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Evaluation of Academic Satisfaction and Quality in the COVID-19 Pandemic: A Post-COVID-19 Study among the Students of Medical Sciences

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Abstract

Background: *One of the most important events that happened during the COVID-19 pandemic was the development of the virtual education system, which had effects on the quality of education and the level of student satisfaction with education in various aspects. This study was conducted to check the quality of virtual education and the level of satisfaction of students of different fields at Shahroud University of Medical Sciences.*

Methods: *In this study, standard questionnaires, whose validity and reliability were checked, were completed by students of different fields and academic semesters, and the results were analyzed with the help of SPSS v21 software.*

Results: *The results of this study showed that the level of education quality and the level of students' satisfaction with virtual education in most of the majors were medium and high.*

Conclusions: *The experience of successful teaching-learning styles can be introduced, specified and evaluated, and it can initiate the cycle of reforming and improving the education process even in critical conditions such as the COVID-19 pandemic.*

Keywords: Virtual education; COVID-19; Shahroud; Satisfaction; Education quality.
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Introduction

Virtual education is possible for students through technologies such as e-mail, video, chat, and scientific and non-scientific electronic groups that have unlimited communication. In this type of education, the teacher plays a small role in creating knowledge[1].

Of course, this communication is not one-way and from the student's side, but the effective environment is focal learning, where four factors affecting learning, including the learner's motivation, knowledge, evaluation, and society, are related to it. In e-learning, they are also the focus of education and curriculum. Familiarization of professors with virtual education programs, using several contents and communicating with students in different ways and receiving feedback, and presenting assignments are some of the things that are effective in increasing the amount of learning in virtual education[2,3].

Despite the expansion of the use of virtual education in universities, there are challenges in some educational centers. For example, medical students need to complete internships in clinical settings. This has made many officials and educational managers of universities face ethical challenges regarding whether students should be present in the clinical environment or not. On the other hand, students are worried about their future careers and may face many financial problems[4]. Therefore, despite the increasing use of virtual education during the COVID-19 pandemic in most educational centers, including faculties and universities of medical sciences throughout Iran, some educational centers, due to the specific missions and policies of the educational system and security issues benefited from combined training (face-to-face and virtual) in compliance with health protocols to train their students.

One of these universities is Shahroud University of Medical Sciences, which during the COVID-19 pandemic continued to adhere to its mission of educating medical students and did not stop training. Considering the critical conditions at this time, the question arises, what was the result of these trainings and how much was the satisfaction level of students' education from face-to-face and virtual trainings?

Certainly, the influence of this period is extensive and during these two academic years, it has had a great impact on students' learning because schools and universities have stopped face-to-face teaching, and it is obvious that face-to-face education is more effective than virtual education[5].

However, considering all these issues, it is necessary to strengthen virtual education methods, and one of the effective ways to strengthen virtual education methods is to find existing obstacles and possible defects and try to solve them. A large part of this is achieved by surveying and assessing the needs of students and professors so that the teaching-learning process can be carried out at a higher quality level using virtual systems[6].

The meaning of academic satisfaction is the level of enjoyment and satisfaction of a person from his role and experiences as a student[7]. Examining the level of satisfaction with education can be an effective index in optimizing students' performance, such as commitment to university goals, successful completion of education, adaptation to the university, and overall satisfaction with life and the success rate

of universities. Satisfaction with education is an effective factor in measuring the quality of learning and education of students. The level of academic satisfaction of students is measured by evaluating educational courses, the teaching-learning process, and factors affecting the level of student learning[7,8].

Considering this issue, we decided to use questionnaires that will completed by students of different fields at Shahroud University of Medical Sciences to investigate the satisfaction of students with virtual education during the COVID-19 era. These questionnaires include a personal information questionnaire, an educational course experience questionnaire (CEQ), and virtual education satisfaction questionnaire. CEQ is a questionnaire designed to determine students' understanding of their educational environment and the quality of this education[9].

Materials and Methods

This study was a cross-sectional study, in which 183 students of Shahroud University of Medical Sciences were included in the study based on the inclusion and exclusion criteria.

Inclusion criteria in this study were students of medicine, nursing, midwifery, health, laboratory science, and anesthesia fields who were above the 2nd semester. The exclusion criterion in this study was the lack of consent to participate in the study.

To gather the demographic information of the students, the quality of the educational course, and the level of satisfaction with virtual education, we used the personal information form (including age, gender, academic semester, the average grades of the previous semester, the average grades of the current semester, field of study, and the number of units selected in the current academic semester), CEQ, and virtual education satisfaction questionnaires.

The prepared questionnaire forms were placed on Google form and after being fully informed, the mentioned students completed these questionnaires. Finally, the data was extracted from the Google Form platform in the form of Excel, and after scoring the students' answers (based on the instructions of the questionnaires) and including their satisfaction scores, the data was entered into the IBM SPSS Statistic ver21 Software and analyzed.

The evaluation of the quality of the training course was done using a questionnaire designed for this purpose. The validity and reliability of the original questionnaire questions have been confirmed [9,10] and the validity and reliability of the Iranian translated version has also been proven in the article by Naghavi et al. (alpha coefficient=85%)[11]. This questionnaire is designed to determine students' understanding of their educational environment and the quality of this education.

One of the reasons for the importance of CEQ in higher education is the connection it has made between learning and teaching effectiveness. The best use of CEQ results is to make changes over time. Rather than emphasizing teacher behaviors, CEQ refers to the formation of learning and covers important aspects of teaching quality that affect student success.

This questionnaire contains 50 items in six areas: a) teaching (items 1-15), b) course goals and standards (items 16-19), c) volume of lessons (items 20-24), d) course materials and references (items 25-38)), e) lesson evaluation (items 39-47), and f) satisfaction (items 48-50). The criterion for scoring items is the Likert scale.

Each item has five options (I completely agree, I agree, I have no opinion, I disagree, I completely disagree), the mentioned options have points of +100, +50, 0, -50, and -100 points respectively. The maximum score of each item is +100, and the minimum score is -100. In addition, the maximum score obtained from the questionnaire is +4500 and the minimum score is -4500. The scoring of questions 1, 2, 4, 8, and 9 of the curriculum evaluation area, i.e. questions 39, 40, 42, 46, and 47, is a reverse-designed questionnaire. That is, contrary to all the questions, the option "completely disagree" is assigned +100 and the option "completely agree" is assigned -100).

The overall score of the questionnaire is classified into three ranks: poor ($X \leq 1500$), satisfactory ($-1500 < X < 1500$), and excellent ($X \geq 1500$). The domain is equal to 9000, and the length of the categories is equal to 3000.

In addition, the questionnaire of Sheikh Taheri and Dehnad (2019) was used to measure the level of students' satisfaction with e-learning. The validity and reliability of this questionnaire has been proven by Sheikh Taheri and Dehnad, and the Cronbach's alpha of the questionnaire was 0.94[9,12].

This electronic questionnaire has 26 questions designed on a 5-point Likert scale (completely agree to completely disagree). The range of scores is between 26 and 130. A score less than 45.5 was considered low satisfaction, a score between 45.5 and 90 was considered medium satisfaction, and a score between 91 and 130 was considered high satisfaction.

This study was conducted by receiving the ethics code number IR.SHMU.REC.1400.268 from Shahroud University of Medical Sciences.

Results

This study was conducted to determine satisfaction with the quality of the academic course and virtual education during the COVID-19 pandemic among the students of Shahroud University of Medical Sciences. 183 students entered the study, and after completing the questionnaire and receiving their demographic information, the following results were obtained.

Figure 1 shows a general description of the statistics used in the study. Among the 183 students participating in this study, 106 were women (57.9%), and 77 (42.1%) were men. Among these, 44.3% of the participants (81 persons) were from medicine, 16.4% (30 persons) from nursing, 9.8% (18 persons) from midwifery, 13.1% (24 persons) from public health, 4.9% (9 persons) from environmental health, 4.4% (8 persons) from occupational health, 4.4% (8 persons) from laboratory science, and 2.7% (5 persons) from anesthesia. On the other hand, 43.7% (80 persons) of the students participating in this study were in the 2nd to 4th semester, 27.3% (50 persons) were in the

5th to 6th semester, and 29.0% (53 persons) were in the 7th semester and above.

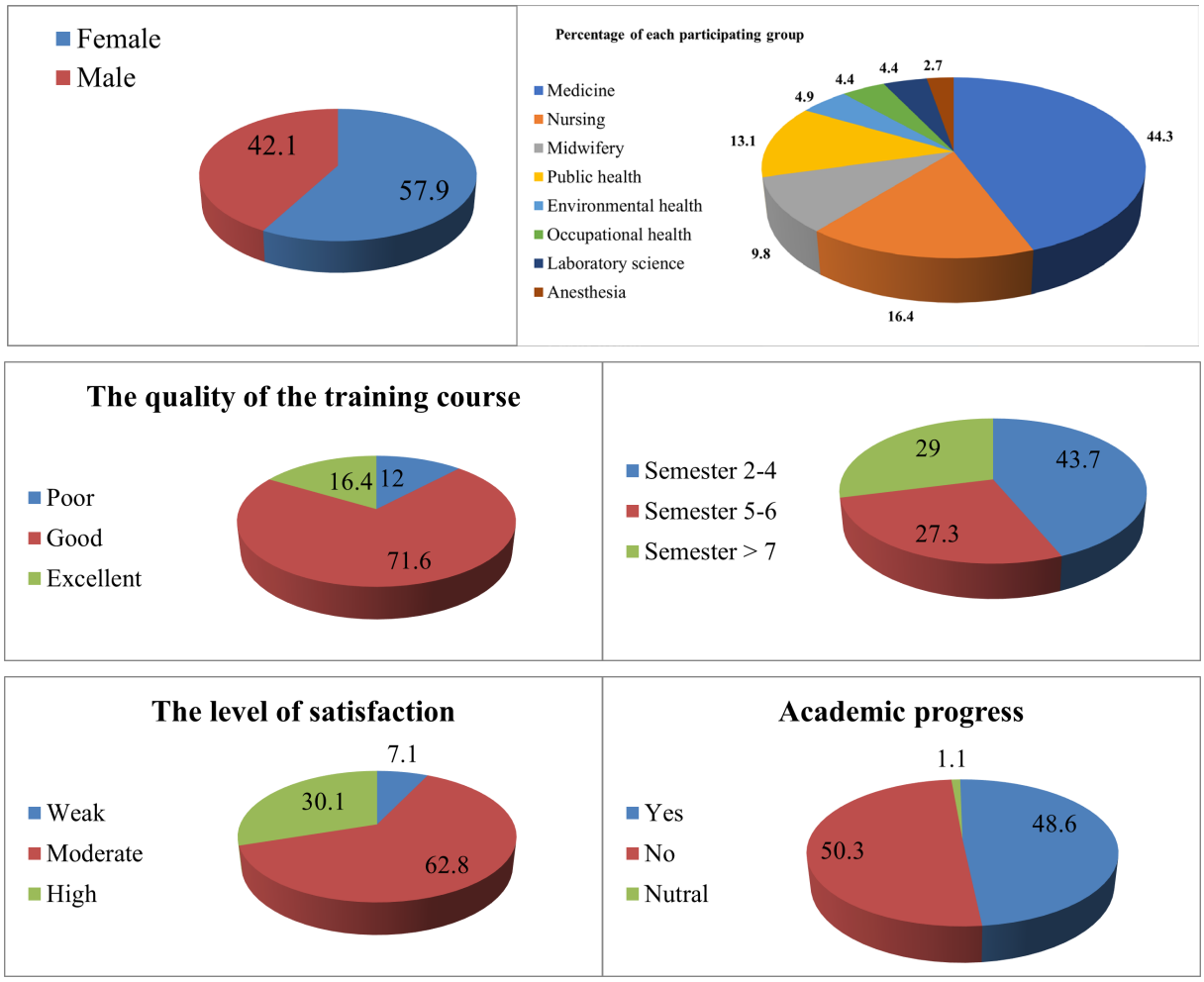

Figure 1. The percentage of each qualitative and quantitative variable in the study

According to the answers of the students participating in this study, the quality of the training course from the students' point of view was evaluated as follows: 12% (22 persons) were poor, 71.6% (131 persons) were good, and 16.4% (30 persons) were excellent. In addition, the level of satisfaction of 7.1% (13 persons) of students with virtual education was weak, 62.8% (115 persons) was moderate, and 30.1% (55 persons) was high.

In this study, the academic progress of the students was measured based on the increase in the Grade Point Average (GPA) of the current semester compared to the previous semester, and according to this, 48.6% (89 persons) of the students had academic progress.

The average (standard deviation) age of the students in this study was 22.85 (1.83), and their average academic term was 5.08 (2.29). On average, the students obtained 18.30 (2.53) units in this semester, and their current and previous semester averages were 16.83 (1.11) and 16.65 (1.36), respectively.

In terms of dimensions of virtual education quality (CEQ) (Table 1), the average (standard deviation) of teaching, course goals and standards, volume of courses, resources and course materials, curriculum evaluation, and satisfaction was 63.9 (575), 30.6 (166)%, -63.9 (240), 102.7 (519), -92.0 (183) and -6.0 (138), respectively.

The average grade point average of the quality of virtual education (CEQ) among the students was 35.2 (1485), and the range of this grade point average was between 4500 and -4500. In addition, the average score of satisfaction with virtual education among students was 77.3 (21.6), which ranged from 26 to 130.

Table 1. Mean and standard deviation of quantitative variables in the study

Variable	Min	Max	Mean	SD
Age	20	32	22.85	1.83
Academic term	2	11	5.08	2.29
The number of elective units in the current semester	12	24	18.30	2.53
GPA of the current semester	13	20	16.83	1.11
GPA of the previous semester	12	19.93	16.65	1.36
Teaching	-1500	1500	63.9	575
Course goals and standards	-400	400	30.6	166
Volume of courses	-500	500	-63.9	240
Resources and course materials	-1400	1400	102.7	519
Curriculum evaluation	-800	300	-92.0	183
Satisfaction	-300	300	-6.0	138
Total Average of CEQ	-4000	4300	35.2	1485
Sum of satisfaction points from virtual education	26	128	77.3	21.6

Table 2 shows the relationship between satisfaction with the quality of the academic course and satisfaction with virtual education with age. It was seen that the level of satisfaction of students at young ages was higher than their level of satisfaction at older ages, and this relationship was statistically significant (P-value=0.026). Tukey's test showed that the average age difference was significant only in two groups of low and high satisfaction with virtual education (P-value=0.026).

On the other hand, in this study, there was no correlation between the quality of the training course and the age of the students (P-value=0.062).

Table 2. The relationship between satisfaction with the quality of the academic course and satisfaction with virtual education with age

Variable	Sub-variable	Average age	SD of age	P-value
The level of students' satisfaction with virtual education	Low*	23.85	1.51	0.026
	Moderate	22.95	1.99	
	High*	22.42	1.41	
The quality of the training course	Weak	23.41	1.73	0.062
	Good	22.90	1.9	
	Excellent	22.23	1.30	

*** Turkey's test showed that the mean difference is significant only between the lower and upper groups (0.03).**

The level of students' satisfaction with virtual education increased with the increase in the number of elective units in the semester (Table 3), but the increase was not statistically significant (P-value=0.018). On the other hand, the quality of the educational course (CEQ) was higher for students who had more elective units in this academic semester and this difference was statistically significant (P-value=0.018). Tukey's test showed that the average age difference was significant only in the two groups of low and high satisfaction with virtual education (P-value=0.021).

Table 3. The relationship between satisfaction with the quality of the academic course and satisfaction with virtual education with the number of selected units in the current semester

Variable	Sub-variable	Average selected unit	SD of the number of selected units	P-value
The level of students' satisfaction with virtual education	Low	17.38	3.66	0.238
	Moderate	18.23	2.58	
	High	18.65	2.03	
The quality of the training course	Weak	18.77	3.42	0.018
	Good*	17.98	2.41	
	Excellent*	19.33	1.97	

*** Turkey's test showed that the mean difference is significant only between the lower and upper groups (0.021).**

In this study and using the chi-square test (Table 4), it was seen that there was no difference between the level of students' satisfaction with virtual education and the quality of the training course (CEQ) in both genders (P-value=0.052 and P-value=0.532, respectively).

Table 4. The relationship between satisfaction with the quality of the academic course and satisfaction with virtual education with gender

Variable	Sub-variable	Female	Male	P-value
The level of students' satisfaction with virtual education	Low	11 (10.4)	2 (2.6)	0.052
	Moderate	60 (56.6)	55 (71.4)	
	High	35 (33.0)	20 (26.0)	
The quality of the training course	Weak	15 (14.2)	7 (9.1)	0.532
	Good	73 (68.9)	58 (75.3)	
	Excellent	18 (17.0)	12 (15.6)	

The numbers are expressed as numbers (percentages).

In addition, by using Chi-square test, it was seen that the level of students' satisfaction with virtual education and the quality of the training course (CEQ) was not related to the academic progress of the students (Table 5), and the level of satisfaction of the students with the academic progress was not different from the students without the academic progress (P-value= 0.444 and 0.099, respectively).

Table 5. The relationship between satisfaction with the quality of the academic course and satisfaction with virtual education with academic progress

Variable	Sub-variable	Have academic progress	Lack of academic progress	P-value
The level of students' satisfaction with virtual education	Low	8 (8.7)	5 (5.6)	0.444
	Moderate	54 (58.7)	60 (67.4)	
	High	30 (32.6)	24 (27.0)	
The quality of the training course	Weak	11 (12.0)	11 (12.4)	0.099
	Good	61 (66.3)	69 (77.5)	
	Excellent	20 (21.7)	9 (10.1)	

The numbers are expressed as numbers (percentages).

The level of students' satisfaction with virtual education and the quality of the training course (CEQ) decreased with the increase of the academic semester (Table 6). In the students of the 6th semester and above, 17.0% (9 persons) had low satisfaction, 62.3% (33 persons) had moderate satisfaction, and only 20.8% (11 persons) had high satisfaction, while in the 2nd to 4th semesters, 41.3% (33 persons) had high satisfaction, 56.3% (45 persons) had moderate satisfaction, and only 2.5% (2 persons) had low satisfaction. In addition, the differences were statistically significant (P-value<0.001).

In the students of the 6th semester and above, 22.6% (12 persons) experienced poor quality, 67.9% (36 persons) experienced good quality, and 9.4% (5 persons) experienced excellent quality, while in the 2nd to 4th semesters, these numbers were 7.5% (6 persons), 65.0% (52 persons), and 27.5% (22 persons), respectively, and the differences were statistically significant (P-value<0.001).

Table 6. The relationship between satisfaction with the quality of the academic course and satisfaction with virtual education with the academic semester

Variable	Sub-variable	Academic semester			P-value
		2-4	4-5	>6	
The level of students' satisfaction with virtual education	Low	2 (2.5)	2 (4.0)	9 (17.0)	<0.001
	Moderate	45 (56.3)	37 (74.0)	33 (62.3)	
	High	33 (41.3)	11 (22.0)	11 (20.8)	
The quality of the training course	Weak	6 (7.5)	4 (8.0)	12 (22.6)	<0.001
	Good	52 (65.0)	43 (86.0)	36 (67.9)	
	Excellent	22 (27.5)	3 (6.0)	5 (9.4)	

The numbers are expressed as numbers (percentages).

Table 7 shows the level of students' satisfaction with virtual education in different fields of study. The level of satisfaction of most of the students of medicine (65.4%), nursing (60.0%), midwifery (66.7%), public health (66.7%), laboratory science (75.0%), and anesthesia (80%) was medium. In the field of medicine, 4.9% (4 persons) had low satisfaction, 65.4% (53 persons) had moderate satisfaction, and 29.6% (24 persons) had high satisfaction with virtual education. In the field of nursing, 60.0% (18 persons) were moderately satisfied, and 40.0% (12 persons) were highly satisfied with virtual education. In midwifery, 11.1% (2 persons) had low satisfaction, 66.7% (12 persons) had moderate satisfaction, and 22.2% (4 persons) had high satisfaction with virtual education. In the field of environmental health, 22.2% (2 persons) had low satisfaction, 33.3% (3 persons) had moderate satisfaction, and 44.4% (4 persons) had high satisfaction with virtual education. In the

occupational health field, 25.0% (2 persons) had low satisfaction, 37.5% (3 persons) had moderate satisfaction, and 37.5% (3 persons) had high satisfaction with virtual education.

In the field of public health, 4.2% (1 persons) had low satisfaction, 66.7% (16 persons) had moderate satisfaction, and 29.2% (7 persons) had high satisfaction with virtual education.

In the field of laboratory science, 12.5% (1 person) had low satisfaction, 75.0% (6 persons) had moderate satisfaction, and 12.5% (1 person) had high satisfaction with virtual education. In the field of anesthesia, among the five participants in this study, 20% (1 person) had low satisfaction and 80% (4 persons) had moderate satisfaction with the training course.

Table 7. The level of students' satisfaction with virtual education in different fields of study

Variable	Sub-variable	The level of students' satisfaction with virtual education			P-value
		Low	Moderate	High	
Fields of study	Medicine	4 (4.9)	53 (65.4)	24 (29.6)	0.184
	nursing	0 (0)	18 (60.0)	12 (40.0)	
	midwifery	2 (11.1)	12 (66.7)	4 (22.2)	
	environmental health	2 (22.2)	3 (33.3)	4 (44.4)	
	occupational health	2 (25.0)	3 (37.5)	3 (37.5)	
	public health	1 (4.2)	16 (66.7)	7 (29.2)	
	laboratory science	1 (12.5)	6 (75.0)	1 (12.5)	
	Anesthesia	1 (20.0)	4 (80.0)	0 (0)	

The quality of the training course for the majority of students (Table 8) in the fields of medicine (81.5%), nursing (66.7%), midwifery (77.8%), public health (62.5%), laboratory science (75.0%), and anesthesia (100%) was moderate. In the field of medicine, 9.9% (8 persons) experienced poor quality, 81.5% (66 persons) experienced good quality, and 8.6% (7 persons) experienced excellent quality.

In the field of nursing, 6.7% (2 persons) experienced poor quality, 66.7% (20 persons) experienced good quality, and 26.7% (8 persons) experienced excellent quality. In midwifery, 16.7% (3 persons) experienced poor quality, 77.8% (14 persons) experienced good quality, and 5.6% (1 person) experienced excellent quality. In the field of environmental health, 11.1% (1 person) experienced poor quality, 44.4% (4 persons) experienced good quality, and 44.4% (4 persons) experienced excellent quality.

In the occupational health field, 50.0% (4 persons) experienced poor quality, 12.5% (1 person) experienced good quality, and 37.5% (3 persons) experienced excellent quality. In the field of public health, 12.5% (3 persons) experienced poor quality, 62.5% (15 persons) good quality, and 25.0% (6 persons) experienced excellent quality. In laboratory sciences, 12.5% (1 person) experienced poor quality, 75.0% (6 persons) experienced good quality, and 12.5% (1 person) experienced excellent quality. In the field of anesthesia, among the five participants in this study, all of them had experienced a good quality of the training course.

Table 8. Quality of education (CEQ) in different fields of study

Variable	Sub-variable	Quality of education (CEQ)			P-value
		Low	Moderate	High	
Fields of study	Medicine	8 (9.9)	66 (81.5)	7 (8.6)	0.003
	Nursing	2 (6.7)	20 (66.7)	8 (26.7)	
	Midwifery	3 (16.7)	14 (77.8)	1 (5.6)	
	Environmental health	1 (11.1)	4 (44.4)	4 (44.4)	
	Occupational health	4 (50.0)	1 (12.5)	3 (37.5)	
	Public health	3 (12.5)	15 (62.5)	6 (25.0)	
	Laboratory science	1 (12.5)	6 (75.0)	1 (12.5)	
	Anesthesia	0 (0)	5 (100)	0 (0)	

On the other hand, in this study, no correlation was observed between the dimensions of the quality of education or the level of satisfaction with virtual education and the academic progress of students (Table 9).

Table 9. Pearson's correlation coefficient between the dimensions of the quality of virtual education and the level of satisfaction with virtual education and students' academic progress

Variable	Sub-variable	Pearson's correlation coefficient	P-value
The quality of virtual education	Teaching	-0.072	0.338
	Course goals and standards	-0.051	0.493
	Volume of courses	0.050	0.500
	Resources and course materials	0.010	0.895
	Curriculum evaluation	-0.119	0.110

	Satisfaction	-0.057	0.443
	CEQ GPA	-0.042	0.574
The level of satisfaction with virtual education	Sum of satisfaction points from virtual education	0.098	0.190

Finally, by using linear regression analysis (Table 10) and in the presence of control on other variables, it was seen that only the teaching aspect of the quality of the training course (CEQ) affected on the level of satisfaction of the students (P-value=0.016), and other aspects of the quality of educational course such as educational goals and standards, volume of courses, resources and course materials, course evaluation, and satisfaction did have no effect on the degree of satisfaction of students with virtual education (P-value=0.677, P-value=0.239, P-value=0.285, P-value=0.873 and P-value=0.395).

Table 10 shows the linear regression analysis of the effects of educational quality dimensions on students' satisfaction with virtual education. In this study, it was seen that each point of increase in the teaching dimension causes an increase of 0.011 in the satisfaction score of students with virtual education (P-value=0.016). In addition, in this study, it was observed that different aspects of the quality of the academic course had only a 26% effect (R2=0.261) on students' satisfaction with virtual education, and students' satisfaction with virtual education is more influenced by other factors (73.9%).

Table 10. Linear regression analysis of the effects of educational quality dimensions on students' satisfaction with virtual education

Model	B	P-value	R Square
Teaching	0.011	0.016	0.261
Course goals and standards	-0.005	0.677	
Volume of courses	0.008	0.239	
Resources and course materials	0.006	0.285	
Curriculum evaluation	-0.001	0.873	
Satisfaction	0.013	0.395	

Discussion

In this study, the level of satisfaction of Shahroud University of Medical Sciences students with virtual education and the quality of the academic course during the COVID-19 pandemic was investigated using the CEQ questionnaire and the virtual education satisfaction questionnaire. The findings of this study showed that despite the critical conditions prevailing in the international community, and the critical conditions of the country during the COVID-19 pandemic period, 62.8% of the students were moderately satisfied and 30.1% were highly satisfied with the virtual education provided at Shahroud University of Medical Sciences.

In addition, the average satisfaction with virtual education in this study was 77.3±21.6. Although achieving these results is not extraordinary and is far from ideal conditions, considering that this period was a critical, difficult, and busy period for officials, professors, employees, and students, achieving these satisfactory results in such conditions is commendable.

In Farsi et al.'s study [9], 68.61% of students were relatively satisfied with virtual education and 18.25% were very satisfied with virtual education[21]. In addition, the mean±standard deviation of students' satisfaction with virtual education in Farsi et al.'s study[9] was 62.22 ±26.82, which is consistent with our study.

In the study of Sadeghzadeh et al., the average student satisfaction with virtual education was 74.35±22.94, 73.1% of students were relatively satisfied, and 9.9% were highly satisfied with virtual education during the Covid-19 era, which was in line with our study[13].

In Eleva et al.'s study, students' satisfaction with non-attendance education was evaluated as medium (76.8%), which was in line with our study[14]. The possible reason for this agreement may be the sudden changes following the Covid-19 pandemic in all the above studies, the negative attitude of students towards virtual education[15,16], the preference of students for face-to-face education over virtual education[17], the problems in the virtual education system, and the need to face-to-face training in the practical aspects of medical science units[18].

Seada et al. in their study titled "Students' Satisfaction and Obstacles in Electronic Education among Nursing Students" showed that 93.4% of students were highly satisfied with virtual education[19]. In addition, in the study of Moghadam et al., the average satisfaction with virtual education was 76.22±41.89, and 40.0% of students were moderately satisfied with virtual education[20].

The satisfactory findings of the present study were not in line with the results of Seada et al. and Moghadam et al.,[19,20]. This inconsistency may be because in Ebrahim et al.'s study, students' satisfaction was divided into only two levels, poor and good, and in Alinejad Moghadam's study, it was divided into 4 levels (low, medium, high, and very high). In addition, better access to the necessary facilities for virtual education is one of the possible factors of this inconsistency. On the other hand, there were no sudden conditions and changes following the COVID-19 epidemic in this study.

In the systematic review study by Niknaee et al., it was stated that the level of satisfaction with virtual education varies from country to country and ranges from 26.4% to 82%. The

highest level of satisfaction was for students from Saudi Arabia, Poland, and South Korea, and the lowest level of satisfaction was for students from Jordan, Iran, and the United States[21].

Virtual education for students had challenges such as slow internet speed, internet disconnection in class, lack of proper interaction between professor and student, lack of feedback at the right time, and lack of proper evaluation of learned materials for students. Online learning in the current situation can be a good opportunity to promote and develop virtual education and use modern technologies for educational systems[21].

This study also showed that 48.6% of the students in this study improved academically during the COVID-19 era, but the level of satisfaction with virtual education has not changed in the students who have improved academically. In Farsi et al.'s study, no significant relationship was found between students' satisfaction with virtual education and their academic progress[9].

The findings of this study showed that there was an inverse and significant relationship between students' overall satisfaction with virtual education and the age variable (P-value=0.026), and this relationship was also present in the quality of the training course (CEQ), but it was not significant (P-value= 0.062). In addition, the level of students' satisfaction with virtual education as well as the quality of the training course (CEQ) decreased significantly with the increase of the academic semester (P-value<0.001 and P-value<0.001).

Despite the study of Sadeghzadeh[13], Farsi[9], and Noghan[22], no relationship was found between the age of students and students' satisfaction with virtual education (P-value>0.05), but in the study of Farsi et al. similar to our study, an inverse and significant relationship between students' academic semester and their satisfaction with virtual education was seen[9]. However, Noghan et al. did not report a relationship between academic semesters and students' satisfaction with virtual education[22].

There was a significant difference in the number of selected units in the current semester among those who evaluated the quality of education as good and excellent (P-value=0.018). In addition, in occupational health and midwifery fields, the highest weak satisfaction with virtual education was recorded, but the difference between the level of satisfaction with virtual education among students of different fields was not significant (P-value=0.184).

On the other hand, there was no statistically significant relationship between the variables of gender, field of study, academic progress, and dimensions of the quality of the educational course with the level of satisfaction with virtual education in students. This is even though in Farsi et al.'s study[9], male and female students' satisfaction with the quality of the academic course (P-value=0.013) and their satisfaction with virtual education (P-value<0.001) had a significant difference, their GPA was not different (P-value=0.194), which is contrary to the results of our study.

In Farsi et al. and Noghan et al. study, no relationship was found between the dimensions of the quality of the educational course and the level of students' satisfaction with virtual education and their academic progress[9,22]. However, the study of Sadeghzadeh et al., similar to our study, reported that gender and academic achievement had no relationship with the level of satisfaction with virtual education[13]. In the study of Moqaddam et al., the satisfaction level of girls was insignificantly higher than that of boys (P-value=0.4)[20], which is consistent with the results of our study.

Since universities of medical sciences are the main suppliers of human resources for hospitals and medical centers, continuing the education of students in these universities and educational institutions in this critical period and increasing the quality of this education to train the elite and ready-to-work forces should be one of the main concerns of university officials.

The evaluation of students' opinions about the quality of teaching is not only a measure to check the quality of teaching, but it also focuses on the possibilities and necessities of educational correction and verification by revealing educational weaknesses. Using this approach, the experience of successful teaching-learning styles can be introduced, specified, and evaluated, and it can initiate the cycle of reforming and improving the education process even in critical conditions such as the COVID-19 pandemic.

The results of this study showed that students were generally satisfied with virtual education. This satisfaction has decreased with the increase in the academic semester and the age of the students, which indicates the need to improve virtual education in higher semesters. By increasing the level of student's' satisfaction with virtual education and providing its infrastructure, it is possible to continue virtual education in the post-COVID era and reduce the costs of students and universities.

Ethical Considerations

This article is the result of a medical student's thesis, which has been registered with ethical code of IR.SHMU.REC.1400.268.

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Conflict of Interest

The authors of this article declare that they have no conflict of interest.

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