ELS service providers as a whole (their readiness, personal attention), and students' satisfaction was not affected by the instructor's perspective regards e-learning. The study concluded that QC, QIN, and QSys determine individual impact, system usage, and user satisfaction. Also, DIA, LCAX and LPIWO determine user-perceived satisfaction, and the determining factor for individual impact was system use and user satisfaction.

The sample size compared to the population of the three countries adopted in the study was appropriate, but it is good to expand the sample size; the sample size is considered a constraint of the study in terms of generalization; if it is expanded, it may enrich the study. The result indicates that if a different view is used for a different university in Iraq, Cyprus and Germany, the validity and reliability of the model increase. Future research can be done using different cases to assess the success of ELS during the period (CO-19-CR), future use of the system, and perform a comparative study.

The results indicated that the dimensions are appropriate for understanding ELS determinants from the viewpoint of students, but instead of adopting student-specific measurements only, adopting appropriate dimensions for students and lecturers may be more suitable for understanding ELS determinants. There were no conclusive estimates of preference or definite rejection of the factors measured in the ELS from the students' point of view. Using more apparent items may improve opinions or express them more clearly than before.

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