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Iranian Students' Satisfaction with Virtual Education during the COVID-19 Pandemic: A Systematic Review

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Abstract

Background: With the start of the COVID-19 pandemic and using virtual education in universities, faculty members and students faced a serious challenge in education. This study aimed to investigate Iranian students' satisfaction with virtual education during the COVID-19 pandemic.

Materials and Methods: In this systematic review, a search of online databases (Medline, EMBASE, Scopus, Web of Science, ERIC, SID, CIVILICA, and Google Scholar search engine) was conducted for relevant studies up to December 2022. The quality of the information was evaluated using the STROBE and COREQ tools.

Results: Eleven related studies were selected. The students' satisfaction with virtual education ranged from 29.6% to 86.5%. Students indicated the strengths of virtual education as the elimination of travel costs, the reduction of the stress of presentation, saving time, more freedom, getting out of the framework, the possibility of recording the class and using it at another time, and preventing the COVID-19 spread. The primary weaknesses of virtual education were the lack of feedback and face-to-face interaction, the low quality of teaching by educators, the poor quality of educational content, the lack of participation of learners in teaching, the disruption of the e-learning websites, low Internet speed, and the cost of the Internet. The findings showed that the cultural and personality differences of students were effective in determining the strengths and weaknesses of virtual education ($p<0.05$).

Conclusion: Satisfaction with the quality of virtual education varied from 29.6 to 85.5%. Despite problems in virtual education, universities should use the benefits of this approach and try to resolve the challenges expressed by students to achieve maximum satisfaction.

Key Words: COVID-19, Iran, Satisfaction, Students, Virtual Education.

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1- INTRODUCTION

The COVID-19 pandemic has affected various aspects of the economic, social, and cultural life of all people across the world (1). Among the affected cases is the higher education system of different countries. The need for social distancing to prevent the spread of the disease caused the closure of universities and higher education institutions and deprived 1.5 billion students of access to face-to-face classrooms (2). As a result, the higher education systems in different countries resorted to various measures to maintain the health of students while continuing education. One of these measures is providing education in electronic form or through virtual space (3, 4).

The World Health Organization (WHO) also introduced distance education devices, such as the use of radio, television, and the Internet, as the best ways to continue education during the COVID-19 crisis (5, 6). After the spread of COVID-19, the Ministry of Science, Research, and Technology, which is in charge of Iran's higher education, ordered the closure of educational institutions. Consequently, Iranian universities and higher education centers tried to continue their education in different ways, and electronic education replaced face-to-face classes (7-9).

E-learning or virtual education, in a broad definition, refers to any use of web-based and Internet technologies to provide educational services. In other words, electronic education involves any form of learning in which the network is used for transferring knowledge, interaction, and facilitating learning (10, 11). At present, opportunities have risen following COVID-19 through the provision of electronic education for universities and higher education institutions. These opportunities include the development of electronic infrastructures, updating the curriculum headings, creating virtual course content by university professors, expanding the international scope to attract international students to specialized or formal university courses, and providing the possibility of higher participation in International research (12). The pandemic, however, created many challenges for the higher education system of different countries. With the absence of classrooms, the quality of university education declined. University officials and faculty members were forced to reconsider the methods of university education and management (12).

Moreover, many universities and institutions of higher education, as well as a large number of students, did not have the necessary infrastructure and resources (such as computers and access to the Internet) for electronic education, and numerous problems existed, such as the lack of access of some students to the virtual space, the high cost of the Internet for many families, and the low speed of the Internet in some areas (13). Much research has been conducted on virtual education and its challenges before the pandemic (14-18). These studies, however, are sparse and with varying results and mostly focus on students in universities under the supervision of the Ministry of Science. In these studies, the dimensions and elements of virtual learning and its benefits and challenges have been emphasized from various angles (19-22).

In addition, along with virtual education, students' satisfaction with this type of education is also important (23), and evaluating their satisfaction is necessary to improve learning and maximize the goals of training courses (24). Evaluating the students' satisfaction with virtual education programs allows educational institutions to implement their programs more effectively and to identify areas for the improvement and development of virtual education (25, 26). Since students' learning can be influenced by their satisfaction, it is essential to consider their

points of view about teaching and learning methods (27). Therefore, the primary way to measure the success of this new education method in Iran is to evaluate the level of satisfaction of its users. The present study aimed to investigate the satisfaction of Iranian non-medical students with virtual education during the COVID-19 pandemic.

2- MATERIALS AND METHODS

2-1. Data sources

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) checklist was used as a template for this review (28). A systemic search of electronic databases Medline, EMBASE, Scopus, Web of Science, ERIC, SID, CIVILICA, and Google Scholar search engine was conducted with Mesh keywords, including "Virtual learning, Virtual education, E-learning, Web-based learning, Online learning, Distance learning, Distance education, Students, University students, Iran, Challenges, Benefits, Opinion, COVID-19, and Satisfaction", with no time limit up to December 2022. Keywords were combined using "OR" and "AND" Boolean operators. The search was performed independently and in duplication by two reviewers, and any disagreement was solved by the supervisor.

2-2. Protocol and registration: Not available.

2-3. Eligibility criteria

The participants, interventions, comparators, and outcomes (PICO) scale was used to formulate the review objective and inclusion criteria.

Participants: Iranian university students (non-medical students).

Interventions and Comparators*:* The included studies were non-interventional, so no intervention or comparison group existed.

Outcomes: Students' satisfaction with virtual education.

2-4. Inclusion criteria

Research articles conducted in Iran during COVID-19 were the main criteria for inclusion in the study. Other inclusion criteria were the focus on the satisfaction of non-medical university students towards virtual education, published up to December 2022, written in English or Persian, and published articles with full text available.

2-5. Exclusion criteria

The exclusion criteria were abstracts without the full article, articles not written in English or Persian, reviews or meta-analyses, letters, commentaries, editorials, short reports, case reports, pilot and preliminary studies, and briefs.

2-6. Study selection

The database search was performed for the relevant studies, abstracts of the studies were screened to identify eligible studies, full-text articles were obtained and assessed, and a final list of selected studies was made (**Figure 1**). This process was performed independently and in duplication by two reviewers, and any disagreement was resolved by a third reviewer. References were organized and managed using EndNote software (version X8).

2-7. Data collection process

A researcher-made form was developed as a template and followed for each study. Two reviewers collected the data independently, and a third reviewer solved any discrepancies. The collected data included study population, authors' names, and settings, year of publication, study type, sample size, participants' field, and the main results.

2-8. Risk of bias

The quality of the included studies was evaluated using the modified STROBE (STrengthening the Reporting of Observational Studies in Epidemiology), and the COREQ (Consolidated criteria for reporting qualitative research) checklists. The modified STROBE is a valuable tool for evaluating the quality of observational studies. This checklist has 11 items, and a maximum of one point is allocated to each methodological element. The final score of the checklist varies from 0 to 11, indicating high quality (8-11), moderate quality (4-7), and low quality (0-3) points (29).

The COREQ is a 32-item checklist developed by Tong et al. (30). It has been developed to promote explicit and comprehensive reporting of qualitative studies (interviews and focus groups). The standard COREQ checklist includes 32 items grouped into three domains: (1) research team and reflexivity, including eight items on the details of the researcher and relationship with study participants, (2) study design, including 15 items that identify the theoretical framework, participant selection process, data collection, and study setting, and (3) data analysis and reporting, including nine items. Using established criteria and based on the number of items addressed in each study, COREQ compliance was coded high (≥ 25 items), moderate (17 to 24), low (9 to 16), or very low (≤ 8). COREQ compliance for included studies was checked against each of the 32 criteria (yes/no) by two researchers. The data were checked and compiled by a third researcher. Another researcher resolved discrepancies in study inclusion or item ratings.

2-9. Synthesis of results

Due to the difference in the included studies, study designs, small sample sizes, students' field, and the type of questionnaire used, a meta-analysis was not conducted.

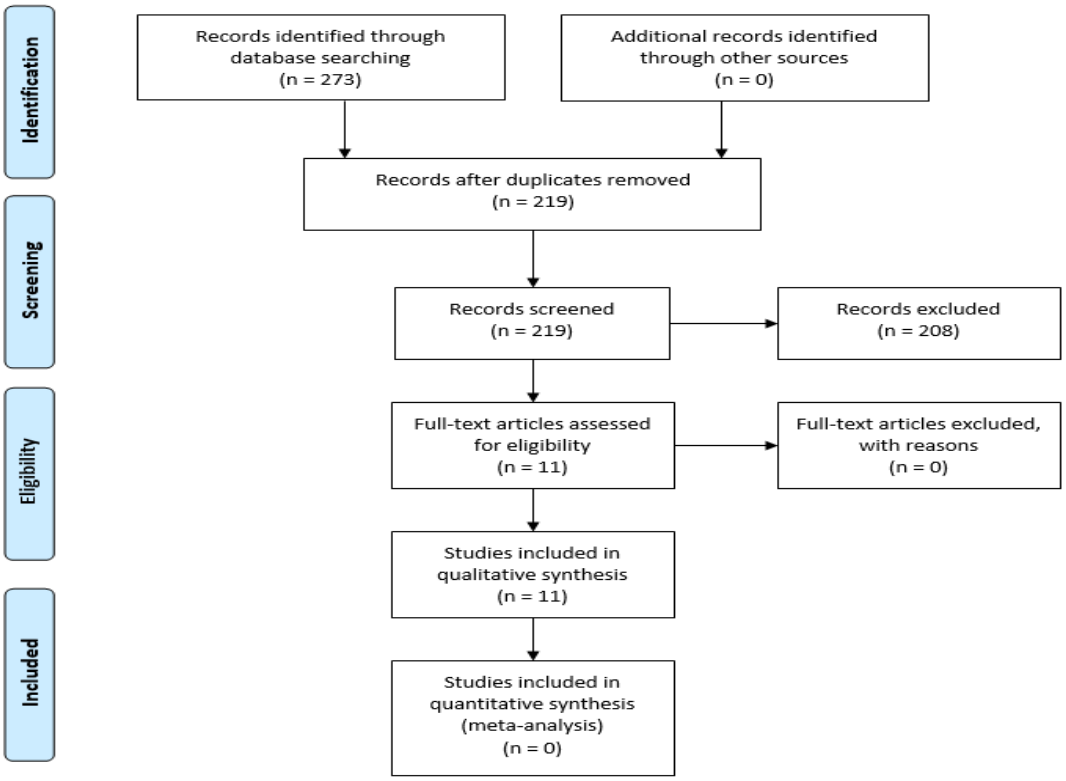

Fig.1: PRISMA flowchart.

3-RESULTS

A total of 2788 non-medical students were evaluated in 11 related studies. The significant characteristics of the selected studies are summarized in **Table 1** and the following:

1. A cross-sectional study at Mehralborz University in 2021 aimed to measure the satisfaction of MS students with the e-learning system during the outbreak of the COVID-19 pandemic. The results showed that the environment factor had the highest effect on perceived satisfaction, followed by factors of students, user interface design, professors, and technology. The flexibility of educational units had the lowest effect on perceived satisfaction (19).

2. A qualitative study at Shahid Beheshti University investigated the challenges and opportunities of virtual education from the perspective of undergraduate students of the Faculty of Literature and Humanities. The results showed that the challenges of virtual education included five main themes: technical problems, educational problems, problems related to teacher performance, problems related to student performance, and problems with activity and interaction. The advantages of e-learning included eliminating travel costs, reducing the stress of presentation, saving time, freedom and moving beyond the framework, the possibility of recording the class and using it later, prevention of COVID-19, elimination of dormitory problems, and the optimization of leisure time (20).

3. A qualitative, descriptive phenomenology aimed to investigate the lived experience of Guilan University students with virtual education during the COVID-19 pandemic. The results found that the challenges of virtual education included several sub-themes around two mains themes of learners' mood (low productivity, lack of motivation, time constraints, poor experience, learning opportunities, comfort-seeking, psychological security, and stress), and learning context (low teaching quality, lack of variety of educational tools, and lack of face-to-face interaction with students, and accessibility) (21).

4. A qualitative study at Farhangian University aimed to examine the opportunities and disadvantages of e-learning during the COVID-19 pandemic from the perspective of student-teachers working with the SWOT model. The results showed that 86.5% of students were satisfied with the training, and the best advantage was saving time. They mentioned reducing air pollution, preserving the environment, and preventing the spread of the Coronavirus as opportunities. The most cited challenge of e-learning was the disruption of the e-learning website, and the most common external problems were connection interruptions, low speeds, and high Internet costs. Cultural and personality differences of individuals were effective in determining the strengths and weaknesses of e-learning. Also, the role and personality of teachers were important in improving teaching (22).

5. A cross-sectional study at Bonab University aimed to investigate the effect of online flipped classrooms on the learning and satisfaction of undergraduate civil engineering students. The results showed that in the initial sessions, the mean scores of the quizzes in the flipped method did not differ significantly from traditional classes. However, there was a statistically significant difference between the results of the initial and later quizzes in the flipped online class. Although the scores of the subsequent quizzes and the final exam in the flipped class were higher than traditional classes, it was not statistically insignificant ($p>0.05$). The students' statements indicated their satisfaction with the online class using

flipped model compared to their other online classes (31).

6. A mixed-method study at Ayatollah Borujerdi University investigated the extent of satisfaction of Iranian university students with online classes (OCs) during the COVID-19 pandemic. The results showed that the students were not highly satisfied with OCs, and their satisfaction with subscale factors such as instructors, technology, course setup, interactions, outcomes, and overall satisfaction was reduced by approx. 50%. It indicates that the factors shaping university students' learning satisfaction were inefficient (32).

7. A mixed-method study at Ayatollah Borujerdi University aimed to investigate the correlation between university students' satisfaction and anxiety in online classes during the COVID-19 pandemic. The results showed that the mean satisfaction of university students in online classes was 81.20±16.54 (moderate). Also, a moderate negative correlation was found between the students' satisfaction and anxiety in online classes. It means that the higher satisfaction of university students in online classes led to lower anxiety (33).

8. A cross-sectional study on the students of Allameh Tabatabayi, Shahid Beheshti, and Tehran Universities investigated the level of satisfaction of students with online education and the factors affecting its effectiveness. The results showed a mean satisfaction score of 2.4 out of 5 (low). The lowest level of satisfaction was related to practical training. Factors affecting the level of students' satisfaction were categorized into five dimensions: the conditions of the classes and the virtual system, the characteristics of students and professors, technological infrastructure and the necessary tools, and the support of the university. The factors of professors, conditions of the educational system and classroom, and characteristics of students had the greatest influence on satisfaction with online education (34).

9. A cross-sectional, web-based study at the Rasht Branch of Islamic Azad University (IAU) aimed to examine the impact of the COVID-19 pandemic on students' learning in the Iranian EFL context. The results showed that the students were not involved in continuous online teaching and learning during the COVID-19 pandemic, and their learning was heavily affected by the pandemic. In addition, results showed that students had problems with the Internet and technological facilities. They suggested an IAU design and a resourceful online platform, which would be free for and accessible to users with a poor Internet connection, as some students lived in areas where the Internet speed was too low (35).

10. A cross-sectional, web-based study on physical education students across Iran aimed to investigate the effects of COVID-19 on the satisfaction of students with online teaching in Iran. The results showed that the effect of all components of online classes on student satisfaction is increasing. Among the components of online classes, the "instructor's prompt feedback" was the highest (0.20), and the "student's expectations" (0.14) was the lowest predictor of student satisfaction. It means that COVID-19 did not have a negative effect on the academic performance of physical education students, and they were satisfied with online classes (36).

11. A mixed-method study at Bu-Ali Sina University aimed to investigate students' satisfaction with the pedagogical flexibility of the upside-down learning approach in terms of media, online-offline teaching, and evaluation method in electronic learning. The results showed that the students were satisfied with the flexibility of the flipped learning approach in terms of integration with the content, offline teaching, online teaching, and evaluation method (37).

Table-1: General characteristics and quality assessment of included studies (n=11).

Authors, Year, Reference	Setting	Sample size	Study type	Participants field	Main results	Quality assessment of included studies
Nazarzadeh et al., 2021, (19)	Mehralborz University	307	cross-sectional study	MS students	The dimension of environment had the most effect on perceived satisfaction, followed by student dimension, user interface design, professor and technology, respectively.	*moderate
Ebrahimi et al., 2021, (20)	Shahid Beheshti University	16	qualitative study	undergraduate students of the Faculty of Literature and Humanities	The challenges of virtual education including 5 main themes: technical problems, educational problems, problems related to teacher performance, problems related to student performance and problems related to activism and interaction.	**high
Qorbanpour Lafamajan et al., 2021, (21)	Guilan University	21	qualitative study	undergraduate students of the Faculty of Literature and Humanities	The challenges of virtual education including sub-theme around the two main themes of learners' mood (low productivity, lack of motivation, time constraints, etc.); and learning context (low teaching quality, lack of face -to - face interaction with students, etc.).	**moderate
Yazdi et al., 2022, (22)	Farhangian University	22	qualitative study	MS and BS student-teachers of Fatemeh Zahra Campus	86.5% of students were satisfied with the training and the best strength was saving time.	**high
Mollaei et al., 2021, (31)	Bonab University	35	cross-sectional	undergraduate civil engineering students	The students' statements indicated their satisfaction with the online class using flipped model compared to traditional online classes.	*moderate
Azizi et al., 2021, (32)	Ayatollah Borujerdi University	quantitative part=509 students, qualitative part=20 students	mixed-method study	undergraduate B.A. students	The university students were not highly satisfied with online classes. It means the factors shaping university students' learning satisfaction, such as instructors, technology, interactions, course-set-up, and outcomes were not performed well.	*moderate

Azizi et al., 2022, (33)	Ayatollah Borujerdi University	quantitative part=430 students, qualitative part=20 students	mixed-method study	undergraduate university students majoring in applied linguistics, mathematics, physics, social sciences, law, electronics, and mechanics	The mean of university students' satisfaction in online classes was 81.20±16.54 (moderate).	*moderate
Jalali et al., 2022, (34)	Allameh Tabatabayi, Shahid Beheshti and Tehran Universities	760	cross-sectional study	BS, MS, and PhD students	The results showed the mean satisfaction score of online education was 2.4 out of 5 (low). The lowest level of satisfaction was related to practical training.	*high
Ghavidel, 2022, (35)	Islamic Azad University, Rasht Branch	139	cross-sectional study	undergraduate students taking English Language Translation and English Language Literature courses	The students were not satisfied in a continual online teaching and learning during the COVID-19 pandemic. Also, they had problems with the Internet and technological facilities.	*moderate
Kordloo et al., 2021, (36)	Iran	464	cross-sectional study	Associate, BS, MS, and PhD physical education students	The physical education students were satisfied with online classes. Among the components of online classes, Instructor's Prompt Feedback was the highest (0.20) and Student's Expectations (0.14) was the lowest predictor of student satisfaction.	*moderate
Pourjamshidi et al., 2022, (37)	Bu Ali Sina University	quantitative part=30 students, qualitative part=15 students	mixed-method study	undergraduate educational sciences students	The students were satisfied with the flexibility of the flipped learning approach in terms of integration with the content, offline teaching, online teaching and evaluation method.	*moderate

* STROBE tool (29), ** COREQ tool (30). BS: bachelor's degree, MS: master's degree, PhD: Doctor of Philosophy.

4- DISCUSSION

The present study aimed to evaluate Iranian students' satisfaction with virtual education during the COVID-19 pandemic. It was found that the students' satisfaction with virtual education ranged from 29.6% to 86.5%. The benefits of this educational method included the elimination of travel costs, saving time, the possibility of recording the class and using it later, and preventing the spread of COVID-19. The most cited weaknesses of virtual education included a lack of feedback and face-to-face interaction, incompetent teachers, the disruption of the e-learning website, low Internet speed, and the cost of the Internet.

Online learning experienced rapid growth in recent years. The COVID-19 pandemic, however, made distance learning the sole option for educators and students. Most educational psychologists agree that the presence in the classroom and among other students is beneficial to personality development and life skills practice, as well as increasing learning ability (38). In December 2019, following the COVID-19 pandemic and the closure of universities, extensive measures were taken across countries, including Iran, to prevent interruptions in university education. In Iran, as in other countries, the best available solution was virtual education. However, university professors and students faced serious challenges in teaching and learning due to insufficient knowledge of using lesson management systems and holding and participating in online classes (4, 39). Changing face-to-face classes to electronic classes was among the plethora of problems caused by COVID-19 in the educational system of different countries. Specifically, many universities and institutions of higher education and even a large number of students did not have the necessary infrastructure and resources for electronic education, such as computers and access to the Internet (13). A significant challenge of using virtual education is moving away from human relationships and towards the virtual world. Also, virtual education programs could lack the desirable quality. The absence of necessary infrastructure for virtual education (problems such as bandwidth limitation, which causes difficulties in accessing audio, video, and moving content) lead to considerable loss of time for the learners and instructors alike (40). Other challenges of this educational method include the lack of up-to-date and situational instructions in virtual education, inefficiency in preparing rules and regulations for student evaluation, the poor quality of content, insufficient infrastructure, low Internet speed, and high cost of the Internet (41-42). Many studies have investigated the effects, strengths, and disadvantages of virtual education. A study on Master's students indicated that despite their adaptability to electronic education, they preferred face-to-face education (43). Students of an Algerian university were not interested in electronic education and emphasized traditional education methods (44).

Another study in Pakistan on the students' perception of e-learning showed that 77% of students had a negative perception of e-learning (45). Zarei et al. (2018) identified some challenges of virtual education as professors not using webcams, the system not recording classes, limitations in uploading course files, lack of communication with professors, not using discussion forums, absence of skill and training courses, lack of monitoring of course content, failure to respond to students' problems, lack of access to professors, their teaching methods, and their insufficient training and lack of hardware literacy (46). In another study, Zarei et al. (2019) introduced the lack of a suitable motivational system as one of the obstacles to virtual education and

considered its quality lower than face-to-face education (47). Mohammadi et al. (2018) determined the possibility of full-time access to course content as one of the merits of the virtual method. However, the limitation of the teacher's role as a mere transmitter of content, time limits, learners' insufficient skill and knowledge of virtual education, incompatibility of educational content with the learning style of learners, lack of suitable educational content, poor presentation methods, and lack of suitable evaluation were among the disadvantages of this method of education (48). Shahmoradi et al. (2018) indicated the lack of preparation and motivation of learners as one of the challenges of virtual education (49). Angabini et al. (2010) showed the most important challenges of virtual education as the underdevelopment of the Internet platform and the high costs of Internet services, as well as the insufficient competency of professors and the unfamiliarity of the learners with virtual education (50).

Ahmady et al. (2020) stated that the primary challenges of virtual education were the lack of facilities and problems such as low-speed Internet, unsuitable smartphones, and inappropriate virtual education platforms (51). Bagherimajd et al. (2013) indicated the most important challenges of e-learning as management factors so that effective education is not possible without the support of high-level managers and sufficient supervision in the e-learning system (17). In a study with a phenomenological approach, Shafiei Sarvestani et al. (2019) investigated students' experiences with electronic classes and found infrastructural, communication, and ethical problems as the most important challenges (52). The findings of another study showed that low educational satisfaction could reduce motivation and lead to a lower engagement of students in academic activities (53). Zamani et al. (2015) investigated the challenges of evaluating the academic performance of students in electronic courses based on ethical, psychological, pedagogical, and technical indicators. They concluded that the primary challenges of virtual environments from the students' perspective were technical (infrastructure and network security), pedagogical (teaching techniques, lack of skills, and familiarity with technology), psychological (anxiety and stress), and ethical issues (fraud and plagiarism) (54). A study by Busan (2014) showed that despite the appropriateness of the content, factors such as technical problems and lack of access to electronic equipment could lead to dissatisfaction with the virtual education system (55). Some researchers correlate the success of this method to educational content. For example, Aliabadi et al. (2020) found that when electronic content used for education is based on a multimedia model, the learning rate increases (56).

The success of this method does not depend merely on the content and is associated with other conditions, including the professors and their teaching methods and the feedback and interaction between the teacher and learners. Al-Hujran et al. (2013) determined the role of lecturers in positive participation in learning as an element of success in the virtual education method (57). Arabposhtkohi et al. (2019) found that motivation and feedback between the instructor and learner influence the effectiveness of virtual education, leading to saving time, new learning opportunities, and continuous repetition of learning content. In another study, they showed that the index of educational content and motivation, feedback, and balanced workload are among the most important factors in virtual educational programs (58, 59). Mässing (2017) showed that easy access to learning content, positive attitude, and learner awareness and motivation are

among the success factors of online and virtual education (60). Brari et al. (2019) concluded that feedback is one of the essential features of virtual educational methods and can be the basis for interaction and identification of problems in the learning and teaching process. Time limits and shortages are among the problems of this teaching model, leading to teachers only presenting the content (61). Overall, satisfaction with virtual education is affected by several factors, including previous experience, familiarity with computers, the technology used in virtual education courses, appropriate teaching methods, the amount of support received, and the flexibility of the program (62). A significant factor in the success of education is selecting the correct education method according to the existing conditions. Such a method should be useful and effective while being usable by different sections of society. Without considering the infrastructure and goals of virtual education, its implementation and effectiveness cannot be achieved. In other words, before making any decisions, the necessary infrastructure should be considered and implemented for educational purposes. In this regard, information and communication advisors suggest developing and publishing programs and software that are suitable and compatible with the education system and creating a legal support framework, operational guidelines, and an education supervisory group to control the planning and compilation of educational content, followed by providing necessary equipment, hardware, and software support (63-65).

5- CONCLUSION

The present study showed that the students' satisfaction with virtual education ranged from 29.6% to 86.5%. The lowest satisfaction was with practical training. Students indicated the strengths of virtual education as the elimination of travel costs, reduction of the stress of presentation, saving time, freedom from the constraints of the framework, the possibility of recording the class and using it later, and preventing the COVID-19 spread. The most frequently cited weaknesses of virtual education were the lack of feedback and face-to-face interaction, the low quality of teaching, poor educational content, the lack of participation of learners in teaching, the disruption of the e-learning website, low Internet speed, and the high cost of the Internet. The findings also showed that the students' cultural and personality differences affected their choice of strengths and weaknesses of virtual education. In general, virtual education has expanded widely around the world despite the short life of efforts to improve the facilities and infrastructure of hardware and network. Further development and maximized satisfaction can be achieved by paying attention to the diversity and appeal of training with various solutions, providing appropriate content based on the needs assessments, and better interactions between professors and students.

6- AUTHORS' CONTRIBUTIONS

Study conception or design: MR, and FJ; Data analyzing and draft manuscript preparation: MS, AK, KS, and MAA; Critical revision of the paper: MR, and FJ; Supervision of the research: MR and MS; Final approval of the version to be published: MR, MS, AK, KS, MAA, and FJ.

7- CONFLICT OF INTEREST: None.

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