Original Article

Barriers and challenges of virtual education in faculty of nutritional sciences and food technology during the covid-19 pandemic: An experience from Iran

Arezoo Haghighian-Roudsari[1], Mahdieh Niknam[2*], Donya Shahamati[3], Nasrin Borumandnia[4], Nasrin Omidvar[5]

[1] Assistant Professor, Department of Community Nutrition, National Nutrition and Food Technology Research Institute, Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2] Researcher, Research Center for Social Determinants of Health, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[3] National Nutrition and Food Technology Research Institute, Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[4] 4Assistant Professor, Department of Bio-statistics, Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[5] Professor, Department of Community Nutrition, National Nutrition and Food Technology Research Institute, Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Article Info

Article history:
Received 23 Sep. 2022
Accepted 14 Jan. 2023
Published 28 Feb. 2023

***Corresponding author:**
Mahdieh Niknam, Researcher, Research Center for Social Determinants of Health, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
Email: ma_niknam@sbmu.ac.ir

How to cite this article:
Haghighian-Roudsari1 A, Niknam M, Shahamati D, Borumandnia N, Omidvar N. Barriers and Challenges of virtual education in Faculty of Nutritional Sciences and Food Technology during the COVID-19 pandemic: an experience from Iran. J Med Edu Dev. 2023; 16(48): 21-29.

Abstract

Background & Objective: Following the COVID-19 pandemic, virtual education was adopted as the only way to prevent the cessation of educational processes. This study aimed to identify the challenges experienced by faculty members and students of the faculty of Nutrition and Food Technology, Shahid Beheshti University of Medical Sciences, during the COVID-19 pandemic in Tehran, Iran.

Materials & Methods: In this cross-sectional study, 218 students from all levels and 31 faculty members participated. Data were collected from February through March 2022, using two separate online questionnaires for students and faculty members to investigate potential problems and challenges in various educational areas. The results of the completed questionnaires were recorded in an Excel file and then transferred to the SPSS software (version 21) for statistical analysis.

Results: Students were moderately satisfied with the quality of virtual education (P=0.02). Challenges related to "educational strategies" were the key challenges experienced by the students. Undergraduate students faced the most challenges (P=0.001). From the faculty members' perspective, challenges related to "technical problems of virtual education" were the most important ones. Both faculty members and students viewed the challenges related to "policy-making, planning, and regulations" as the least important obstacles.

Conclusion: This study showed that the capacity development of students and faculty members to develop educational strategies and improving infrastructure to overcome technical problems in virtual education is probably the most important factor that needs to be addressed within the educational system.

Keywords: Challenge, Virtual, COVID-19, Students, Faculty members

Introduction

Over the last century, humans have had enormous achievements in knowledge acquisition and technological development that have led to significant changes in different aspects of life, including the education system (1). One of these achievements is the concept of virtual education, which has evolved because of expanded access to the Internet and various social

networks coupled with other modern educational tools. Virtual education has made knowledge acquisition possible regardless of distance, time limitations, and spatial constraints (2). Despite economic and social barriers and cultural differences between countries that impact technological improvements, virtual education infrastructure has become available almost all over the world (3). Iran, as a middle-income country, is not an exception. Virtual education has been established as an official training method in the country since 1996, and each year, more universities have applied this approach ever since (2). However, the level of such developments can be very different.

In December 2019, all educational institutions and universities were closed because of the rapid prevalence of a new Coronavirus worldwide and the lockdown announcement (4). This called for a sudden change in the world's educational system, i.e., shifting the whole system to distance learning to prevent the learning process from cessation (5). Although the change was inevitable, it happened with almost no preparation (6). As a result, some universities encountered serious challenges because of poor infrastructure and inadequate capacity development among faculty members and students (7).

Several studies have explored the challenges of virtual classes from the perspective of students and academicians during the COVID-19 pandemic. A study in Indonesia showed that the lack of needed educational infrastructure and sufficient experience were the major challenges regarding virtual education (8). Studies in Pakistan and Nairobi revealed that time management, lack of technical support, and poor internet access were among the key challenges of implementing virtual education (9, 10). Several studies in different universities in Iran (2, 11-13), have explored the challenges and efficacy of virtual education during the Coronavirus pandemic and contradictory results have been reported. A study by Farokhi on students showed that, because of poor infrastructure, half of the students believed online platform could not replace face-to-face classes (2). Similarly, two other studies reported technical problems as the most critical challenges (11, 12). A systematic review indicated that challenges related to ethics and information security were among the major challenges of presenting virtual education in nursing schools in Iran (6).

Two years after the experience, it is well-accepted that virtual education is going to remain an inseparable part of the education system; therefore, the need to improve its quality and the required infrastructure is considered an essential priority. Identifying barriers and challenges of virtual education can help to enhance its effectiveness and provide evidence on the need for its proper expansion in the future (14). Therefore, this study aimed to investigate barriers and challenges experienced by faculty members and students in a Medical University setting in Iran during the COVID-19 pandemic.

Materials & Methods

Design and duration

This descriptive, cross-sectional study was conducted from February through March 2022 in the Faculty of Nutrition and Food Technology, Shahid Beheshti University of Medical Sciences, in Tehran city.

Participants and Sampling

The study participants included students from all levels of education, as well as faculty members in the school of Nutrition and Food Technology at Shahid Beheshti University of Medical Sciences. The minimum sample size was determined to be 212 students according to the following equation, in which alpha=0.05, effect size = $d/\sigma = 0.2$, and the design effect = 2. Also, 10% of dropouts in the sample were considered.

The convenience sampling method applied to recruit the participants. All the students who had studied at least one academic semester through virtual education, using the virtual platforms of the university (NAVID Learning Management System, Adobe Connect, Skyroom, etc.), and had signed a consent to participate were included in the study. Students were excluded from the study if they had accessed their course(s) through other educational platforms used by the faculty (e.g. Skype, WhatsApp, etc.). Also, students with incomplete questionnaires were excluded from the study.

The census method was done for sampling the faculty members. All the faculty members of the faculty, as well as those who were collaborating with the faculty as an adjunct professor participated in the study, after signing a consent letter.

Tools/Instruments & Data collection

Two separate questionnaires were designed and used to assess the perspective of students and faculty members about the barriers and challenges of virtual education.

Student questionnaire

The questionnaire used to assess students' challenges regarding virtual education had been previously developed and validated by Derakhshanfard et al. (11).

This 31-item questionnaire with a five-point Likert scale was designed in eight sections, including educational, personal, executive, managerial, technical, budgetary, organizational and cultural factors. After being reviewed by the research team, some modifications were made to the questionnaire. Because of the small number of items on some scales of the initial questionnaire, they were pooled together. For example, technical and executive factors were pooled as one and named technical-executive factors. Also, individual and budget factors were merged, and the cultural factor scale, which comprised only one item, was pooled with the individual factor. The final changed questionnaire included four factors instead of eight, including 1) Challenges of educational strategies (11 items), which assessed the familiarity of students and faculty members with virtual education methods and the type of educational content, and their relevance to the content of courses, 2) Individual- budget factors (9 items) which measured the costs and facilities required, as well as skills and motivation of students for virtual education, 3) technical-executive factors (8 items) that were related to the system problems and support for uploading files and Internet difficulties to enter the classroom, and 4) Managerial- organizational factors (3 items) that included questions on planning and management systems.

Faculty members' questionnaire

The faculty members' questionnaire was a researcher-made questionnaire based on previous qualitative studies in virtual education (15, 16). The initial version of the questionnaire included 35 items, compiled by the research team, which were categorized and nominated based on the concepts of Chekhandi study (15). A panel of experts assessed its content and face validity. A panel of ten experts (including six nutritionists, two Food Technology specialists, a Sociologist, and an Expert in the education department of the faculty) evaluated the questionnaire. Content validity ratio (CVR) and content validity index (CVI) were calculated, and the modifications were made to the items of the initial questionnaire using the Lawshe table (17). The CVI was calculated through two stages. In the first stage, I-CVI was calculated for each item of the questionnaire according to three criteria: specificity, simplicity and fluency, and clarity. In the second stage, S-CVI was calculated for the whole questionnaire by the two following methods:

1) The ratio of questions in the questionnaire whose content validity was confirmed.

2) Determining the average I-CVI values of the questionnaire items. According to the Lawshe table, items with a CVR above 0.62 are kept in the questionnaire. Finally, 22 out of 35 items got the suitable CVR and were kept in the final questionnaire. The CVI was then calculated for the remaining 22 items. Given that the-CVI score above 0.79 was appropriate (18), all items had an acceptable score higher than this value. The S-CVI value in both methods showed acceptable values (above 0.9).

After the validation process, the 22-item faculty members' questionnaire was completed that included the following four factors: 1) Technical (9 items), including topics related to challenges in entering and use of virtual tutorials, class settings, uploading files holding exams, 2) Educational (5 items) which assessed the perspective of faculty members regarding curriculum development, virtual education experience, promoting participation and interaction with students, 3) Policy, planning and regulation (4 items) related to the management of classes and building the infrastructure, and 4) Student-related factors (4 items) included skills, motivation, facilities and student interaction in virtual classes.

Both student and faculty members' questionnaires were designed as online forms. Before completing the questionnaires, each participant was informed about the study's objectives. Initially, participants' demographic information was asked, followed by questions about virtual education.

Data analysis

Data were entered into an Excel file and then transferred to SPSS- version 21. The relationship between qualitative variables was determined using the chi-square test, and the Shapiro-Wilks test applied to determine normality of quantitative data. A comparison of numerical variables at two levels of qualitative variables was performed using an independent t-test or its non-parametric equivalent, Mann-Whitney. Comparison of numerical variables between over two groups was performed by analysis of variance or its non-parametric equivalent, Kruskal-Wallis. Post-hoc tests were also used to examine the significance of multivariate variables. Finally, Pearson or Spearman correlation coefficient determined the relationship between numerical variables. A statistically significant level was considered less than 0.05.

Results

218 students from various educational levels and different majors took part in the study. The characteristics of the students are presented in Table 1.
Over 70% of the participating students were female, and over 90% were in the BSc program. Over 80% of the students were on free admission.

Table 1. General characteristics of students who participated in the study (n = 218)

Variables	Number	Percent
Sex		
Male	57	26.1
Female	161	73.9
Field of study		
Food Hygiene and afety	3	1.4
Food Sciences	95	43.6
Nutritional Sciences	106	48.6
Food and Nutrition policy	8	3.7
Clinical Nutrition	6	2.8
Degree Programm type		
Bachelor of Science (BSc)	182	83.5
Master of Science (MSc)	17	7.8
PhD	19	8.7
Tuition sponsorship		
Yes	181	83
No	37	17
Place of residence		
Urban area	193	88.5
Rural area	25	11.5

Most of the students used personal computers (42%) and some used cell phones (21%), or a combination of both (22%) to take part in virtual education (Figure 1).
Nearly half of the students (45%) were moderately satisfied with the quality of virtual education (Figure 2).

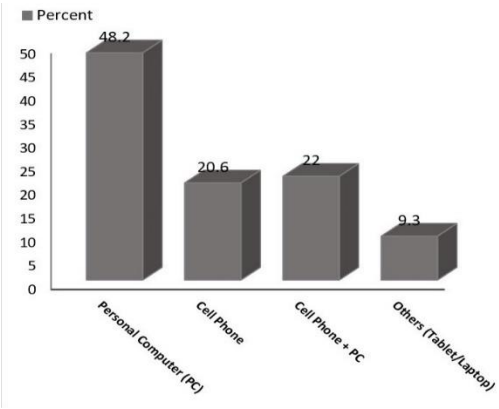

Figure 1. Electronic tools used by students during virtual education

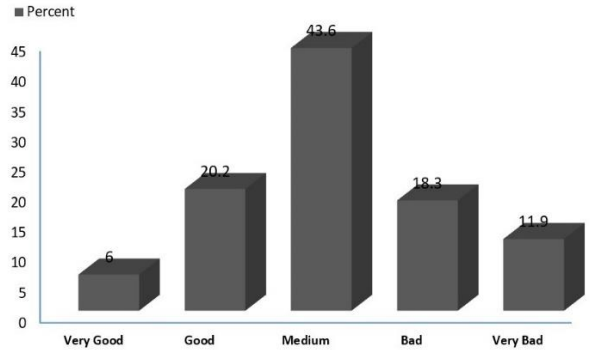

Figure 2. The Students' satisfaction with the quality of virtual education

According to Table 2, a significant difference was found in the satisfaction level of students based on the degree programs (P = 0.02). However, there was no significant difference based on gender, the field of study, type of admission, and place of residence.

Table 2: The relationship between satisfaction with virtual education's quality and the students' general characteristics

Variables		Degree of satisfaction with the quality of virtual education N (%)					P-value
		Very good	Good	Medium	Bad	Very bad	
Sex	Male	2 (3.5)	15 (26.3)	24 (42.1)	8 (14)	8 (14)	0.69[b]
	Female	11 (6.8)	29 (18)	71 (44.1)	32 (19.9)	18 (11.2)	
Programm type	Bachelor of Science (BSc)	10 (5.5)	33 (18.1)	77 (42.3)	37 (20.3)	25 (13.7)	0.02[*d]
	Master of Science (MSc)	2 (11.8)	4 (23.5)	9 (52.9)	2 (11.8)	0 (0)	
	PhD	1 (5.3)	7 (36.8)	9 (47.4)	1 (5.3)	1 (5.3)	
Field of study	Food Hygiene and Safety	0 (0)	0 (0)	1 (33.3)	1 (33.3)	1 (33.3)	0.056[d]
	Food sciences	5 (5.3)	24 (25.3)	38 (40)	14 (14.7)	14 (14.7)	
	Nutritional sciences	6 (5.7)	16 (15.1)	48 (45.3)	25 (23.6)	11 (10.4)	
	Food and Nutrition Policy	1 (12.5)	3 (37.5)	4 (50)	0 (0)	0 (0)	
	Clinical Nutrition	1 (16.7)	1 (16.7)	4 (66.7)	0 (0)	0 (0)	
Tuition sponsorship	Yes	8 (4.4)	41 (22.7)	75 (41.4)	33 (18.2)	24 (13.3)	0.56[b]
	No	5 (13.5)	3 (8.1)	20 (54.1)	7 (18.9)	2 (5.4)	
Place of residence	Urban area	1 (4)	8 (32)	11 (44)	4 (16)	1 (4)	0.16[b]
	Rural area	12 (6.2)	36 (16.7)	84 (43.5)	36 (18.7)	25 (13)	

b: Mann Whitney test d: Kruskal Wallis

Barriers and challenges of virtual education from the students' perspective

The relationship between virtual education challenges and students' academic and general characteristics is presented in Table 3. From the students' perspective, "educational strategies" (34.79± 9.73) and "management factors" (9.74 ± 3.15) received the highest and lowest scores, respectively. Table 3, shows a significant difference between all four groups of challenges based on students' educational level (P <0.001), where

undergraduate students reported the highest scores in all challenges. According to the post hoc test, there was a significant difference between undergraduate and Ph.D. students in terms of three challenges, including "technical and executive", "individual and budgetary," and "managerial and organizational". There was also a significant difference between the three challenges of "educational strategies", "individual and budget," and "managerial and organizational" based on the students' field of study, i.e., students who majored in Nutrition Sciences and also Food Technology had the highest scores.

Barriers and challenges of virtual education from the faculty members' perspective

Overall, 31 faculty members completed the questionnaire., most of the participating faculty members aged 40 to 60 years (62.5%), were educated in Nutrition Sciences (50%), and their academic rank was associate or assistant professor (74.2%). Almost half of the faculty members had over ten years of teaching experience at the university.

From the faculty members' perspective, "technical problems" were the most significant obstacle to virtual education (25.81 ± 6.30). "educational challenges" ranked second (17.16 ± 3.76) from the faculty members' viewpoint. Challenges related to "Policy-making, planning, and regulations" received the lowest score (14.1 ± 3.59). The relationship between the general characteristics of the faculty members and the challenges of virtual education is shown in Table 4. As illustrated, no significant relationship was observed between the reported challenges regarding virtual education based on the faculty members' demographic characteristics. The demographic characteristics of participated faculty members are shown in Table 5.

Table 3. The relationship between the challenges of virtual education with the general characteristics of students

Virtual education challenges / variables		Technical-Executive		P-value	Educational		P-value	Individual-Budget		P-value	Managerial-Organizational		P-value
		Mean ± SD	Min-Max		Mean ± SD	Min-Max		Mean ± SD	Min-Max		Mean ± SD	Min-Max	
Gender	Male	19.33 ±8.56	9-34	0.25	33.95 ± 10.21	13-55	0.44	22.11 ± 7.42	8-40	0.38	9.16 ± 3.08	3-15	0.11[b]
	Female	20.39 ± 5.99	7-34		35.09 ± 9.58	11-55		23.10 ± 7.25	8-39		9.94 ± 3.15	3-15	
Field of study	Food Hygiene and Safety	17.33 ± 5.69	7-34	0.42	27 ± 5.29	23-33	0.009[*d]	18.33 ± 2.52	16-21	0.017[*d]	7.33 ± 4.04	5-12	0.026[*d]
	Food Sciences	20.28 ± 6.69	8-34		35.66 ± 10.86	11-55		9.93 ± 3.12	8-40		9.93 ± 3.12	3-15	
	Nutritional sciences	20.42 ± 5.27	7-34		35.32 ± 8.49	12-54		24.03 ± 7.81	8-38		9.98 ± 3.04	3-15	
	Food and Nutrition Policy	17.13 ± 6.40	12-22		25.38 ± 7.96	11-36		15.38 ± 5.40	8-24		6.75 ± 3.54	3-12	
	Clinical Nutrition	17.50 ± 4.09	12-22		28.17 ± 5.46	20-34		19.83 ± 5.78	10-25		7.67 ± 2.16	4-9	
Program type	Bachelor of Science (BSc)	20.73 ± 5.92	7-34	0.001[*c]	36.38 ± 9.30	12-25	0.001[*d]	23.80 ± 7.22	8-40	0.001[*d]	10.12 ± 3.04	3-15	0.001[*d]
	Master of Science (MSc)	18.59 ± 4.57	7-34		29.24 ± 7.42	17-47		20.12 ± 5.35	9-27		8.41 ± 2.45	4-13	
	PhD	15.63 ± 5.46	12-29		24.58 ± 7.74	11-37		16.11 ± 5.18	8-25		8.41 ± 2.45	3-12	
Tuition sponsorship	Yes	20.40 ± 6.08	11-55	0.28[b]	35.17 ± 10.04	11-55	0.28[b]	23.18 ± 7.53	8-40	0.15[b]	7.26 ± 3.45	3-15	0.14[b]
	No	18.70 ± 5.20	12-46		32.95 ± 7.91	12-46		21.19 ± 5.80	8-34		9.14 ± 2.45	3-13	
Place of residence	Urban area	21 ± 5.52	13-32	0.43[a]	35.92 ± 7.50	24-51	0.66[b]	23.64 ± 7.50	13-39	0.56[a]	10.52 ± 2.68	6-15	0.23[b]
	Rural area	20 ± 6.02	7-34		34.65 ± 9.85	11-55		22.74 ± 7.28	8-40		9.64 ± 3.20	3-15	

a: Independent sample t-test
b: Mann-Whitney test
c: ANOVA
d: Kruskal Wallis

Table 4. The relationship between the challenges of virtual education and the demographic characteristics of faculty members

Virtual education challenges / variables		Technical		P-value	Policy, planning, and regulation		P-value	Educational		P-value	Challenges related to students		P-value
		Mean ± SD	Min-Max		Mean ± SD	Min-Max		Mean ± SD	Min-Max		Mean ± SD	Min-Max	
Gender	Male	25.44 ± 5.56	19-38	0.74	14.63 ± 3.50	6-20	0.4	17.56 ± 3.41	8-22	0.52	16.25 ± 2.41	10-19	0.23
	Female	26.2 ± 7.18	12-36		13.53 ± 3.72	6-20		16.73 ± 4.18	11-24		15.07 ± 2.96	10-20	
Age (year)	40 ≥	26.13 ± 5.87	19-36	0.95	14.25 ± 2.82	10-17	0.27	19.12 ± 3.52	13-24	0.43	16.75 ± 2.66	11-19	0.49
	41-50	25.47 ± 6.98	12-38		13.20 ± 4.13	6-20		16.40 ± 4.07	8-21		15.33 ± 2.92	10-20	
	51-60	25.40 ± 5.94	15-30		14.40 ± 2.88	10-17		16.20 ± 3.83	11-21		15 ± 3	10-18	
	60 <	27.33 ± 7.64	19-34		17.67 ± 2.08	16-20		17.33 ± 1.15	16-18		15.67 ± 1.15	15-17	
Faculty members' study field	Food Sciences	27 ± 7.37	19-38	0.19	14.75 ± 2.96	11-20	0.36	18.38 ± 1.51	17-21	0.63	16.88 ± 2.23	14-20	0.54
	Nutritional Sciences	26.33 ± 4.99	15-36		13.94 ± 3.61	6-20		17 ± 4.51	8-24		15.28 ± 2.89	10-19	
	Food Hygiene and Safety	32	32		19	19		20	20		18	18	
	Food Sciences/Food Hygiene and safety	30	30		13	13		14	14		15	15	
	Medicine	19	19		17	17		18	18		17	17	
	Persian Literature	12	12		6	6		12	12		11	11	
	Basic Sciences	17	17		13	13		15	15		15	15	
Academic rank	Professor	26 ± 5.24	19-34	0.82	14.88 ± 3.72	8-20	0.57	17.13 ± 3.40	11-21	0.15	16.13 ± 2.03	14-20	0.21
	Associate professor	26.46 ± 6.69	15-38		13.69 ± 3.82	6-20		15.85 ± 3.93	8-21		14.69 ± 2.96	10-19	
	Assistant professor	24.80 ± 7.04	12-36		14 ± 3.46	6-17		18.90 ± 3.41	12-24		16.60 ± 2.63	11-18	
Teaching experiences (year)	10 ≥	25.53 ± 6.32	12-36	0.50	13.47 ± 3.52	6-17	0.11	17.80 ± 4.23	8-24	0.6	15.80 ± 2.86	10-19	0.91
	11-20	24.82 ± 6.63	15-38		13.64 ± 3.64	8-20		16.27 ± 3.72	11-21		15.36 ± 3.11	10-20	
	20 <	28.80 ± 5.81	19-34		17 ± 2.74	13-20		17.20 ± 2.28	14-20		16 ± 1.41	15-18	

Table 5. Characteristics of participated faculty members in the study (n = 31)

Variables	Number	Percent
Sex		
Female	15	48.4
Male	16	51.6
Age (Year)		
40 ≥	8	25
41-50	15	46.9
51-60	5	15.6
61 <	3	9.4
Field of study		
Food Sciences	8	25.8
Nutritional Sciences	18	58.1
Food Hygiene and Safety	1	3.2
Food Sciences/ Food	1	3.2
hygiene and safety Medicine	1	3.2
Persian literature	1	3.2
Basic sciences	1	3.2
Academic rank		
Professor	8	25.8
Associate professor	13	41.9
Assistant professor	10	32.3
Teaching experiences (year)		
10 ≥	15	48.4
11-20	11	35.5
20 <	5	16.1

Discussion

The current study showed that the students were moderately satisfied with the quality of the presented virtual education presented during the Covid-19 pandemic. From the students' perspective, "educational strategies" were the most important challenges and undergraduate students experienced them the most. They mainly blamed the faculty members for the poor educational strategies in the virtual classes. From the faculty member's perspective, "technical problems of virtual education" as well as "educational challenges" were the most important challenges in performing virtual education. Both faculty members and students viewed the challenges related to "policy-making, planning, and regulations" as the least important obstacles.

This study indicated that personal computers and cell phones were the common tools used for participating in virtual classes. Apparently, the ease of access to the internet had made these tools as the most common tools for utilizing virtual education. Similarly, a study conducted in Indonesia, which also investigated the challenges of virtual education during the COVID-19 pandemic, showed that smartphones and personal computers were the most common tools used for participating in virtual education classes (8).

The present study revealed that students were moderately satisfied with the quality of the virtual education classes. Educational satisfaction reflects the level of enjoyment and satisfaction as a learner from his role and experiences, which matters in the quality of learning and education (15, 16). Previous studies confirm that virtual education, because of existing gaps in curriculum content and design, technology, and learner support, could not attain a high level of satisfaction and has not completely replaced face-to-face classes (3, 8). A study by Farsi et al. (2018) showed that among nursing students of Aja University of Medical Sciences, the majority (56%) had moderate satisfaction with virtual education during the COVID-19 pandemic, and only a small percentage (13.4%) expressed high satisfaction (7). In the same way, the students of the Ferdowsi University of Mashhad and Hamedan University of Medical Sciences evaluated the utility of virtual education at an average level (11, 12). Although these results are not extraordinary and are far from the desired level, considering the critical conditions created during the COVID-19 pandemic for officials, faculty members, employees, and students, attaining this level of satisfaction is expected.

In the present study, from students' perspective, "educational strategies", including unfamiliarity with the virtual system, inappropriate preparation of educational content, and selection of an undesirable presentation method, were the main challenges that negatively affected the quality of education and their satisfaction level. Similarly, a phenomenological study at Kurdistan University in west Iran showed that challenges such as unfamiliarity with the virtual system, inefficiency in developing educational content, and lack of diversity in the content presentation were the most important barriers stated by the students (1). The pedagogical obstacles were also ranked as the most important problems by the students of the Rehabilitation faculty of the Hamadan University of Medical Sciences (11). Considering the poor infrastructure for virtual education in most Iranian universities and the sudden transition of the educational system to online mode, encountering these problems was near to expected. It is needed to notify that a large part of this problem could be related to the poor skills and experience of faculty members in presenting and teaching through online platforms (19). Lack of teachers' knowledge and technological skills (subject knowledge, assessment of educational needs, internet search, information management, organizing skills, specific skills of information technology) are factors that might be related to the pedagogical obstacles frequently identified by the students (20).

The findings of the present study are in line with those of Zhalehjoo et al. (13) who reported higher challenges for

undergraduate students in using virtual education. This can be attributed to the larger number and lower internet and study skills of undergraduate students compared to those at the graduate levels. In addition, it has been shown that undergraduate students have less interaction with their professors and other employees of the university education system, which may affect their learning outcomes. Undergraduate classes are more crowded and this may cause poor coordination and interaction as well (12, 13).

The findings of the present study reemphasize the need to improve students' skills in utilizing virtual education and expand the capacity of faculty members to develop more interactive and interesting strategies in designing undergraduate virtual classes. However, these findings require further research in various faculties and fields of study. The findings also indicated that from the faculty members' view, "technical problems of virtual education" were the most important challenges, specifically because of the internet speed, the difficulty of creating and uploading educational content, online exam security, and the quality of videos and audio files, which all refer to the infrastructure. Ghafoori Fard and Yari Zanganeh have reported similar findings from surveys in Medical Sciences Universities and the Islamic Azad University of Marvdasht in central Iran (3, 14). Also, a systematic review showed that challenges related to implementing virtual education processes and ethics and information security were among the major challenges of presenting virtual education in nursing schools (6). Although these studies were conducted in various academic settings and among faculty members with different backgrounds, similar findings are because of the similar situation they faced during the pandemic and limited technical preparation(s) (13). It also reflects the fact that the educational system has not been well prepared for virtual education and this has further negatively affected the quality of education during this emergency situation, developing educational content(s) and tools that support students' productivity and make teaching more responsive and flexible in a short time regardless of their issues and responsibilities can be problematic.

In the present study, faculty members and students viewed the challenges related to "policy-making, planning, and regulations" as the lowest obstacles to the virtual presentation of university courses. This challenge included establishing regulations, planning for uploading and downloading education files, time management for attending virtual meetings, continuous classroom assessment, and technical support (13). This finding is inconsistent with the results from the faculty members of another study at Birjand University that revealed that "policies, planning and regulations" were the major challenge in their online instruction (16). The lack of acceptance/satisfaction of students and faculty members toward virtual education is an issue that requires policy-making and planning to meet the technical needs and provide the infrastructure (17, 21).

Study limitations and strengths

This is the first study that examines virtual education's challenges and obstacles from the perspective of students and faculty members of the Nutrition and Food Technology School during the COVID-19 epidemic in Iran. The current study developed a validated-researcher-made questionnaire to examine the challenges of virtual education from the faculty members' point of view. However, the study has certain limitations that need to be considered. One of the most important limitations of the present study was the inability to perform face-to-face interviews with the participants because of the pandemic and distance working situation, which increased the need for follow-ups to get complete questionnaires. Also, it was focused only on one faculty, which limits the generalizability of the results. The satisfaction with the quality of virtual education was only reflected through the students' perspective and neglected the opinion of other groups involved in the education process, i.e., faculty members and education office staff of the university.

Conclusion

Awareness of the obstacles and challenges of virtual education can provide a better perspective for educational planners to reevaluate priorities in planning and improving educational settings in universities. Virtual education, most times, is going to remain a complementary method along with face-to-face education in most universities. The findings re-emphasize the need for the capacity development of faculty members and improving infrastructure to overcome technical problems in performing effective virtual education in medical universities in Iran.

Ethical considerations

In order to inform the students and faculty members, they were assured that the information is completely protected and they can cooperate in completing the questionnaire if they wish. The approximate time to complete the

questionnaire was announced to both groups. This study was carried out as a research project approved by the Research Council of National Nutritional Research and Food Technology Research Institute (NNFTRI) with the ethics code number IR.SBMU.nnftri.Rec.1400.098.

Acknowledgments

We express our gratitude and appreciation to the Research Deputy of NNFTRI for the financial support of this study. Financial support and sponsorship This work was supported by the NNFTRI of Shahid Beheshti University of Medical Sciences.

Disclosure

None of the authors had any personal or financial conflicts of interest.

Author contributions

All authors were responsible for designing and conducting the study. MN and AH-R, and NO contributed to the content and face validity. MN, AH-R and NB contributed to the statistical analysis. MN and AH-R performed the drafting of the manuscript, and all authors contributed to the revision of the manuscript.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article and further information will be made available to researchers only by considering the ethical standards.

References

1. Barkhoda J, Ahmadhidari P. Representation of students' experiences of the challenges and problems of teaching professors in cyberspace. Journal of Research in Teaching. 2021;9(1):73-98. [https://doi.org/10.34785/J012.2021.456]
2. Farokhi M. A Survey of Tehran Refah College Students' Evaluation of Virtual Education in the Corona Period. Religion & Communication. 2021; 28(59): 274-47. [https://doi.org/10.30497/rc.2021.75819]
3. yarizanganeh M. Investigating the Impact of COVID- 19 on Educational Activities in universities: Emphasizing Satisfaction with the Quality of Virtual Education system in Islamic Azad University. The Journal of Modern Thoughts in Education. 2021;17(1):70-87.
4. Mosalanezhad L, Atashpoor S, Kalani N. What do medical students want to learn in the Corona Crisis Curriculum? Expressing Students' Expectations and Strategies. Journal of Education and Ethics in Nursing. 2021;10(1):4-11.
5. Mohsenabadi M, Karami S. Impact of COVID-19 pandemic on assessment of medical students: a student's perspective. Reasearch in Medical Education. 2021; 13(2): 1-3. [https://doi.org/10.52547/rme.13.2.1]
6. Sadeghi mahali N, Arsalani N, Rad M, Nematifard T, Khaki S, Fallahi-Khoshkenab M. Comparison of Virtual Education Challenges in Nursing Before and After COVID-19; A Systematic Review. Iranian Journal of Systematic Review in Medical Sciences. 2021;1(3):81-103. [http://ijsr.ir/article-1-99-en.html]
7. Farsi Z, Aliyari Sh, Ahmadi Y, Afaghi E, Sajadi A. Satisfaction of the Quality of Education and Virtual Education during the Covid-19 Pandemic in Nursing Students of Aja University of Medical Sciences in 2020. Journal of Military Medicine. 2021; 23(2): 174-85. [https://doi.org.10.30491/JMM.23.2.174]
8. Simamora RM. The Challenges of online learning during the COVID-19 pandemic: An essay analysis of performing arts education students. Studies in Learning and Teaching. 2020; 1(2): 86-103. [https://scie-journal.com/index.php/SiLeT/article/view/38/21]
9. Ullah A, Ashraf M, Ashraf S, Ahmed S. Challenges of online learning during the COVID-19 pandemic encountered by students in Pakistan. Journal of Pedagogical Sociology and Psychology. 2021; 3(1): 36-44. [https://doi.org/10.33902/JPSP.20211167246]
10. Oketch-Oboth JW. Online Learning Challenges, Stress Experience and Coping Strategies Among University Students During the Lockdown Due to COVID-19 Pandemic. Journal of Pedagogy, Andragogy and Heutagogy in Academic Practice/ISSN: 2708-261X. 2021; 2(1): 15-27. [http://uonjournals.uonbi.ac.ke/ojs/index.php/pedagogy]
11. Derakhshanfard S, Mortazavi Z, Ghanbari E, Mortazavi S. Problems of using E-Learning during the outbreak of COVID 19 disease from the perspective of students of Hamadan University of Medical Sciences. Horizon of Medical Education Development. 2021; 12(3): 52-65. [https://doi.org.10.22038/HMED.2021.53361.1104]
12. Kashani S, Keshtidar M, Heydari R, Esfahani M, Tabatabai FA-S. Identification and analysis the factors affecting the virtual education of the general physical education course of Ferdowsi University of Mashhad during the corona virus. Research on Educational Sport. 2022;10(26):85-116. [https://doi.org/10.22089/res.2021.9312.1940]
13. Zhalehjoo N, Arabi M, Momeni Z, Akbari Kamrani M, Khalili A, Riahi S ea. Virtual Education status from the Perspective of Students at Alborz University of Medical Sciences in the Covid-19 Pandemic Period. Journal of Medical Education Development. 2021; 14(42): 37-45. [https://doi.org.10.52547/edcj.14.42.37]
14. Ghafourifard M. The promotion of Virtual Education in Iran: The Potential which Turned into reality by Coronavirus. Iranian Journal of Medical Education. 2020; 20: 33-4. [http://ijme.mui.ac.ir/article-1-5071-en.html]
15. Chahkandi F. Online Pandemic: Challenges of EFL Faculty in the Design and Implementation of Online Teaching amid the Covid-19 Outbreak. Journal of Foreign Language Research. 2021; 10(4): 706-21.
16. Sadati L, Nouri Z, Hajfiroozabadi M, Abjar R. Faculty Members' Experiences About Virtual Education Opportunities and Challenges During The Covid-19: A Qualitative Study. Journal of Medical Education Development 2021;14(42):1-10. [https://doi.org.52547/edcj.14.42.1]
17. Ayre C, Scally AJ. Critical values for Lawshe's content validity ratio: revisiting the original methods of calculation. Measurement and evaluation in counseling and development. 2014;47(1):79-86. [https://doi.org/10.1177/0748175613513808]
18. Shrotryia VK, Dhanda U. Content validity of assessment instrument for employee engagement. SAGE Open. 2019;9(1):1-7. [https://doi.org.10.1177/2158244018821751]

19. Fathi VK, Pardakhtchi MH, Rabiei M. Effectiveness evaluation of virtual learning courses in high education system of IRAN (Case of Ferdowsi University). Information And Communication Technology In Educational Sciences. 2011;1(4):5-21.
20. Hermanto YB, Srimulyani VA. The challenges of online learning during the covid-19 pandemic. Jurnal Pendidikan Dan Pengajaran. 2021; 54(1): 46-57. [http://dx.doi.org/10.23887/jpp.v54i1]
21. Bozkurt A, Sharma RC. Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. Asian Journal of Distance Education. 2020;15(1):i-vi. [https://doi.org.10.5281/zenodo.3778083]