Original Article

Access this article online

Quick Response Code:

Website: www.jehp.net

DOI: 10.4103/jehp.jehp_1555_20

The level of satisfaction and quality of E-learning in medical universities of Iran during the epidemic of COVID-19

Mina Iravani, Maryam Beheshti Nasab[1], Hadis Bahmaei[1], Saeed Ghanbari[2], Zaynab Mohaghegh[1], Shahla Faal Siahkal[3]

Department of Midwifery, Reproductive Health Promotion Research Center, Faculty of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, [1]Department of Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, [2]Department of Biostatistics and Epidemiology, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, [3]Department of Midwifery, Student Research Committee, Ahvaz Jundishapur University of Medical Science, Ahvaz, Iran

Address for correspondence:
Shahla Faal Siahkal, PhD Student of Midwifery, Student Research Committee, Ahvaz Jundishapur University of Medical Science, Ahvaz, Iran.
E-mail: faalshahla1@yahoo.com

Received: 07-12-2020
Accepted: 02-05-2021
Published: 31-01-2022

Abstract:

BACKGROUND: E-learning is web-based learning for education and training. The current global pandemic crisis created due to COVID-19 has made worldwide online learning. This study aimed to investigate the level of satisfaction and quality of E-learning in medical universities from the students' point of view during the epidemic of COVID-19 and assessing the obstacles and solutions proposed to improve the quality of E-learning.

MATERIALS AND METHODS: A cross-sectional, web-based study was conducted among 400 medical university students of Iran during the epidemic of COVID-19. After getting written consent, three parts questionnaire contains demographic, user satisfaction, quality questionnaire, and three open-ended questions were distributed randomly using social media. Descriptive analysis, *t*-test, Chi-square, and Pearson correlation coefficient were used to achieve the objective of this study, with significance set to $P < 0.05$. Furthermore, three open-ended questions were reviewed qualitatively and the problems and solutions suggested by the students were reported.

RESULTS: Based on the findings of the descriptive section, 277 of the respondents were girls (69%) with a mean age of 21 ± 2 years. Sixty-nine percent of students were studying in medical sciences universities and 31% were studying in Islamic Azad University. The level of satisfaction was in the upper range of low (34.0 ± 10.0); $P < 0.001$, and intention to reuse was moderate (23.06 ± 6.0); $P = 0.064$. Student's perception of quality in most domains was in the upper range of low to medium. User satisfaction, intention to reuse, the quality of knowledge, and participatory quality for evaluating online courses were significantly higher in the Azad University group than in medical universities.

CONCLUSION: Given that this is the first experience in the use of E-learning in Iran, both universities have not yet fully succeeded in satisfying students and it is necessary to increase the quality of E-learning based on student suggestions.

Keywords:

COVID-19, education, medical students, personal satisfaction, quality

Introduction

E-learning is a web-based learning, online learning, or Internet-based learning for the distribution of information, communication, and knowledge for education and training.[1,2] E-learning is an alternative to the usual classroom instruction, enabling students to access courses without time or geographical restrictions.[3] The advantages of virtual education include increasing the quality of students' learning, ease of access to a large amount of information and knowledge, quick and timely access to information in a short time, reducing educational costs, increasing the quality and accuracy of academic content and student scientific advancement.[4,5] Some of the difficulties of E-learning can be made low motivation, time-consuming in poor Internet connection, software problems, and

How to cite this article: Iravani M, Nasab MB, Bahmaei H, Ghanbari S, Mohaghegh Z, Siahkal SF. The level of satisfaction and quality of E-learning in medical universities of Iran during the epidemic of COVID-19. J Edu Health Promot 2022;11:9.

an individual's social isolation.[6] Several factors affect the success of E-learning programs such as information quality, system quality, instructor attitude toward E-learning, diversity in student assessment, and learner perceived interaction with others. User satisfaction depends on all of the above.[2] Today, most universities are working to increase the effectiveness of emerging technologies in their educational activities.[7] The World Health Organization has identified E-learning as a useful tool for meeting the educational needs of health in developing countries.[8] In many countries, studies on computer-assisted education have shown positive and promising results compared to other common teaching methods.[9] Ke and Kwak introduced the five elements of student satisfaction as the learner's relationship with the teacher, active learning, easy learning, student independence, and technology competence.[10] Kuo *et al*. found that student-teacher interaction and dealings between content and learner and technology efficiency are the valid indicators of students' positive perception.[11] However, the current global pandemic crisis created due to COVID-19 has made worldwide online teaching and learning. Teachers and students were not ready for online teaching but to avoid wasting time, governments, faculty members across various universities, and education institutions are responding in to be accountable to their students and continue education during this crisis period.[12] In Iran, E-learning has started in all educational levels after the start of COVID-19 in March 2020 and continues to this day. In this regard, the universities of medical sciences are trying to continue their education by using the Virtual University of Medical Sciences Navid system and the Islamic Azad University by setting up a virtual education network.[13] Given that student satisfaction has always been one of the goals of universities,[14] and most studies have been done in a single university and can't provide comprehensive views of virtual education in Iran. On the other hand, there was no comparison between the E-learning performance of public and private universities. This study aims to assess the level of satisfaction and quality of E-learning in medical universities from the perspective of students during the epidemic COVID-19. This study also examines the barriers and problems of E-learning and solutions provided by students to improve the quality of this type of education.

Materials and Methods

Study design and setting

This descriptive-analytical paper was conducted among medical students of the University of Medical Sciences and the Islamic Azad University of Iran.

Sampling participants and sampling

A web-based random sampling method was used to select the sample. Due to the coronavirus epidemic and the impossibility of face-to-face sampling on the one hand and students' familiarity with the internet and related technology, on the other hand, we chose this sampling method. We included all medical students using E-learning education during this semester. Hence, students who have completed theory courses or are taking internships are excluded from the study. To do this, various student groups of medical universities were identified through snowballs and contacted the admins of the groups across the country and asked them to help the research team by placing a link to complete the questionnaire. Then, after an explanation about the research and its general purpose and getting written consent, students were invited to complete a questionnaire that had three parts. The first part of the questionnaire contains demographic and information about their educational status and the second part includes a user satisfaction questionnaire, a questionnaire for continuing to use E-learning, and a researcher-made questionnaire on the quality of virtual education. The third part contains the two open-ended questions for assessing the obstacles and suggesting solutions for enhancing E-learning quality.

Data collection tool and technique

For the data collection in this study, we used four questionnaires as follows:

Demographic questionnaire

The validity and reliability of demographic information are obtained using the content validation method. Thus, according to the objectives of the research, the researcher prepared the information form and then provided it to 10 members of the faculty of Ahvaz University of Medical Sciences. The questionnaire was reformed and completed using their views.

User satisfaction scale

The User Satisfaction Questionnaire is based on the research of Oliver[15] and contains three items. Answering questions on a seven-point Likert scale is a range of fully agree (option 1) to completely opposite (option 7). The reliability of the questionnaire reported by Cronbach's alpha, 0.90.[16] In the Persian version, 4 more items were added, which reached a total of 7 items by Cronbach's alpha of 0.90.

Quality Questionnaire

The CDC and NHS Education Quality Questionnaire[17,18] is designed to assess the quality of E-learning, which according to our knowledge has not been used in the Iranian population so far. This questionnaire was translated into Persian by experts. To determine the content validity index, the questionnaire was given to 10 faculty members of the School of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, and then for internal reliability, the questionnaires were given to 100 medical students that

using E-learning education and finally reliability was determined using Cronbach's alpha by a statistician. The questionnaire contains 47 items in eight sections as follows: knowledge (3 items), interaction (3 items), activity process (12 items), text content quality (8 items), reusability and compliance with standards (3 items), image quality (6 items), student evaluation (5 items), and finally, ensuring participatory quality to evaluate online courses (7 items). Answering the questions used a range of three-point scale of good (score 1), moderate (score 2), and bad (score 3).

Open-ended questions

Three open-ended questions were designed to examine the barriers and problems of E-learning and the solutions suggested by students to solve the problems. After collecting the answers, the author analyzed them qualitatively, and the categories and themes were extracted.

Reliability analysis

In the study of the reliability of domains using Cronbach's alpha, all domains are in the good and appropriate range above 0.7, except the domain of interest in continuing learning, which is in the acceptable range (0.609). Table 1 shows the results.

Sample size

Based on an estimate of more than nearly 10,000 students, the sample size is estimated at 384 according to Morgan's table. The questionnaire was completely filled without errors by 400 students and statistically analyzed.

Statistical analysis

Data were analyzed using a IBM SPSS Statistics 22 (IBM, USA, 2013). Descriptive analysis was performed for categorical variables such as sex, university, level of education, term, the field of study, and previous use of E-learning. A continuous variable like age was reported by the mean and standard deviation (SD). The Kolmogorov–Smirnov test is used to test the normality of data distribution. *T*-test was used to compare the domains of E-learning between Azad University students and medical science students and a Chi-square test was used to compare the level of satisfaction and quality of education in the fields of E-learning. Furthermore, Pearson correlation coefficient was used to investigate the relationship between satisfaction and interest in learning continuity with the quality domains of E-learning.

Ethical considerations

The ethical code of this study has been issued by Ahvaz Jundishapur University of Medical Sciences with the ethics code IR. AJUMS. REC.1399.371. Informed consent has been obtained online from all participants in this study.

Results

Demographic characteristics

This cross-sectional study was conducted on 400 medical students of Iranian National and Islamic Azad Universities. Of these, 277 were girls (69%) and 123 were men (31%). The mean age of students was 21 ± 2 years. Fifty-nine percent of students have already used E-learning. Most respondents studied at the undergraduate level (72%). Students of the paramedical school had the highest percentage (28%) and the school of pharmacy had the lowest (5%) participation rate. Sixty-nine percent of students were studying in medical sciences universities and 31% were studying in medical sciences faculties of Islamic Azad University. Table 2 shows the characteristics of participants.

Result of satisfaction and quality of e-learning

The total score of satisfaction and quality (mean ± SD) is shown in Table 3. The result showed that the level of satisfaction with E-learning was in upper range of low (34.0 ± 10.0), interest in continuity was moderate (23.06 ± 6.0), and the quality score was in upper range of low to moderate. Among the quality domains, activity process (23.0 ± 6.0), reusability and compliance with standards (6.0 ± 1.0), and image quality (12.0 ± 3.0) domains were moderate and the rest were in the upper range of low scores.

Table 1: Reliability statistics

Domains	Cronbach's alpha	Cronbach's alpha based on standardized items	Number of items
User satisfaction	0.924	0.925	7
Interest in continuing learning	0.609	0.637	5
Knowledge	0.866	0.867	3
interaction	0.801	0.801	3
Activity process	0.899	0.898	12
Content quality	0.903	0.902	8
Reusability	0.724	0.727	3
Image quality	0.885	0.886	6
Student evaluation	0.876	0.876	5
Participant quality	0.888	0.889	7
Total	0.947	0.949	47

Comparison of satisfaction and quality of E-learning between two universities

A Chi-square test was used to compare the level of satisfaction and quality of education in the fields of e-learning. As shown in Table 4, the level of satisfaction and quality of education in most areas are reported to be low to moderate. User satisfaction (moderate satisfying: 34.7 vs. 26.2 and satisfied: 15.7 vs. 5.4; $P < 0.001$, respectively) and interest to continue learning (moderate satisfying: 52.9 vs. 59.9 and satisfied: 23.1 vs. 9.7; $P = 0.001$) were significantly higher in the Azad University group than medical universities. However, the unsatisfied rate is high in both groups. Furthermore, the quality of knowledge (moderate to complete satisfaction: 45.4 vs. 33.7; $P = 0.007$) and participatory quality for evaluating online courses (moderate to complete satisfaction: 52.1 vs. 38.3; $P = 0.014$, respectively) in the Azad University group was higher than the group of medical universities. In other domains, there was no difference between the groups. Student's perception of quality in most domains was in the low to medium range.

Table 2: The characteristics of study

Variable	*n* (%) or mean±SD
Age	21.0±2.0
Sex	
Girl	277 (69)
Boy	123 (31)
University	
University of medical sciences	279 (69)
Islamic Azad university	121 (31)
Level of education	
Undergraduate	289 (72)
MSc	18 (4)
PhD	16 (4)
MD	77 (19)
Term	
2	97 (24)
4	96 (24)
6	85 (21)
Other	122 (28)
Field of study	
Paramedical	114 (28)
Nursing	99 (24)
Midwifery	75 (18)
Medical	62 (15)
Dentistry	28 (7)
Pharmacology	22 (5)
Previous use of e-learning	
Yes	238 (59)
No	162 (40)

SD=Standard deviation

Correlation between satisfaction, interest in continuity, and the quality domains

Pearson correlation coefficient was used to investigate the relationship between satisfaction and interest in learning continuity with the quality domains of E-learning. The results showed a strong correlation between satisfaction with E-learning with the field of knowledge and teacher-student interaction ($r = 0.755$ and 0.714; $P < 0.01$). The correlation of other quality domains and satisfaction was moderate. Furthermore, there was a moderate correlation between interest in learning continuity and knowledge and teacher-student interaction ($r = 0.643$ and 0.544; $P < 0.01$). The correlation of interest in learning continuity and other domains was relatively weak ($r < 0.431$) [Table 5].

The barriers and problems of medical students in using E-learning

Another purpose of this study was to investigate the barriers and problems of medical students in using E-learning. According the answers of students to the three open-ended questions, barriers and problems raised by students were divided into six categories: Internet, system, problems of professors, students, examinations, and resources.

Internet obstacles

- Disruption of internet speed and low speed
- Low speed and quality of servers
- Internet outage

Table 3: Result of satisfaction and quality questionnaire

Items	Mean±SD			*P*
	Total (*n*=400)	University of medical sciences (*n*=279)	Islamic Azad university (*n*=121)	
User satisfaction	34±10	36.2±10.2	31.1±11.9	<0.001
Interest in continuing learning	23.06±6	23.5±6.29	22.05±7.39	0.064
Knowledge	7±1	7.28±1.78	6.71±2.03	0.005
interaction	7±1	7.31±1.7	6.76±1.95	0/006
Activity process	23±6	23.8±6.09	24.1±6.59	0/635
Content quality	18±4	18.9±3.93	17.19±4.93	<0.001
Reusability	6±1	7.01±1.59	6.69±1.9	0/117
Image quality	12±3	12.78±3.35	12.59±3.76	0/633
Student evaluation	11±2	11.54±2.75	11.04±3.05	0/108
Participant quality assurance checklist	15±3	16.05±3.51	14.94±4.19	0/012

SD=Standard deviation

Table 4: Frequency of satisfaction and quality of e-learning between two universities

Items	Frequency (%)			χ^2	*P*
	Score	University of medical sciences (*n*=279)	Islamic Azad university (*n*=121)		
User satisfaction					
Low satisfied	32.6-49	191 (68.5)	60 (49.6)	17.52	<0.001
Moderate satisfied	16.3-32.6	73 (26.2)	42 (34.7)		
Satisfied	0-16.3	15 (5.4)	19 (15.7)		
Interest in continuing learning					
Low satisfied	28-42	85 (30.5)	29 (24)	13.08	0.001
Moderate satisfied	14-28	167 (59.9)	64 (52.9)		
Satisfied	0-14	27 (9.7)	28 (23.1)		
Knowledge					
Low satisfied	6-9	177 (63.4)	66 (54.5)	9.98	0.007
Moderate satisfied	3-6	80 (28.7)	38 (31.4)		
Satisfied	0-3	14 (5)	17 (14)		
Interaction					
Low satisfied	6-9	187 (67)	68 (56.2)	5.25	0.072
Moderate satisfied	3-6	80 (28.7)	43 (35.5)		
Satisfied	0-3	12 (4.3)	10 (8.3)		
Activity process					
Low satisfied	24-36	126 (45.2)	57 (47.1)	1.11	0.571
Moderate satisfied	12-24	143 (51.3)	62 (51.2)		
Satisfied	0-12	10 (3.6)	2 (1.7)		
Content quality					
Low satisfied	14-21	116 (41.6)	51 (42.1)	0.053	0.975
Moderate satisfied	7-14	155 (55.5)	67 (55.4)		
Satisfied	0-7	8 (2.9)	3 (2.5)		
Reusability					
Low satisfied	6-9	167 (59.9)	66 (54.5)	4.84	0.089
Moderate satisfied	3-6	100 (35.8)	43 (35.5)		
Satisfied	0-3	12 (4.3)	12 (9.9)		
Image quality					
Low satisfied	12-18	138 (49.5)	56 (46.3)	0.351	0.839
Moderate satisfied	6-12	123 (44.1)	57 (47.1)		
Satisfied	0-6	18 (6.5)	8 (6.6)		
Student evaluation					
Low satisfied	10-15	169 (60.6)	61 (50.4)	3.65	0.161
Moderate satisfied	5-10	97 (34.8)	52 (43)		
Satisfied	0-5	13 (4.7)	8 (6.6)		
Participant quality assurance checklist					
Low satisfied	14-21	172 (61.6)	58 (47.9)	8.56	0.014
Moderate satisfied	7-14	100 (35.8)	55 (45.5)		
Satisfied	0-7	7 (2.5)	8 (6.6)		

- The high cost of Internet
- Definitive sound
- Not available in some areas such as villages
- Lack of Internet and computer or laptop for all users (especially students living in the village).

System problems

- It is not possible to provide services to a large number of students simultaneously
- Problem connecting to the application
- Lack of familiarity of professors and students with software (professors and students have not received the necessary training to work with the application)
- Inefficiency in connecting to the system using mobile definitive sound
- The inefficiency of tests and evaluations performed during the training course
- Lack of sufficient infrastructure for E-learning
- Do not hold webinars or at least Weiss
- Unable to record class and save PowerPoints
- Inconsistency between the time of courses in the Azad University system
- If we edit the homework section in the Navid system, it will delete the answer completely and the teacher

Table 5: Correlation analysis

Variable	Interest in continuing learning	Knowledge	interaction	Activity process	Content quality	Reusability	Image quality	Student evaluation	Participant quality assurance checklist
User satisfaction	0.686**	0.755**	0.714**	0.519**	0.551**	0.622**	0.551**	0.615**	0.676**
Interest in continuing learning	1	0.643**	0.544**	0.387**	0.419**	0.420**	0.397**	0.390**	0.431**

**Correlation is significant at the 0.01 level (two-tailed)

will not give the exercise score!
- The message sending section for professors in the Navid system has a bad design, and if we want the message to be sent only to the professor, we must delete the names of the other students one by one. If the master deletes a file and uploads it again, the new file icon will not be displayed
- Access to recorded sessions is only available at night and this restricts the student.

Problems related to professors

- The inability of professors in the field of virtual education
- Lack of teacher supervision infrastructure
- Failure to provide content based on a lesson plan
- Announce the time of the quizzes shortly before the quiz
- Irregularities in the teaching time and the short teaching time of some professors
- Teachers' lack of motivation
- Many professors only read the booklet and do not provide any explanation
- Some professors do not upload the booklet or course content and the student only has to stare at the blank page
- Inexperience and illiteracy of some professors in using e-learning
- Lack of attention of professors to the content created
- Noncompliance of teaching methods with virtual teaching methods
- Some professors upload the content of 10 sessions at a time, which makes it difficult to find the text of the session and upload it
- Classes that were held once a week during face-to-face training are now 3–4 h per session instead of 1.5–2 h
- The indifference of many professors in responding to students' problems.

Problems with students

- Students have not received the necessary training to work with the system.
- The inconvenience of the program for teaching practical, cognitive, and comprehensive lessons
- Lack of effective and direct access to professors
- Lack of direct communication between the student and the teacher to fix the problems
- Student's lack of concentration due to the lack of a teacher's image and only the teacher's voice
- A high volume of assignments and a short time to do them
- Presentation of a large volume of content in one session by professors
- Lack of collective participation in class discussions and one-sided teaching process
- Students are not active
- Lack of control over students
- Lack of standard program for attendance for students
- Creating problems downloading files for students who have access to the classroom with a mobile system
- Low learning and low efficiency of courses for students.

Exam problems

- Lack of coordination between professors and students to hold examinations
- High cheating and earning unrealistic scores.

Problems with resources provided by professors

- Low quality in sending resources by professors
- In many cases, just a photo of the pages of a book, reference, or PowerPoint file is provided without any explanation.

Suggested solutions by students

- Holding classes by video conference
- Provide training related to the system to students and professors before the start of the course
- Supervise the performance of professors and remind the professor during the course not after the end of the semester
- Upload content with a suitable time interval and low volume until the end of September
- Appropriate division and timing in submitting content and coordination of professors together
- Provide free and high-speed internet packages to students and receive dedicated bandwidth
- Upload books and resources electronically
- Upgrading the servers and bandwidth of Navid system and Azad University system
- Classes are held by professors at specific hours with audio and video access to professors
- Students access files before class
- Ability to record classes to students
- E-learning software upgrade
- Compatibility of the application with the mobile system

- Enabling questions and answers in class
- Eliminate the current semester without taking into account the years, considering that virtual education is not a suitable alternative to face-to-face education and is more of a supplement to face-to-face education.

Discussion

Investigating the level of satisfaction and quality of e-learning during the outbreak of COVID-19 was the first purpose of this study, which showed that the level of satisfaction and quality is at the level of low to moderate.

Student satisfaction is based on the experience that students had while receiving certain services at the university.[19] Students' satisfaction will be related to their experiences during e-learning. If the student has a good experience of this type of learning, it will be accompanied by satisfaction and the student will want to continue this type of learning and vice versa. Student satisfaction or dissatisfaction with e-learning helps the student decide whether he or she wants to continue using this form of learning.[10,20] The research conducted by Darmawan[21] showed that when the reality is lower than the expectation, it will cause poor effectiveness that leads to low satisfaction for students. Satria *et al*.[22] showed that the satisfaction is caused by the content, accuracy, form, ease of use and timeliness that make the effectiveness of learning so that it affects the high satisfaction for students in using e-learning. In our study, the rate of intention to reuse was moderate.

On the other hand, the quality of e-learning is directly related to student satisfaction. According to Hammouri and Abu-Shanab papers, perceived simplicity of use, perceived usefulness, system quality, information quality, and system efficiency are the main factors affecting student satisfaction.[23] This study is in line with our study that satisfaction is related to different dimensions of quality. In our paper, student satisfaction and intention to reuse has a strong correlation with knowledge and student-teacher interaction.

In the field of knowledge, three questions were answered. "Is the identified knowledge or skill appropriate for e-learning?," "Are learning strategies appropriate for e-learning?" And "Are learning objectives transparent and measurable?" According to the results, it seems that the Islamic Azad University has performed better in this area than medical universities. Also, in the checklist for evaluating online courses by students who took a general quality assessment, Azad University received a higher score than medical universities.

One of the goals of all universities in Iran is to satisfy students and provide quality services. However, because the Islamic Azad University is a nongovernmental and private organization and receives tuition from students and the student is a customer of this organization, student satisfaction is one of the important goals in this university unit and more efforts are being made by the founders to obtain student satisfaction. This difference, though small, could be due to this.

Fichten *et al*. in a study at McGill University in Canada (2014) examined the problems of E-learning and addressed problems such as difficult access to websites and course management systems, problems with audio and video, time constraints in online exams, problems loading and opening files, excessive downloading, improper use of e-learning by professors and lack of knowledge of working with e-learning, and lack of access to notes and course materials.[24] In our study, the most common problems related to poor internet speed, disconnection during the class, lack of familiarity of students and teachers with how to use e-learning, lack of interest and motivation in students and teachers and noncompliance with the curriculum and lesson plan, and problems loading and opening files are the most common problems were raised among medical students of Iran that are consistent with the study of Fichten *et al*. In line with our study, a qualitative survey was done in Sabzevar University. Lack of feedback, communication channel problems, un-preparedness of the recipient of the message, and weakness in the educational content were determined as a barrier against of virtual education.[25] However, our study was done comprehensively around all of the medical universities of Iran.

A study that used virtual education during quarantine to train urology assistants found that 89% of assistants considered this method suitable for continuing education, and almost 84% were satisfied with it, which indicates that if virtual education is implemented properly can be a good alternative to traditional education.[26]

Overall, both universities have not yet been able to fully achieve the quality of e-learning and student satisfaction. It seems that the reason for the low quality of e-learning from the perspective of students in Iran is related to the low speed of the Internet and software problems, which according to the relevant officials and its improvement, it is hoped to increase the quality of this type of education in the coming semesters. This study, by examining the obstacles and problems of e-learning during the COVID-19 epidemic, has tried to provide suggested solutions by students to improve the quality of education.

Limitation and recommendation

The limitation of this study is its cross-sectional design. As a result, it examines education over a period of time

and may change over time. Second, this work was done during quarantine, which made it impossible to conduct face-to-face interviews with research samples. On the other hand, it is possible that the psychological conditions in the community due to COVID-19 affect the response of students. It is suggested that this study be repeated later through face-to-face interviews for more detailed feedback. Thus, the finding of this study can be effective in identifying problems in the online education system and planning to solve problems and can improve the level of E-learning and student satisfaction.

Conclusion

The current global pandemic crisis created due to COVID-19 has made worldwide online teaching and learning. To maintain social distance, the virtual education system was expanded rapidly worldwide. All institutions and universities have made all efforts to increase the quality of this type of education. This study was tried to determine the level of quality and satisfaction of medical students from the virtual education system. According to the results of the study, the quality of this type of education and consequently, the satisfaction of students was the level of low and moderate. The universities can improve level of the education by upgrading the E-learning software of universities, allocating a dedicated internet band, and educating professors and students. As a result, level of education in universities can be maintained at the desired level during the epidemic COVID-19.

Acknowledgment

We are grateful to all the medical students who participate in this study. We also thank the faculty of nursing and midwifery and the Student Research Center of Ahvaz Jundishapur University who cooperated with us in compiling this research project.

Financial support and sponsorship

This article is based on student research project (plan number 99S42) that was funded by Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. The ethical code of this study is IR.AJUMS. REC.1399.371.

Conflict of interests

There are no conflicts of interest.

References

1. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med 2006; 81:207-12.
2. Cidral WA, Oliveira T, Di Felice M, Aparicio M. E-learning success determinants: Brazilian empirical study. Comput Educ 2018; 122:273-90.
3. Al-Samarraie H, Teng BK, Alzahrani AI, Alalwan N. E-learning continuance satisfaction in higher education: A unified perspective from instructors and students. Stud High Educ 2017; 43:2003-19.
4. Jefferson R, Arnold L. Effects of virtual education on academic culture: Perceived advantages and disadvantages. China Educ Rev. 2009;6:61-66.
5. Mirjana RM. Advantages and disadvantages of e-learning in comparison to traditional form of learning. Ann Univ Petroşani Econ 2010; 10:289-98.
6. Srivastava DP. Advantages and disadvantages of E-education and E-learning. J Retail Market Distrib Manage 2019; 2:22-7.
7. Qurbankhani MS. Representing the challenges of virtual education in the iranian higher education system: A phenomenological study. Inform Commun Technol Educ Sci 2017; 7:26.
8. Childs S, Blenkinsopp E, Hall A, Walton G. Effective e-learning for health professionals and students – barriers and their solutions. A systematic review of the literature – findings from the HeXL project. Health Inform Lib J 2005; 22:20-32.
9. Thiele JE. Learning patterns of online students. J Nurs Educ 2003; 42:364-6.
10. Ke F, Kwak D. Constructs of student-centered online learning on learning satisfaction of a diverse online student body: A structural equation modeling approach. J Educ Comput Res 2013; 48:97-122.
11. Kuo YC, Walker AE, Belland BR, Schroder KE. A predictive study of student satisfaction in online education programs. Int Rev Res Open Distribut Learn 2013; 14:16-39.
12. Saxena K. Coronavirus Accelerates Pace of Digital Education in India; 2020. Available from:https://edtechreview.in/e-learning/3984-corona-virus-accelerates-pace-of-digital-education-in-india. [Last accessed on 2020 Dec 01].
13. NAVID Learning Management System. Tehran University of Medical Sciences. Available from: https://tumsnavid.vums.ac.ir/?AspxAutoDetectCookieSupport=1. [Last accessed on 2020 Mar 25].
14. Lee JW. Online support service quality, online learning acceptance, and student satisfaction. Internet High Educ 2010; 13:277-83.
15. Oliver RL. A cognitive model of the antecedents and consequences of satisfaction decisions. J Mark Res 1980; 17:460-9.
16. Chiu CM, Hsu MH, Sun SY, Lin TC, Sun PC. Usablity, quality, value and e-learning continuance decisions. Comput Educ 2005;45:399-416.
17. Scotland NEf. "NHS Shared Learning Quality Assurance Checklists for Evaluating Learning Objects and Online Courses": NHS Education for Scotland; 2009. Available from: https://www.knowledge.scot.nhs.uk/media/4088630/quality_assurance_checklists.pdf. [Last accessed on 2020 May 22].
18. CDC. "Quality E-Learning Checklist Quality E-learning Checklist,": Centers for Disease Control and Prevention; 2018; 1-2. Available from: https://www.cdc.gov/training/development/pdfs/design/elearning-checklist-508.pdf. [Last accessed on 2020 May 22].
19. Puška A, Ejubović A. Quality enhancement through determining the gap between the expectations and perceptions of students: Empirica college case study. Proceedings of the Faculty of Economics in East Sarajevo, 1 (12):23-36.
20. Puška A, Puška E, Dragić L, Maksimović A, Osmanović N. Students' satisfaction with E-learning platforms in Bosnia and Herzegovina. Technol Knowl Learn 2021; 26 (3): 173–191. [doi: 10.1007/s10758-020-09446-6].
21. Darmawan F. Pengukuran tingkat kepuasan pemanfaatan E-learning (studi kasus E-learning IF UNPAS). J Speed 2015; 7:64-70.
22. Satria Wijaya IG, Kayun Suwastika IW. Analisis Kepuasan Pengguna Elearning Menggunakan Metode End-User Computing Satisfaction. E-Proceedings KNS and I STIKOM Bali; 2017;558-562. ISSN 2460-8378. Available at: <https://knsi.stikom-bali.ac.id/index.php/eproceedings/article/view/102>. [Last accessed on 2020 May 22].
23. Hammouri Q, Abu-Shanab E. Exploring factors affecting users'

satisfaction toward e-learning systems. Int J Inform Commun Technol Educ 2018; 14:44-57.

24. Fichten CS, Ferraro V, Asuncion JV, Chwojka C, Barile M, Nguyen MN, *et al*. Disabilities and e-learning problems and solutions: An exploratory study. J Educ Technol Soc 2009; 12:241-56.
25. Mortazavi F, Salehabadi R, Sharifzadeh M, Ghardashi F. Students and #39; perspectives on the virtual teaching challenges in the COVID-19 pandemic: A qualitative study. J Educ Health Promot 2021; 10:59.
26. Narain T, Mittal A, Singh V, Panwar V. Feasibility and usefulness of online virtual training of urology residents in times of COVID-19: A single-center experience and an evidence-based strength, weakness, opportunity, and threat analysis. J Educ Health Promot 2021; 10:116.