



DEPARTMENT OF EDUCATION,
COMMUNICATION & LEARNING

E-LEARNING IN EDUCATION DURING THE PERIOD OF PANDEMIC (COVID-19)

Yavar Ghanbari

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Abstract

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Purpose: The overall purpose of this study is to evaluate the success of e-learning implementation during the COVID-19 pandemic and to investigate the factors affecting it. This is examined using a case study of students of the University of Tehran (Tehran-Iran).

Theory: The study is built upon the Delone and Mclean Information Systems Success Model. It provides a useful framework for organizing information systems success measurements.

Method: The selected design frame is a case study that allows achieving an accurate understanding and attitude of students' experience in E-learning. The data were collected through a questionnaire and analyzed using SPSS and AMOS software version 24.

Results: This study provides features of the quality of information, systems, and services that can affect the success of e-learning systems during the Covid-19 pandemic.

Foreword

I would like to thank my supervisor, Mrs. Susanne Garvis at the University of Swinburne for her guidance, support, and feedback. I would also like to thank the students of the University of Tehran (Tehran, Iran) for making this research possible, and for supporting me throughout the work. Thanks to all the participants who generously took the time to share their unique views and experiences. They are undoubtedly the core of this research.

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1. Introduction

Education is the process or act of communicating or obtaining general knowledge to develop the powers of judgment and reasoning. Generally, it intellectually prepares the person or others for mature life (Dictionary.Com, 2020). The main core of education is to learn (Al-Shboul, 2020; Radha, et al., 2020). Learning is a procedure of obtaining skills or knowledge through experience, study, or training. Any freak event in the world including pandemics will always leave its impact on education (Radha, et al., 2020). With the spread of COVID-19, concerns about maintaining people's health and well-being have increased sharply as it is very challenging to control by health organizations. Currently, no race or nation in the world is immune to the pandemic of coronavirus. It seems that the whole of the world is overwhelmed by the rapid spread and destructive effects of COVID-19. There are no boundaries for coronavirus pandemic with fast and large effects. All aspects of human activities are influenced by the outbreak of COVID-19 globally from education, sports, research, transportation, entertainment, social interactions, politics, businesses, economy, and even worship. In fact, COVID-19 has threatened the entire world, enduring the situation was challenging. In the meantime, the education department has received the worst effects of the Covid-19 outbreak. The differences in the education departments have been enlarged worldwide by the spread of the COVID-19 (Onyema et al., 2020). The presence of three gaps is revealed by the fast transformation of educational activities from the face-to-face method to the online method including the use gap, the access gap, and the gap in teacher skills. This digital gap makes greater the distances between families with fewer resources and families with more resources (Hodges, et al., 2020).

By the outbreak of this hazardous virus across the world, educational institutions have been forced to shut down for controlling the spread of this virus (Radha, et al., 2020). To limit the spread of new coronavirus disease (COVID-19), as of 13 April 2020, universities and schools have been closed in most countries around the world. And this pandemic has forced nearly all education systems to use distance learning solutions (United Nations Educational, Scientific, and Cultural¹, 2020). Hence, the teaching professionals have been forced to consider other teaching approaches during this lockdown. Hence, the way is paved to web-based, online learning, or e-learning. Learning in today's scenario has moved toward the digital world where students and teaching professionals are connected virtually. E-learning is quite simple to implement and understand (Radha, et al., 2020). Using the internet, laptop, desktop, or smartphones creates a major constituent of this learning procedure. E-learning presents fast growth and evidenced to be the best in all sectors, particularly in education over this lockdown (Mathivanan et al., 2021; Radha, et al., 2020; Onyema et al., 2020; Sahu, 2020)

Though, by the shift to online mode, numerous queries have been raised on the education's quality (Sahu, 2020). So, with an unforeseen shift from face-to-face learning to online, there are problems that stakeholders face. In addition, many countries, including Iran, face major problems in technology infrastructure, especially in rural areas. Therefore, because of the above, the success of e-learning during the COVID-19 is an important issue that requires fundamental focus. If e-learning programs fail, the necessary revisions and actions should be taken, and if successful, it can be used in post-corona courses, as well as for many other organs in different situations. This study tries to investigate e-learning success during this pandemic. This survey is performed with the students who study at the University of Tehran to learn more about the role of e-learning in this pandemic. Also, it can be a learning archetype within educational institutions for enhancing the skills and knowledge of students through digital technologies, in general.

The University of Tehran is one of the oldest and most prestigious universities in Iran. Only students with high scores on the entrance exam can study at this university. The faculty of this university are among the best professors in the country, also the University of Tehran has the best educational facilities. However, it has not made extensive use of new teaching methods such as e-learning. I studied at the University of Tehran and I was always wondering why, despite all these facilities and experienced professors, the university has neglected e-learning. Therefore, with the outbreak of the corona epidemic, and the need to implement e-learning; It was a good opportunity to examine the success of e-learning systems at this university.

¹ UNESCO

According to what was stated, this study aims to evaluate the success of e-learning during COVID-19 in Iran. I am from Iran and I have studied there for many years. I am relatively familiar with the educational conditions in Iran. Due to the importance of implementing e-learning in the corona, I became interested in examining its success in my country. Because its results can be useful and effective for improving the educational system. To achieve the research aim, questions based on the theory model (which will be described in the third section) are presented and the present study will try to answer these questions:

Q1: How does the service quality influence using the system?

Q2: How is user satisfaction is influenced by the quality of the service?

Q3: How does the information quality affect the use of the system?

Q4: How is user satisfaction is affected by the information quality?

Q5: How is the use of the system is affected by the system quality?

Q6: How is user satisfaction is influenced by the system quality?

Q7: How does system use influence the success of the E-learning portal?

Q8: How does user satisfaction influence the success of the E-learning portal?

Hypotheses

In line with the research theory model and the questions raised above, the research hypotheses were designed:

H1: There is a significant relationship between service quality and system use.

H2: There is a significant relationship between service quality and user satisfaction.

H3: There is a significant relationship between information quality and system use.

H4: There is a significant relationship between information quality and user satisfaction.

H5: There is a significant relationship between system quality and system use.

H6: There is a significant relationship between system quality and user satisfaction.

H7: There is a significant relationship between system use and E-learning benefits.

H8: There is a significant relationship between user satisfaction and E-learning benefits.

H8: There is a significant relationship between user satisfaction and E-learning benefits.

2. Literature

2.1. E-Learning

2.1.1. Concept and history

The global-based availability of technology the revolution of information and features and benefits (speed, ease, breadth of service, versatility, etc.) have made major impacts on contemporary education. It has a key role in all novel pedagogical skills in education at all levels. Several available online sources exist to learn from wherever you require it. Digital gadgets and devices make the students engaged in entertainment and learning activities (Radha et al., 2020). The traditional education way has been altered by the technologies to the new method of learning, such as artificial intelligence, social networks, digital booklet etc. (Di Vaio et al., 2020a). Therefore, e-learning is covered under a greater course of technology-based learning via websites, video conferencing, learning portals, mobile apps, YouTube, and thousands of free websites for mixed learning devices. A wide debate has existed on a common explanation of the e-learning concept. As a construct, it includes several learning approaches, processes, applications, as well as academic fields (Hubalovskya et al., 2019). The concept of e-learning was presented by Oxford as a kind of “learning performed through electronic media, characteristically on the Internet”. In the report by the Canadian Council on Learning, it was indicated that learning is to develop the skills and knowledge using information and communication technologies, more to support interactions for learning, with learning tools and activities, and with other individuals (Abrami et al., 2008). E-learning is referred to as the deliberate use of technology and network communication in learning and teaching (Chitra & Raj, 2018). Moreover, E-learning has been explained as technology-centered learning where learning materials are offered electronically to remote audiences through a computer network (Mayer & Clark, 2016). Presently, electronic learning enhances the knowledge of the students, even the industry, and professional and academic staff skills through the internet (Chopra et al., 2019; Adams et al., 2018). Ellaway and Masters (2008), “e-learning incorporate a pedagogical method typically seeking flexibility, engagement, and learner-based. It encourages interaction (student-student, staff–employees, and employees –student), and communication and collaboration, simultaneously (though not exclusively).” In fact flexibility and interaction resulting from electronic devices improves learning (Al-Shorbaji et al., 2008). E-learning is related to using applications and electronic systems within learning procedures. The potential for remote interaction between experienced teachers/professors and students is facilitated by E-learning (Wang et al., 2009). Known also as e-learning, it has obtained extensive acceptance in all academic institutions and educational fields (hubalovskya et al., 2019).

2.1.2. Advantages and challenges

Today, E-learning has obtained incrementing importance for different reasons, such as the increased global economy and information and the emergent consumer culture. In the current century, students need flexibility in the structure allowing them to study, participate and work at the same time in family life. Such flexibility is enabled by alternative delivery approaches including Internet use (Tirziu and Vrabie, 2015).

By moving the world towards the digital age, most universities attempt at maximizing the utilization of technology in education. Hence, it is essential to consider both its disadvantages and advantages. It can present and share teaching-learning materials via various setups including videos,

audio, slideshow, PDF, word documents, and e-mail. All direct communications with teachers and webinars via messaging or different chat forums, make a new option in the learning procedure. It presents easy access to definite electronic manuals. It presents clear, easy, and continuous instructions to comprehend the audiences well. E-learning is often considered an appropriate method for self-learning. It presents a variety of content for the learners that covers most of the doubts and topics (Bajaj & Sharma, 2018). Because E-learning provides access to a variety of scientific resources, so it covers a lot of content and is able to answer many academic ambiguities. Many researchers have studied the benefits of using ECT in the education system and e-learning methods. Some of the most important benefits related to Moore's study are presented in Table 1, along with the authors and the title of the research.

Table 1

The advantages of E-Learning

Researchers	Titles	Benefits identified
(Goldsworthy et al., 2006)	The use of personal digital assistants at the point of care in an undergraduate nursing program.	Flexible means of learning
(Kwofie & Henten, 2011)	The advantages and challenges of e-learning implementation: The story of a developing nation	Higher level of freedom for students
(Srivastava, 2018)	Advantages & Disadvantages of E-Education & E-Learning	Better retention/ Up-to-date learning materials
(Naing et al., 2015)	A systematic review and meta-analysis of medical students' perspectives on the engagement in research	Diverse nature/ Convenient for students
(Dhir, et al., 2017)	E-learning in medical education in India	Timesaving/ Scalable e-learning systems
(Qureshi et al., 2012; Al-Shorbaji et al., 2015)	Challenges of implementing e-learning in a Pakistani university	Adult learning values
(Al-Shorbaji et al., 2015)	eLearning for undergraduate health professional education: a systematic review informing a radical transformation of health workforce development	Uniformity

Regardless of the online education's advantages, various challenges have been identified by the early stages of e-learning including low retention rates, unfamiliarity, insufficient interaction, and no discipline in learner (Lim & Morris, 2009; Liaw, 2008), lack of administrative support and technical support toward the execution, lack of systematic approaches and awareness towards technology, and attitudes towards technology and transmuting education system (Qureshi & Nawaz, 2010), inefficiency and qualified instructor for e-learning, lack of government support in the financial field,

poor availability of hardware and software supporting the e-learning setting and standard or quality of education (Babu & Sree Reddy, 2015). Some of the challenges facing e-learning are summarized in Table 2

Table 2.

The Challenges of E-Learning

Challenges	Such as	Researchers
Individual	Student Motivation	Medárová et al. (2012), Yoo et al. (2012), Bozkaya and Kumtepe (2012), Nwabuo et al. (2013), Hepworth and Duvigneau (2013), Alajmi (2014), Gallego-Arrufat and Gutiérrez-Santiuste (2016)
	Awareness and attitude towards ICT	Nagunwa and Lwoga (2012), Bozkaya and Kumtepe (2012), Alajmi (2014)
	Cost of using technology	Becker et al. (2013)' Nor and Mohamad (2013)
	Teaching and learning activities	Andersson, 2008
	Sense of isolation due to less face to face interaction	Reynolds et al. (2013), Chatzara et al. (2012), Muhammad et al. (2015)
Technology	Technological Challenges/ Technology infrastructure	Rana et al., 2014, Graham et al. (2013), Alsabawy et al. (2013), Gutiérrez-Santiuste and Gallego-Arrufat (2016), Nwabuo et al. (2013), Güllü et al. (2016)
	Low-quality computers	Radijeng (2010)
	Access	Bon, 2007
	Virus attacks	Shonola & Jo (2014), Prakasam (2013), Qureshi et al. (2012)
Pedagogy	Quality Course Content	Veeramani (2010), Mtebe & Raisamo (2014), Masoumi (2010)
	Insufficient feedback	Guy (2012), Andersson & Grönlund (2009)
	Level of knowledge of the teacher	Marzilli et al. (2014), van Leusen and Millard (2013), Dogan (2015)
	Weak Learning Management	Güllü et al. (2016), Pratas and Marques (2012)

	System	
	Attracting online students	Guy (2012), Lester and Perini (2010),
Enabling Conditions	Ethical barriers	Levy et al. (2013), Sana and Mariam (2013), Egi et al. (2014), Muhammad et al. (2015), Bhat and Shetty (2015)
	Rules and regulation	Güllü et al. (2016), Andersson and Grönlund (2009)
	Administrative support	Mahmoodi-Shahrehabaki (2014), Ocak (2011), Gutiérrez et al. (2016)
	Security	Bryer and Chen (2012), Zamzuri et al. (2011), Saxena and Yadav (2013), Levy et al. (2013), Yang et al. (2013)
	Support and guidance for students, Flexibility, Academic confidence	Li & Irby, 2008

2.2. Corona Virus

2.2.1. Introduction and history

The Wuhan Municipal Health Commission (WHO, 2020) stated the first incidence of concentrated pneumonia cases on December 30, 2019, in Wuhan city, Hubei province of China. On January 30, 2020, the World Health Organisation stated the Coronavirus as a worldwide health emergency. On March 11, 2020, the World Health Organisation declared COVID-19 a global pandemic (Gyimah, 2020). It was found that there was a relation between pneumonia cases and large animal seafood market in Wuhan. Disinfection and hygiene measures were quickly carried out by the local government agency. The Chinese health authorities and the Centres for Disease Control and Prevention (CDC) later demonstrated and proclaimed that a new coronavirus (CoV), indicated as Wuhan CoV, led to the outbreak of pneumonia in the city of Wuhan (CDC, 2020). The virus that was previously known and most closely resembles 2019-nCoV is the SARS virus, which was spread in 37 countries in 2002-2003 (Cohen & Normile, 2020).

Transmission from one person to the other was established after three weeks of the report to the WHO and took the passage from Wuhan to Thailand, Hong Kong, and South Korea. Experts from the University of Southampton identified the cities and nations to more at higher risk worldwide for the spread of the new coronavirus (2019-nCoV) (Shengjie et al., 2020). After a month the virus had already arrived in all continents from Asia (Taiwan, Japan, Singapore, Malaysia, Vietnam, Nepal, India) to Australia, Saudi Arabia, the Americas (USA, Canada, Mexico), and Europe (France, Germany, Finland, and Italy) (Tarro, 2020). The number of cases of COVID-19 on March 17, 2020 in Iran was 17,361, and the number of deaths was 1,135. On February 20, 2020, the first death to COVID-19 was announced officially, in Qom city, Iran (Raoofi et al., 2020).

2.2.2. Effects of COVID-19 on educational systems

The educational process was disrupted for the learners by the pandemic COVID-19. Millions of educators and billions of students are influenced by the closure of educational places, quarantine conditions, and restrictions. Negative psychological circumstances may be caused by social distancing and other restrictions owing to COVID-19 including fear and anxiety. All of the above increase the responsibilities and concerns of parents, and Moreover, the well-being of parents and students may be also affected (Ozer, 2020). All over the world, educational institutions have been temporarily closed by most governments to control the COVID-19 pandemic spread. More than 60% of the world's student society is affected by such nationwide closures. Localized closures have been implemented by several other countries affecting millions of additional learners (UNESCO, 2020). Among other the countries that are closing schools owing to COVID-19 are Ethiopia, Senegal, China, Africa, Honduras, France, Kazakhstan, Japan, Iran, India, South and North Korea, the USA, Spain, Lebanon, Italy, Vietnam, and Germany. Closing schools has, educational and economic costs and the people across communities are affected by the disruptions these closures. However, its negative effects are more severe for low-income families (UNESCO, 2020).

The UNESCO tracks the effects of the pandemic on education. The following were recognized as the impacts of COVID-19 pandemic on higher education institutions: disruption of academic calendar of higher institutions, reduction of international education, canceling the international and local conferences, learning and teaching gap, cut in the budget of higher education, and loss of workforce in the educational institutions (Ogunode et al., 2020). Moreover, closing the schools can influence the quality of learning and teaching as well as the achievement mainly for learners with particular requirements or those with learning difficulties needing further guidance and physical attention from the educators. Although technology can be utilized to address some of the consequences of school closures, it can not be a complete substitute for all the significant effects of the face-to-face method (Quentin, 2014). Students deprived of their liberty due to COVID-19 are deeply concerned about when face-to-face training occurs (Römer, 2020).

2.2.3. E-Learning and Covid19 in Iran

The methods of learning and teaching perpetually have been altered by the present pandemic (COVID-19). Thus, with the dramatic increase in e-learning, conditions for learning have changed significantly. Even before COVID-19, the rapid adoption and expansion of educational technology with EdTech investments worldwide in 2019 reached \$ 18.66 billion. By 2025, the public virtual education market is projected to reach \$ 350 billion. Significant growth has been present in using online instruments (online instruments refer to any program, app, or technology that can be accessed via an internet connection such as: electronic tutoring, video conferencing, and webinars) since the explosion of COVID-19 (Cathy & Farah, 2020). COVID-19 crisis hits at a time when most of the education systems are not ready for the world of digital learning opportunities, according to the latest report from the OECD's International Student Assessment Program (PISA) (OECD, 2020).

The educational systems have been affected by the COVID-19 pandemic in countries around the world, such as Iran. It has resulted in the closure of face-to-face courses in universities and schools. The global decision to close educational institutions to maintain social distance to prevent the spread of the virus was reasonable (Mahyoob, 2020). Countries that already had the facilities and were ready immediately turned to E-learning (Mahyoob, 2020). Ministry of Higher Education in Iran has recognized the need for the implementation of E-Learning in universities to maintain the teaching and learning process. The universities have implemented e-learning although the universities had little or no experience in e-learning and were not prepared with e-resources for the teaching and learning

process and faced difficulties and obstacles especially when teachers and students did not understand how to use online applications. Therefore, with the outbreak of COVID-19, the implementation of virtual education is a turning point in the Iranian educational system (Sahu, 2020).

Iran has had significant growth in the field of IT in recent years. And the formation of e-government is seriously on the agenda of governments, and government officials have mobilized their forces to achieve such a situation and seek to reform the political, educational, economic and social processes with the help of new communication and information technology. Provide services to citizens in a more efficient way. The education system is one of the important areas that has been highly regarded and the realization of e-learning in the education system has been one of the main goals of e-government. With the outbreak of the coronavirus, this issue has become more important than ever, so in the present study, its success rate has been discussed. In Iran, the electronic education of high school students is done by special plans for each level, using television, mobile, and other social media. E-learning is carried out via learning management systems and mobile messenger systems, such as NAVID, MOODLE, and VESTA, in higher education.

There are sufficient infrastructures, acceptances, and experience in universities in Iran that is compatible with global movements towards e-education. This is a great chance for higher education organizations to move towards E-learning. However, the major concern about the closure of higher education organizations is the failure of providing adequate support for fully operational and technical courses that require face-to-face training and practical work. Thus, it seems that in-service training and culture building for teachers is necessary, because many teachers depend on face-to-face and traditional education. They have a certain bias towards it and prefer the traditional method to the online and electronic methods. They underestimate the impact of e-learning and are reluctant to use it. While with education and awareness, their views can be changed and the culture of using new methods can be spread among them. It is also possible to increase the sense of responsibility in learners and teachers by creating a culture. Moreover, the empathy and coordination of the relevant managers and authorities are required to plan coherently and accurately.

2.3. Conclusion

Before the outbreak of coronavirus, Iran, like most developing countries, was not sufficiently prepared to enter distance education and faced several challenges: weakness in the quality of Internet communications in some parts of the country, lack of speed and coverage of Internet services, high costs of Internet services, filtering and restrictions on the use of software and foreign social networks, and low familiarity of some professors with E-learning (Raoofi et al., 2020). With the sudden entry of the country's educational system into the virtual education space, professors and students did not know the prerequisites for the proper use of this space, and the flow of virtual education is still being pursued with the same traditional view. However, during the corona outbreak, the infrastructure was provided to some extent and the necessary measures were taken. In fact, although the corona pandemic imposed many problems on all indicators of society, including public health, it led to the flourishing of some capabilities in the country, including the pervasiveness and prosperity of virtual education throughout the country. It seems that virtual education in Iran has entered a new phase and more attention has been paid to virtual education.

On the other hand, officials are increasingly aware of the importance of distance education and e-learning-based education. Therefore, it is expected that with the development of the necessary infrastructure such as the development of the global Internet network and increase its speed, the production of interactive learning software, and the use of experiences gained in this pandemic, we will see the growing prosperity of virtual education in the country.

So far, most of the studies conducted are on the strengths, weaknesses, and challenges of advancing e-learning systems in Iran. However, less studies have been done on the success or failure of e-learning in the current situation. Although examining strengths and weaknesses can help predict the success of systems, they are not enough to measure system success. While examining the factors influencing the success of such a system, the success of e-learning can be largely guaranteed, and even after the end of the corona outbreak, this type of training can be continued alongside face-to-face training. Therefore, people who are not able to attend classes are not deprived of education and continuing their education.

3. Theoretical background

In this section, the success model of DeLone and McLean's (2003) Information Systems (IS) is presented, which has been selected as a theoretical framework for this research. The D&M ISS model has proven to be an effective and useful template for organizing information system success measurements. IS researchers have used this model extensively to understand and measure the dimensions of information system success.

3.1. History

The D&M ISS Success Model was first expanded by DeLone and McLean to measure the dependent structure of IS success, in 1992 (DeLone & McLean, 2003). The foundation of this model is made in three dimensions: research, the study of communication, and classification of measurement of information output about the information system (Mason, 1978) According to Shannon and Weaver, there is a degree of communication in all three dimensions (Shannon, 1948):

- ☐ Semantic (information is correctly and successfully transmitted to the recipient)
- ☐ Technical (information system accuracy) and
- ☐ Effectiveness (effect of data on the recipient).

Over time, the Information Success Model (1992) discusses dimensions: Intention to use the system, quality of information, user satisfaction, organizational impact, and quality of the system (Fig1).

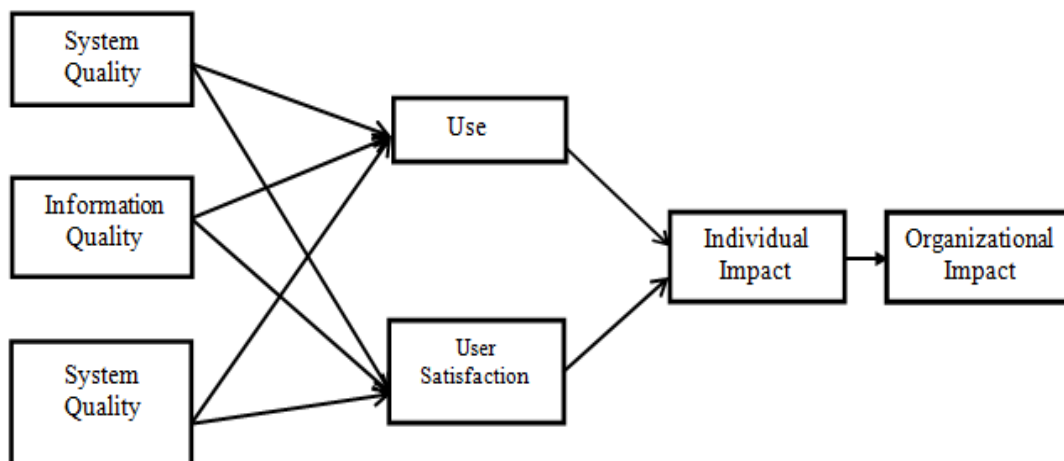


Fig1. D&M IS success model (1992)

Shortly after the release of the D&M model in 1992, some claimed that the D&M model was confusing, not well-executed, well-defined, and etc. (Clark & Mayer, 2016). Researchers have therefore made various suggestions for success in improving the model, and finally a decade later, its creator improved the original model by adding another dimension called service quality and eventually replacing individual and organizational effects with net/success benefits (Zaineldeen et al., 2020). Thus the main model consists of six dimensions; Intention to use the system, information quality, user satisfaction, organizational impact, system quality and service quality (Clark & Mayer, 2016) (Fig 2).

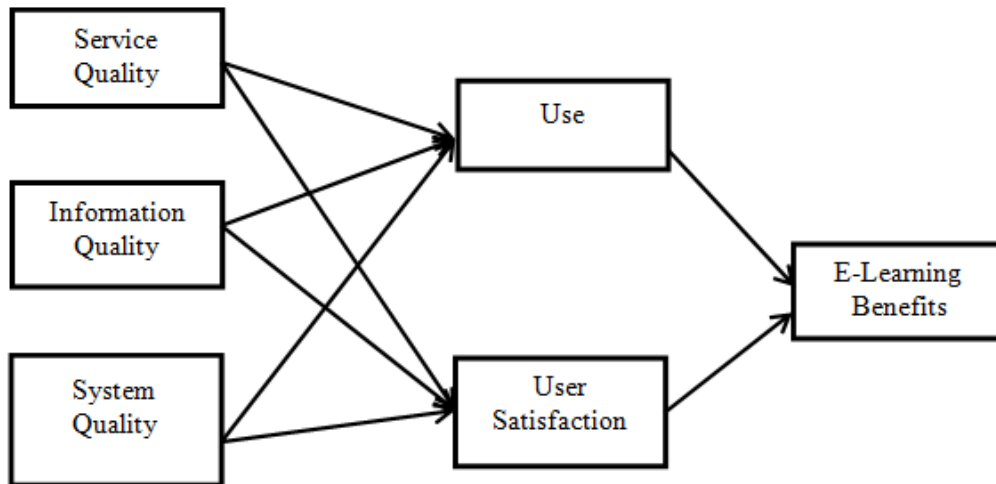


Fig2. Updated Delone and McLean IS Success Model 2003 (D&M ISSM)

3.2. Dimensions

Each IS success model is presented with one or more of the six dimensions mentioned. it should be noted that the present study covers all six dimensions. Success model factors include: (Clark & Mayer, 2016; DeLone & McLean, 2003; Tilahun & Fritz, 2015; Urbach & Müller, 2012):

- System quality:

System quality is one of the favorable features of an information system that refers to the features that are desirable and necessary in the information system. These include system reliability and flexibility, ease of use, system features of intuitiveness, flexibility in response time, and ease of learning. In our study, this dimension of the model was assessed with the following survey questions:

- ☐ I think the E-Learning is easy to use
- ☐ I can perform e-learning the way I want.
- ☐ E-learning is flexible for interaction
- ☐ It was not difficult for me to learn how to work with e-learning

- Information quality:

The quality of the information presents the result of a system in terms of, conciseness, timeliness, completeness, usability, relevance, understandability, currency, accuracy, and understandability.

In this study, the quality of information was assessed with the following questions:

- ☐ The information presented through E-learning is true.
- ☐ The information presented through E-learning is helpful for its purpose
- ☐ E-learning provides timely information.
- ☐ I am confident the information obtained from E-learning

- Service quality:

The quality of services is based on the support that the target society obtains from the information system department and information technology employees and includes technical competency, responsiveness, empathy of personnel, and reliability. In the present study, the following questions were evaluated:

- ☐ Sufficient technical support of the system is provided.
- ☐ The existing general infrastructure is sufficient to support E-learning
- ☐ E-learning is reliable for providing information
- ☐ The results of the e-learning process are complete

- System use:

Quantity and how to use the system are defined as the use of the system. In fact, it is how employees and customers use the capabilities of an IS. It contains appropriateness, amount, frequency, and purpose of use. In our study, this dimension of the model was assessed with the following questions:

- ☐ Using e-learning makes tasks faster
- ☐ Applying the E-learning has recovered my educational status
- ☐ The use of e-learning has facilitated my education
- ☐ I think the E-learning is beneficial in the training course

- User satisfaction:

User satisfaction is the feeling that the user has gained from the moment of starting with the system to the result, towards the whole system and is also affected by the support services. This dimension was measured by the following questions:

- ☐ The performance of e-learning is satisfying for me
- ☐ E-learning has made the process easier
- ☐ In general, I am satisfied with using e-learning

- Net benefits:

Net benefits are the amount of information system helping to the success of organizations, individuals, industries, groups, and countries. These include improving decision making, market efficiency, improving productivity, increasing sales, reducing costs, improving profits, user welfare, job creation, and economic development. Questions to assess this section are:

- ☐ The E-learning will help cost savings
- ☐ The E-learning support will overcome the defects of the In-person training system
- ☐ Using E-learning will improve student supervision
- ☐ Access to educational information is easy through E-learning
- ☐ E-learning increases communication among students
- ☐ E-learning use will cause improved decision making

4. Methodology

In this part, the research design used for the present study is presented. First, introducing the environment, research design and then a description of the statistical population are presented. Then, data collection strategies, sampling, and data analysis techniques are introduced. At the end of the section, ethical considerations are stated.

4.1. Introducing the environment

The University of Tehran is a public university and the largest higher education center in Iran. This university is referred to as the "mother university" and the "symbol of higher education". It was established in 1928. The University of Tehran currently has 110 educational units, 50,000 students, 2,100 faculty members, and 260,000 graduates. Graduates are those who have studied at this university and received their degree from this unit.



Fig 3: University of Tehran

4.2. Research design

Since the present study uses the principles and techniques of basic research to solve executive problems and seeks the practical application of knowledge, the present study is applied in terms of purpose. Because the researcher tries to express what it is change or manipulation and only describes the variables in the research community (the researcher can't control and manipulate the research variables), it is non-experimental in terms of data collection. And in terms of the implementation process, it is Quantitative research.

4.3. Statistical Society and Sampling

The statistical population of this study is students of the University of Tehran in Iran who use the e-learning system during the coronavirus (N=50000).

Cochran's formula was used to calculate the sample size ($n=380$). The convenience sampling method was used by sending a questionnaire to WhatsApp groups of students. To do this, the representatives of each class were identified, given the necessary explanations about the project and a questionnaire was sent to them. Representatives presented the questionnaire to their WhatsApp groups and invited their teammates to participate in the survey.

4.4. Data Collection

In this study, a quantitative approach has been used. A survey was conducted by a questionnaire. The questionnaire was shared with the students by the university's WhatsApp groups. Because access to the university site is sometimes disrupted or slow, the representative of each class forms a WhatsApp group of students and faculty, and many educational issues are presented in the group and students discuss. Therefore, the questionnaire was presented by the representatives in different groups (10 groups). The questionnaire was approved/adapted in the form of e-learning and reviewed. Students were asked to complete a 24- item questionnaire. The two parts of the questionnaire are: the first part is about students' demographic information; the second part includes a set of questions about students' experiences with the e-learning platform. All questions were evaluated on a 5-point Likert scale from 1: "strongly disagree" to 5: "strongly agree". The present research used a cross-sectional study method. From April to May 2021, students participated in this survey . With the help of the representatives of each class, the questionnaires were presented in WhatsApp groups and after answering, 380 questionnaires were completed and analyzed.

4.5. Data analysis

Structural Equation Modelling (SEM) is applied to evaluate the relationships among model structures. In this study, the relationships between the dimensions of the Delone and McLean IS Success Model (2003) were measured. In summary, SEM is one of the methods of multivariate statistical analysis that is used to show the causal relationships between variables. These relationships are the same as research hypotheses. SEM is a very general statistical modeling method; also it is the combination of regression, factor analysis, and path analysis. Path analysis makes it possible for the researcher to examine the relationships between variables (Kline, 2005). This will be done using the AMOS Software version, 24.0. AMOS statistical software stands for analysis of instantaneous structures. AMOS has added an SPSS module and is largely used for path analysis, SEM, and Confirmatory Factor Analysis (CFA). In other words, AMOS is a visual program for SEM and performs its calculations quickly. First, a CFA is performed to prove the fit of the model and then, the model properties are examined on combined reliability and convergent validity basis. After that, the model path coefficients will be evaluated.

4.6. Ethic

An important approach in all research is to evaluate its benefits and risks (Myers & Venerable, 2014; Recker, 2013). The Belmont report guided the current code of ethics and included the first guidelines for ethical action on human issues (Anabo, et al., 2019). Cosby and Bates (2012) discussed the three important ethical principles reported by Belmont: Decent treatment of individuals, fairness, and benefits. This means that the researcher must be confident that the benefits of the research outweigh the risks to the target audience. This principle is very important and necessary (Recker, 2013; Cosby & Bates, 2012). According to the principles of voluntary participation and complete information (Cohen et al., 2002), participants should be informed of the purpose of the research and what their participation involves. They need to know that their participation is voluntary and that they can stop participating at any stage. In addition, this report does not include any personal information that could be used to identify a person. Participation in this study was completely voluntary. The informed consent form was also designed based on the IRB Northcentral template² and the Cosby and Bates Guide (2012). All the important points were clearly stated, such as the objectives of the research, the method of implementation, the introduction of the researcher and how to contact him. This form was

^{2 2} The Office of the Institutional Review Board (IRB) has developed protocol models for ethics in research activities for use by the Northwestern University research community, which is also used by other researchers.

sent along with the questionnaires and the participant was required to complete the form and submit it along with the questionnaire. This was done by representatives in each WhatsApp group.

5. Findings

This section presents the findings of the research obtained via questionnaires. The present research was performed to evaluate e-learning success as a new teaching method during the COVID-19 Pandemic. Six variables were used for evaluation: System Quality, Information Quality, Service Quality, Intention to Use, User Satisfaction, and E-Learning Benefits and successes. Research findings were analyzed by confirmatory factor analysis (CFA) and SEM. IBM SPSS AMOS24 software was used to perform SEM. The following sections will fully describe the validity and reliability of the data, the results analysis of each of the 8 hypotheses, and the evaluation of the findings.

5.1. Demographic Results

After reviewing the received questionnaires, incomplete questionnaires were removed and separated from the analysis (10 incomplete questionnaires). The demographic information of the sample is presented in Table 3. The classes with the highest value are bolded.

Table 3.

Demographic Results (Gender, Age group, Experience Using the E-learning)

Gender

Gender	%	Count
Female	52.3	201
Male	47.7	179
Total	100%	380

Age group

Age group (Year)	%	Count
Less than 20 years	12.3	58
21-30 years	53.6	207
31-40 years	25.8	84
More than 41 years	7.9	30
Missing System	0.4	1
Total	100%	380

Experience Using the E-learning

Experience Using the E-learning	%	Count
Less than 1 term	5.4	14
1-2 terms	51.4	198
More than 3	43.2	168
Total	100%	380

Demographic analysis showed that 52.3% of the students were female and 47.7% were male. In terms of "age group", the data showed that most students, ie 207 of them, were in the age group of 21-30 years (53.6%). The data also show that most of the students participating in the study have experienced e-learning for 1-2 semesters (Table 3).

5.2. Reliability and Validity

Data obtained from questionnaires were entered into SPSS 24 for evaluation. In all cases, the obtained Cronbach's alpha was confirmed because their values were more than 0.7 (Table 4). SPSS data was saved and entered into AMOS for confirmatory factor analysis. The CFA model was designed and run with the help of graphic tools by AMOS 24. The model of CFA is presented in Fig 3. The model was tested to determine if changes were needed before completing SEM. After finishing the CFA, reliability, and validity were assessed so that there were no problems. Figure 3 offers the model with the standard estimate. Correlation and standard regression weight were calculated during CFA, and then CR and AV were measured for all of the constructs. The CR values obtained were higher than 6, indicating confirmation of the composite reliability (Hair et al., 2017). Table 4 presents the reliability values obtained for dimensions.

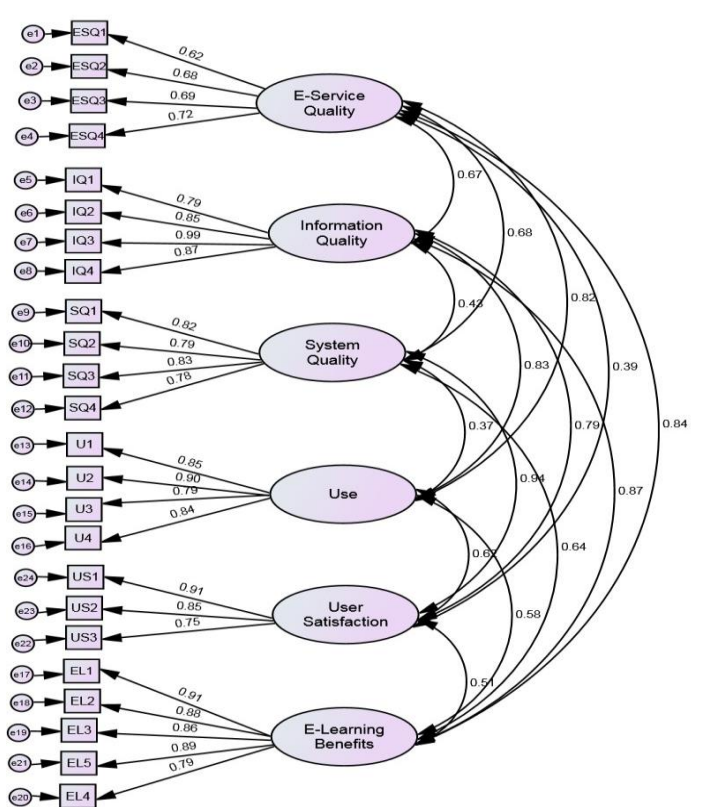


Fig 4. Conceptual Model/IBM SPSS AMOS24

Table 4.

Reliability Statistics - CR and Cronbach's alpha measurements of all items

Construct	Items	CR	Cronbach's Alpha
IQ (Information Quality)	4	0.784	0.813
SQ (System Quality)	4	0.863	0.789
ESQ (E-Service Quality)	4	0.894	0.825
U (Use)	4	0.803	0.794
US (User Satisfaction)	3	0.876	0.805
EL (E-Learning benefits)	5	0.905	0.791

Since multiple items are effective in measuring a construct, a convergent validity check is essential, and it was evaluated using the average variance extracted (AVE) (Kline, 2005). The value obtained for AVE should be 0.5 or more (Hair et al., 2017). The values of all constructs are given in Table 3. The results are greater than 0.5 (.534-.712), which indicates confirming convergent validity. According to statistical science, the square root of AVE was applied to check for discriminant validity (Fornell & Larcker, 1981). The values and the square root of AVE are shown in bold and diagonally in Table 5. The square root of the AVE must be greater than any correlation between constructs to confirm discriminant validity. Discriminant validity was estimated and it was no problem with items reporting to constructs.

Table 5.

Discriminate Validity and Convergent

Item	AVE	ESQ	SQ	IQ	U	US	EL
ESQ	0.602	.534					
SQ	0.712	.487	.501				
IQ	0.579	.451	.467	.603			
U	0.589	.397	.409	.519	.402		
US	0.534	.401	.399	.498	.381	.398	
EL	0.634	.389	.381	.412	.289	.281	.532

The next issue to be examined was the issue of data normality. The SEM assumes that the data are consistent with multivariate and univariate normality (Hair et al., 2017; Byrne, 2016; Kline, 2005). To determine the accordance of the data with the assumptions of normality of a variable, the absolute amount of the skewness and kurtosis of cases were examined. The absolute value of the kurtosis indices was not more than 10 and the absolute value of the skewness indices was not more than 3, therefore the normality of data distribution was confirmed (Table 6).

Table 6.

Assessment of Normality

Variable	Max	min	skew	Kurtosis
ESQ1	5.00	2.00	-1.421	2.234
ESQ2	5.00	1.00	-1.108	1.567
ESQ3	5.00	1.00	-1.301	1.709
ESQ4	5.00	1.00	-1.270	2.341
IQ1	5.00	2.00	-.986	3.568
IQ2	5.00	1.00	-1.021	1.312
IQ3	5.00	2.00	-.845	2.407
IQ4	5.00	1.00	-.629	3.438
U1	5.00	1.00	-1.320	2.345
U2	5.00	1.00	-1.231	3.345
U3	5.00	1.00	-1.342	2.431
U4	5.00	1.00	-1.008	3.421
SQ1	5.00	1.00	-1.112	.894
SQ2	5.00	1.00	-1.235	1.689
SQ3	5.00	1.00	-1.086	2.642
SQ4	5.00	1.00	-1.213	3.781
US1	5.00	1.00	-1.012	2.214
US2	5.00	1.00	-1.127	1.890
US3	5.00	1.00	-1.203	1.735
EL1	5.00	1.00	-1.214	2.674
EL2	5.00	1.00	-.992	2.532
EL3	5.00	1.00	-1.121	2.251
EL4	5.00	1.00	-1.324	3.089
EL5	5.00	1.00	-1.231	3.325

To ensure that the items measure the construct correctly, the measurement of the load coefficient of the items in relevant structures was performed through CFA. The factor load must be greater than 0.6 (Kline, 2005). The factor loads obtained are from 0.624 to 0.987 and therefore the items in the constructs provided very good factor loads (see Table 7). Also, the weights of regression were significant for all of the 24 questions of constructs in the case of unobserved latent constructs (Table 8).

Table 7.
Standardized Regression Weights/ Factor Loadings

Items		Construct	Loading
ESQ1	<---	ESQ	.624
ESQ2	<---	ESQ	.687
ESQ3	<---	ESQ	.698
ESQ4	<---	ESQ	.724
IQ1	<---	IQ	.792
IQ2	<---	IQ	.847
IQ3	<---	IQ	.987
IQ4	<---	IQ	.868
SQ1	<---	SQ	.824
SQ2	<---	SQ	.794
SQ3	<---	SQ	.837
SQ4	<---	SQ	.783
U1	<---	U	.849
U2	<---	U	.902
U3	<---	U	.792
U4	<---	U	.845
US1	<---	US	.915
US2	<---	US	.856
US3	<---	US	.748
EL1	<---	EL	.907
EL2	<---	EL	.883
EL3	<---	EL	.857
EL4	<---	EL	.897
EL5	<---	EL	.793

Table 8.

Regression weights for all of 24 items

Items			Estimate	S.E.	C.R.	P
ESQ1	<---	ESQ	.752	.061	10.798	P<.001
ESQ2	<---	ESQ	.800	.078	9.757	P<.001
ESQ3	<---	ESQ	.885	.045	10.687	P<.001
ESQ4	<---	ESQ	1.000			
IQ1	<---	IQ	1.006	.136	11.012	P<.001
IQ2	<---	IQ	1.132	.132	10.312	P<.001
IQ3	<---	IQ	1.000			
IQ4	<---	IQ	1.021	.086	11.657	P<.001
SQ1	<---	SQ	1.032	.078	11.431	P<.001
SQ2	<---	SQ	.879	.068	12.067	P<.001
SQ3	<---	SQ	1.000			
SQ4	<---	SQ	.825	.106	9.120	P<.001
U1	<---	U	.729	.079	8.214	P<.001
U2	<---	U	.714	.080	9.896	P<.001
U3	<---	U	1.000			
U4	<---	U	.897	.081	10.879	P<.001
US1	<---	US	.905	.076	11.089	P<.001
US2	<---	US	1.000			
US3	<---	US	.935	.061	13.561	P<.001
EL1	<---	EL	1.045	.058	14.451	P<.001
EL2	<---	EL	1.000			
EL3	<---	EL	.563	.067	10.389	P<.001
EL4	<---	EL	.682	.056	12.846	P<.001
EL5	<---	EL	.781	.092	10.80	P<.001

The values evaluated by the CFA indicate the fit of the model. A set of such indicators is used to evaluate the model fit. To evaluate the goodness of the model fit, the following common index of the appropriate model was used:

- Adjusted Goodness-of-Fit Index (AGFI)
- Root Mean Square Error of Approximation (RMSEA)
- Normalized Fit Index (NFI)
- The chi-square ratio
- Goodness-of-Fit Index (GFI)
- Root Mean Square Residual (RMSR)
- Root mean square error of approximation (RMSEA)

The results of Table 9 show that the model fit indices are higher than their recommended acceptance level, thus showing that the measurement model is a good fit with the collected data.

Table 9.
Model fit indices

Fit Index	Obtained Value	Recommended Value*
Chi-square ratio (χ^2/df)	1.84	≤ 3.00
AGFI	0.89	≥ 0.80
GFI	0.97	≥ 0.90
NFI	0.96	≥ 0.90
CFI	0.98	≥ 0.90
RMSR	0.05	≤ 0.10
RMSEA	0.000	≤ 0.08

*(Byrne, 2001; Kline, 2011)

The results of model path coefficients are presented in Table 10.

Table 10.
Path coefficients

Path	β	P-Value	Remarks
ESQ \longrightarrow U	0.78	<0.001	Supported
ESQ \longrightarrow US	0.59	<0.001	Supported
IQ \longrightarrow U	0.64	<0.05	Supported
IQ \longrightarrow US	0.53	<0.001	Supported
SQ \longrightarrow U	0.82	<0.001	Supported
SQ \longrightarrow US	0.00	0.819	Not Supported
U \longrightarrow ELP	0.42	<0.05	Supported
US \longrightarrow ELP	0.68	<0.001	Supported

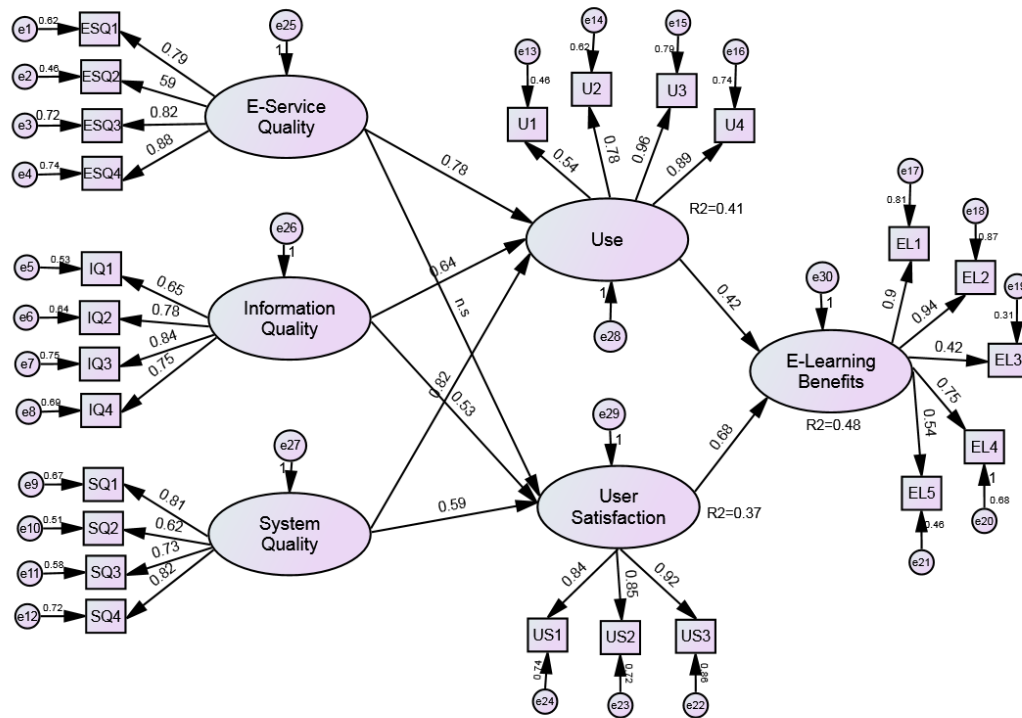


Fig5. SEM Model (IBM SPSS AMOS 24)

Research Question No. 1: How does the service quality influence using the system?

Research hypothesis No.1: There is a significant relationship between service quality and system use.

Applying AMOSV24, SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). The results displayed that the E-services quality (ESQ) has a significant and positive effect on the intended use of the system ($p < .001$, $\beta = 0.78$).

Question No. 2: How is user satisfaction influenced by the quality of the service?

Hypothesis No.2: There is a significant relationship between service quality and user satisfaction.

Using AMOS, SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). Service quality had not a significant effect on the US ($p = .819$).

Question No. 3: How does the information quality affect the use of the system?

Hypothesis No. 3: There is a significant relationship between information quality and system use.

Applying AMOS, SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). The results showed that the IQ has a significant positive effect on the intention to use ($p < .05$, $\beta = .64$).

Question No. 4: How is user satisfaction affected by the information quality?

Hypothesis No. 4: There is a significant relationship between information quality and user satisfaction.

SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). The findings showed that IQ has a significant positive effect on the US ($p < .001$, $\beta = .53$).

Question No. 5: How is the use of the system affected by the system quality?

Hypothesis No. 5: There is a significant relationship between system quality and system use.

SEM analysis was performed on the data by using AMOS. The results displayed that SQ affects the use of the system ($\beta = .82$, $p < 0.001$).

Question No. 6: How is user satisfaction influenced by the system quality?

Hypothesis No. 6: There is a significant relationship between system quality and user satisfaction.

Applying AMOS, SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). The findings showed that the system quality has a positive and significant effect on user satisfaction ($p < .001$, $\beta = 0.59$).

Question No. 7: How does system use influence the success of the E-learning portal?

Hypothesis No. 7: There is a significant relationship between system use and E-learning benefits.

SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). The results showed that the use had a positive effect on E-learning success ($\beta = .42$, $p < .05$).

Question No. 8: How does user satisfaction influence the success of the E-learning portal?

Hypothesis No. 8: There is a significant relationship between user satisfaction and E-learning benefits.

Applying IBM SPSS AMOS, SEM analysis was performed on the data (by standardized estimates and squared multiple correlations). The findings showed that the US has a significant positive effect on e-learning success ($\beta = .68$, $p < .001$).

5.3. Evaluation of the Findings

The SEM shows that intention to user satisfaction and use together account for 48% of the total variance in perceived E-learning benefits and success.

According to the SEM findings presented in this research, quality of service did not have a significant effect on the user satisfaction (US). Quality of information and quality of system affected the US. These constructs did account for 37% of the variance of US ($R^2 = .37$).

Also according to SEM analysis, 41% of the intended use variance was estimated by information, system, and service quality.

The unexplained residual values are due to factors that were not considered in the model or factors that were beyond the control of the researcher.

If consumers are satisfied with e-learning systems and are encouraged to use e-learning due to factors such as increase the quality of services, systems and information, it can be acknowledged that the e-learning system has been successful. And the benefits have been gained. Especially in the current situation and the outbreak of coronavirus, in which we are required to observe the physical distance

and quarantine conditions, students will not be deprived of education and training courses through e-learning. Therefore, the country's educational system receives less negatively impacted in this period.

6. Discussion

In recent years, e-learning has been recognized as a growing and important strategy to improve the educational process in most countries of the world. With the outbreak of the corona pandemic and the need to observe physical distance as an important principle of health and safety, the implementation of e-learning became an inevitable phenomenon. This research study attempted to evaluate the success of the use of e-learning during the Coronavirus pandemic. The results of my study show that e-learning is a useful method in times of pandemic, and its implementation in the Iranian education system will be successful. Through e-learning, it is possible to prevent the closure of the higher education system and use this educational method until the epidemic of the corona virus is eliminated and even after that. The factors considered and effective in this regard were as follows:

6.1. Information Quality:

Findings show the effect of information quality on user satisfaction and intention to use. This means that users considered the information obtained through e-learning to be accurate, complete, easy to understand, and relevant to their academic needs. Students found that e-learning provides information that is timely, relevant, and understandable. These features influence the decision-making process for using e-learning. Information is an important and main factor in the e-learning environment. This is due to the fact that updated and sufficient information presented by the e-learning system will increase students' intention to use such systems. This result is consistent with the results of (Ahn, Ryu, & Han, 2007; Alla & Faryadi, 2013; Cho et al., 2015; Choi et al., 2013; Ramayah, Ahmad, & Lo, 2010; Tilahun & Fritz, 2015) researches.

6.2. System Quality:

According to the results of this research, the system quality has affected the usefulness and benefits of the E-learning system. This result is consistent with the finding obtained by (Abrami et al., 2006; Machado-Da-Silva, Meirelles, Filenga, & Brugnolo Filho, 2014; Mahmoodi et al., 2017; Mohammadi, 2015; Pérez-Mira, 2010; Ramayah et al., 2010; Sharma, Gaur, Saddikuti, & Rastogi, 2017; Yakubu & Dasuki, 2018). Quality is one of the main dimensions that affect user satisfaction. Implementing a quality e-learning system has a positive effect on the usefulness, benefits, and continuous use of e-learning by increasing learner satisfaction. This indicated the benefits such as ease of use or flexibility the e-learning system, can result in students' intention to use and satisfaction them.

6.3. Service Quality:

In the present study, it was found that the quality of services affects the benefits by affecting the intention to use. This result is consistent with research findings conducted by (Choi et al., 2013; Chong, Chong, Ooi, & Lin, 2011; Hassanzadeh, Kanaani, & Elahi, 2012; Milošević, Živković, Manasijević, & Nikolić, 2015; Park, Nam, & Cha, 2012; Ramayah et al., 2010; Tilahun & Fritz, 2015). If e-learning provides sufficient technical support for the system and public infrastructure is in place, motivation and intention to use will be created and this will enable students to continue using the system. In fact, due to the importance of service quality in meeting the demands of students and the acceptance of information systems, quality of service is a very important dimension in e-learning.

This finding indicates that the quality of services presented by the system in terms of accuracy, precision, and ideal services will increase the intention to use e-learning.

In the relationship between SQ and the US, the impact of service quality on student satisfaction was not confirmed. This result is in line with the results of (Aparicio, Bacao, & Oliveira, 2017; Tam & Oliveira, 2016; Uppal, Ali, & Gulliver, 2018) researches and contradicts the results of Cohen & Normile, 2020; Li, Duan, Fu, & Alford, 2012; Ramayah et al., 2010) research. The lack of relationship between service quality and student satisfaction in the present study may be due to the fact that the service sector is not of good quality at present (for example, in the sections of technical staff knowledge, responsiveness, speed of service access, etc. has performed poorly), and if such quality is not available, Students can not be expected to be satisfied.

6.4. Use:

According to the results of the study, the quality of information, services, and systems in the intention to use had positive effects, and consequently intention to use had a positive effect on the benefits of e-learning. Use was the most effective variable that directly affects the benefits of using the E-learning system. The findings of this research are consistent with other studies in the field of e-learning. (Lee & Jeon, 2020; Mohammadi, 2015; Olatubosun, Olusoga, & Samuel, 2015; Raman, Don, Khalid, & Rizuan, 2014).

6.5. User Satisfaction (US):

According to the results, the quality of the system and quality of information had positive effects on the US, and consequently, the US had a positive effect on the benefits of e-learning. User satisfaction with the system plays an important role in continuing to use a system and its success. This finding is similar to the findings of (Bauk, Šćepanović, & Kopp, 2014; Cheng, 2012; Olatubosun et al., 2015; Pérez-Mira, 2010; Raman et al., 2014).

6.6. Limitations of the study

Certainly, any research is associated with problems and limitations, and one of the most important limitations of this study is the peak of Covid-19 and the limitations related to this period. We focused on the University of Tehran in the capital of Iran. Naturally, the conditions and infrastructure of information technology in the capital are much better than in remote areas and their universities. Therefore, this makes it impossible to generalize the results.

At the time of this research, due to the spread of coronavirus, and the critical situation, it is not possible to teach in person and all students must accept the e-learning provided by the university. On the other hand, students' behavior and attitudes are constantly changing and dynamic. Therefore, in a long-term study and favorable conditions, different results may be obtained.

Finally, we conducted a study in Iran, and the implementation of E-learning is in the early stages. The findings of this study may differ from countries with a long history of using online learning.

7. Conclusion and Implications

7.1. Conclusion

The coronavirus epidemic has had adverse effects on the education system and its characteristics and programs. These effects can be felt by parents and students, educators, educational institutions, and other stakeholders. Due to the need to observe physical distance and health and safety points, the closure of universities and schools was done as a way to reduce the prevalence of the disease. Although this decision is very damaging to the education system and causes a major disruption to student learning (suspension of exams, disruption of the academic program, cancellation of conferences, creating gaps in education and learning), but it was reasonable to reduce the risk of disease. On the other hand, the end of the epidemic is not clear and the education system cannot be shut down for a long time, so an alternative to face-to-face education must be chosen. In such circumstances, most countries in the world have turned to the use of information technology and online education. This study also emphasized the need to use technology in the education system as a way to curb the effects of the coronavirus. This is not a problem in developed countries that have a well-developed technology infrastructure and have already used online training. But the success of such a system is controversial in third world countries, including Iran, where e-learning was less commonly used before the corona. Therefore, this study was conducted to evaluate the success of e-learning as a education system during the COVID-19 epidemic and the components that may affect the success rate. In this study, the success model of information systems Delone and Mclean (2003) is used. Based on the components of the mentioned model, 8 questions were presented to achieve the research goal. The main tool for data collection was a questionnaire. The questionnaire was distributed at the University of Tehran, Iran, and students were the main study population, 380 of whom were selected as members of the statistical sample. After performing the analysis, the results were obtained. According to the results, the variables of system quality (easy and flexible to interact) and information quality (accurate, useful, timely information) are involved in the use and satisfaction of the system in Iranian higher education.. However, the variables of service quality (technical support, adequate of infrastructure) only affected the use of the system and did not affect consumer satisfaction. The variables of intention to use and consumer satisfaction will ultimately benefit the e-learning system and bring success. Therefore, by observing such conditions, we can hope for the success of e-learning in the country. Given the above, the Covid-19 crisis and the compulsion to shut down the education system is a serious warning to those who have not previously supported the use of technology in the education and learning system.

7.2. Implications

This study will be more useful for university policymakers such as the Ministry of Science, Research and Technology, the Ministry of Education (for implementation in schools), educational administrators, and the IT department of Iranian universities, to successfully design the country's e-learning programs policies and support systems.

By examining the factors influencing the success of e-learning, its success is greatly possible, and after the end of the Covid-19 outbreak, this type of training can be continued along with face-to-face training, so people who can not attend classes, are not deprived of continuing their education and acquiring knowledge.

The research findings might help other educational institutions that want to use e-learning technologies for the education system to succeed.

7.3. Recommendations

This study provides suggestions to educational institutions for the success of e-learning: providing fully organized data and up-to-date and quality information, strengthening servers, increasing bandwidth, holding workshops and providing appropriate training on how to use e-learning for students and teachers, permanent and quality support, and pay attention to user comments and feedback.

In Iran, e-learning has been implemented with the outbreak of coronavirus, but there are still many success factors that need to be considered. Further experiments are needed to better understand the factors influencing the success of the e-learning system, and future studies should add some social and human administrative factors to the ISS model. Therefore, similar research is recommended in other educational institutions and involving a wider range. Also, conduct a comparative study on the success of e-learning in different universities (especially in areas far from the capital) and compare the results, a more in-depth study on students' differences and the impact of mental characteristics on e-learning acceptance, research similar to surveys of faculty and educational administrators, it is also recommended to examine the role that educators play in the success of e-learning. At the time of the study, students were forced to use e-learning depending on the circumstances, and this may affect the findings. Therefore, future research should examine the success of the e-learning system under normal and voluntary conditions.

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Appendix 1. Questionnaire

Gender:

☐ Female ☐ Male

Age:

☐ Less than 20 years ☐ 21-30 years ☐ 31-40 years ☐ More than 41 years

Experience Using the E-learning portal:

☐ Less than 1 term ☐ 1-2 terms ☐ More than 3

- Please tick your opinion about each item.

Dimensions	Items	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Systems quality	I find the E-Learning easy to use					
	I find it easy to get the E-Learning to do what I want					
	The E-Learning is flexible to interact					
	Learning to operate the E-Learning was easy for me					
Information quality	The information generated by the E-learning is correct					
	The information generated by E-learning is useful for its purpose					
	The E-learning generates information in a timely manner					
	I trust the information output of the E-learning					
Service quality	There is adequate technical support from the system's provider					
	The overall infrastructure in place is adequate to support the E-learning					
	E-learning can be relied on to provide information when needed					
	The output of the E-learning is complete for work processes					
Use	Using E-learning enables me to accomplish tasks more quickly					

	Using E-learning has improved my educational status					
	Using E-learning has made my education easier					
	I find the E-learning useful in the training course					
User satisfaction	I am satisfied with the functions of the E-learning					
	E-learning has eased work processes					
	I am generally satisfied using the E-learning					
E-Learning benefits	The E-learning will help to cost savings					
	The E-learning will help overcome the limitations of the In-person training system					
	Using E-learning will cause an improvement in Improve student supervision					
	The E-learning facilitates easy access to Educational information					
	The E-learning will enhance communication among students					
	E-learning use will cause improved decision making					

Appendix 2. Informed Consent Document

Informed Consent Form

Introduction:

My name is Yavar Ghanbari. I am conducting research on the success of e-learning systems during the Covid-19 outbreak. This research focuses on higher education. I invite you to participate in this study.

Activities:

If you participate in this research, you will be asked to:

1. Complete a questionnaire. The review should take between 15 and 20 minutes.

Eligibility:

You are eligible to participate in this research if:

1. Have spent at least one full semester in e-learning.

You are not eligible to participate in this research if:

1. If you have not passed any semester virtually.

Risks:

There are minimal risks in this study. Possible risks include Loss of anonymity.

To reduce this possibility, you can: Complete the questions privately and email me yourself.

Benefits:

There is no personal benefit to you if you decide to participate. Possible benefits: Helping to strengthen and improve e-learning at the university and using a better system.

Confidentiality:

The information you provide is kept as confidential as possible. I do not need your name or any other specific identifying information. Provide this optional.

I will keep your data for several months. Then, I will delete the electronic data.

Contact Information:

If you have questions for me, you can contact me at: Email: yavar.ghanbari@gmail.com

Voluntary participation:

Your participation is voluntary. If your decision changes and you regret it while working, there is no problem and there will be no penalty for you.

Signature:

I have read the above description. I fully understand the terms of participation. By choosing the Agree option below, I agree to the terms set forth. I want to participate in this survey.

(1) I agree

(2) You do not agree