

Exploring medical students' perspectives on online education in medical education

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ABSTRACT

Aim: Medical education has traditionally been a face-to-face and hands-on field of education. Recently, the development of educational technologies, epidemics, and disasters have made it necessary to use online education method in addition to the traditional method in medical education. The purpose of this study is to evaluate medical students' perspectives on online medical education.

Methods: This study was carried out as a descriptive, cross-sectional and cohort research with the participation of 906 medical faculty students in Türkiye. Data were collected with "distance education evaluation scale for medical faculty students" scale. Descriptive statistics and significance tests (t-test, ANOVA, and Tukey tests) were used to analyze the data.

Results: Medical students stated that online education was economically and time-efficient, that they had difficulty in following the courses, and that they could not manage patients with the knowledge and skills they would gain through online education.

Conclusions: Medical students do not recommend that medical education should be done only through online education. However, it was evaluated that online education should also be utilized, in other words, it would be beneficial to develop hybrid education models.

Keywords: medical education, online education, opinions of medical students

INTRODUCTION

Distance learning was an alternative education program for students who could not find traditional education opportunities, which has been practiced for more than a century. The development of the postal system helped students overcome time and distance in distance education. Distance learning, which was initially done through printed manuals, was made possible with radio, television, and audio-video cassettes over time. With the development of technologies such as the internet, the distance between students and educators has become even shorter [1, 2]. Online learning is the process of learning through the use of the Internet and is a current version of distance education [3].

Online education has become an educational model that has been accepted by many universities in around the world and its application has increased especially during and after the COVID-19 pandemic [4]. Although online education is not a very new concept for educators in general, it has emerged as a global need with the COVID-19 epidemic [5]. As of March 2020, all school internship programs have been suspended in

many countries. Doctoral license exams have been postponed indefinitely [6]. Many educational institutions in the world had to suddenly close and switch from face-to-face education to online education during this process, and they faced various difficulties as there was a sudden transition. According to UNESCO, more than 1.5 billion students worldwide (90.1% of total enrolled students) have been affected by educational changes during the COVID-19 pandemic [5].

Human health is too important to allow mistakes and negligence, and medical students are expected to get the most out of their education. Online education has not been widely accepted, especially in schools, where student-teacher interaction is required, such as medical schools, which require a master-apprentice relationship. It has been observed that medical educators are resistant to this training method [4]. Although online education has been a method gradually applied in medical education in the last 10 years, it has not been a method accepted by medical educators [6].

Online education was also implemented in medical faculties in order to ensure the safety of students and educators during the pandemic period [7], to prevent

contamination in higher education institutions and hospitals [8], to reduce the course load of doctors working during the pandemic period and to prevent medical education from being left unfinished in this process [9]. During the pandemic period, face-to-face education activities had to be stopped in all medical faculties in the half of the second semester of 2020. Medical students were removed from clinics, wards, intensive care units and emergency rooms [6].

The COVID-19 pandemic has caused disruptions and reduced productivity in all education systems nationally. This has shown us how unprepared we are for such extraordinary situations. Online education has created an unfamiliar learning environment for both instructors and students.

On the other hand, questions have also arisen such as whether technology, which has been and continues to be integrated into every aspect of our lives, can be a part of medical education in the normal course. Our aim in this study is to evaluate the thoughts of medical school students about online education applied during the COVID-19 pandemic process through “online education evaluation scale for medical faculty students”. It is hoped that the results of the research will contribute to the restructuring and enrichment of medical education with new educational technologies in extraordinary situations such as pandemics or after.

METHODS

Universe of Study & Data Collection Tool

This study is a descriptive research and was carried out using the survey technique. The population of the research consists of medical faculties in public and private universities. In the 2021-2022 academic year, 2nd class and above medical school students who received online education were included. 1st year students who have just started medical education, students with communication disabilities who do not use social media, who do not agree to participate in the study, and who do not receive online education were not included in the study. Employees will be reached through our own means (e-mail and social media tools) through social media tools.

Sample selection in the study was made by the convenience sampling method. The research scale was shared online with medical faculty student groups, and the students voluntarily participated in the research.

There are various calculation methods used in determining the sample size in scientific studies [10]. In such formulas, it is sufficient to collect data from 384 individuals with a 95% confidence interval (CI) [11]. 906 medical faculty students participated in the research, representing the medical faculty students universe.

The study was carried out with a five-point Likert questionnaire technique, one of the quantitative research methods. A scale of literature research was conducted to be used in the study, and it was seen that the existing questionnaires and scales did not explain the study objectives. For this reason, first of all, a scale development study was conducted to achieve the purpose of the study. In order to develop the research scale, a literature study and interviews with medical faculty members, students and educators were

Table 1. Validity & reliability analysis of scale

Factor analysis		
KMO measure of sampling adequacy		.904
	Approximate Chi-square	14,907.978
Bartlett's test of sphericity	df	465
	Significance	.000
Factor load range	.427	.816
Total variance explained	%	53.150
Cronbach's alpha		.703
Dimensions	Number of expressions	
Online learning applications	4	
Challenges of online learning	9	
Benefits of online learning	11	
Operation of online learning	7	

conducted. In the research, “distance education evaluation scale for medical faculty students”, created by the researchers with the five-point Likert technique, which is one of the quantitative methods, was developed and used. In structuring the scale, it was aimed to determine the functioning, benefits and difficulties of online education applications used in medical education. The scale was first prepared as 30 statements. The scale questions were shared with nine experts, arrangements were made in the way of expressing the questions on the scale with the contributions of the experts, and two more statements were added. In the pilot study, data were collected from 365 medical students, preliminary analyzes were made and one question was excluded from the scale because it did not reach sufficient factor load.

The validity of the scale was tested with exploratory factor analysis. In order to understand the sampling adequacy in factor analysis, Kaiser-Meyer-Olkin (KMO) value, the suitability of the data to normal distribution were calculated with Bartlett's sphericity test, the rotation of the data was made with the varimax method, and the factor loadings and the explanation rate of the total variance were examined. Its reliability was analyzed using Cronbach's alpha method. The analysis results of the scale are given in **Table 1**.

Data Analysis

SPSS statistical software was used to test the aims of the study. Analyzes were performed at a 95% CI ($p=0.050$). In the analysis of the data of the study, frequency analysis, t-test, ANOVA, and Tukey tests were used.

RESULTS

When **Table 1** is examined, KMO sample coefficient of the scale was found to be over 0.90 and was considered good. The results of the Bartlett sphericity test, which was used to evaluate the scale's suitability for factor analysis, were found to be significant ($p=0.000$). Accordingly, the scale is suitable for factor analysis. It was calculated that the factor loadings of the scale were good in general and the power to explain the total variance was 0.53 and found sufficient. As the reliability analysis's Cronbach's alpha coefficient for the entire scale was above 0.70, it was determined that the study was reliable.

Factor statements were scored from one to five points from strongly disagree to totally agree. In the evaluation of the scores, the level of participation in the expression was

Table 2. Frequency table of variables describing participants

Variable	Frequency (n)	Percentage (%)
Grade		
2 nd grade	252	27.8
3 rd grade	208	23.0
4 th grade	285	31.5
5 th grade	109	12.0
6 th grade	52	5.7
Gender		
Female	550	60.7
Male	356	39.3
Age		
18-20	187	20.6
21-23	604	66.7
24-26	115	12.7
27+	-	-
Marital status		
Married	7	0.8
Single	899	99.2
Do you have chronic disease/condition requiring medical follow-up?		
No	820	90.5
Yes	86	9.5

interpreted as low between 1.00-2.33, medium between 2.34-3.66 and high between 3.67-5.00.

906 medical faculty students participated in the study. 60.7% (n=550) of the participating students were female, 27.8% (n=252) 2nd class, 23.0% (n=208) 3rd class, 31.5% (n=285) 4th class, 12.0% (n=109) 5th class, 5.7% (n=52) 6th class. 66.7% of the students are in the 21-23 age group, 99.2% (n=899) are single, and 9.5% (n=86) have a chronic disease that requires follow-up (**Table 2**).

The opinions of medical faculty students about distance education based on their experiences are given in **Table 3**. When **Table 3** was examined, medical school students stated that the most and highest level theoretical courses (4.28), medium level laboratory trainings (3.03) and clinical practices (2.48) were carried out in the expressions about what online education applications were investigated in the first dimension of the scale, They stated that the intern doctor applications were made with a low level of online education.

Medical students stated that they had moderate difficulty following the lesson (3.38), asking questions about the lesson (3.27) and understanding the lesson (3.14) due to difficulties of online education. Medical students expressed their economic gains (3.46) and gaining time (3.04) at a moderate

Table 3. Faculty of medicine students' distance education evaluation scale frequency

Expressions	M	SD
Online education applications	2.91	1.27
1. Our theoretical courses are conducted through the online system.	4.28	0.97
2. Our laboratory trainings are carried out through the online system.	3.03	1.57
3. Clinical applications are carried out through the online system.	2.48	1.42
4. Intern applications are carried out through the online system.	1.88	1.14
Challenges of online education	2.90	1.16
5. I cannot attend online education most of the time.	2.84	1.30
6. After taking online classes, I have a hard time following.	3.38	1.32
7. I have difficulty in understanding online lessons.	3.14	1.30
8. I find it difficult to ask questions in online classes.	3.23	1.41
9. I find it difficult to answer the questions of the teachers in online classes.	3.27	1.33
10. Computer and internet infrastructure to participate in online training is not sufficient.	2.05	1.15
28. I have a hard time keeping up with the online exams.	2.86	1.29
29. I find it difficult to write the answers in online exams.	2.59	1.22
30. Online exams affected my course performance negatively.	2.81	1.35
Benefits of online education	2.03	1.08
11. Online education saved me time.	3.04	1.45
12. Online education supported me economically as it did not require me to go to school.	3.46	1.32
13. I find online education useful in theoretical lessons.	2.90	1.40
14. I find online education useful in laboratory lessons.	1.62	1.01
15. I find online education useful in clinical practice courses.	1.46	0.97
16. Online education should continue after covid in theoretical lessons.	2.55	1.47
17. Online education should continue after covid in laboratory classes.	1.50	0.98
18. Online education should continue after covid in clinical practice courses.	1.36	0.90
19. I learn lessons better in online education than face-to-face education.	2.26	1.33
21. I think that I can do patient management with the knowledge and skills I gained through online education.	2.20	1.20
32. My family wants education to continue after covid with the online education method.	2.11	1.33
Operation of online education	2.91	1.18
20. Provides the opportunity to listen to the lessons in online education.	3.77	1.26
22. The online education system of faculties works smoothly.	2.74	1.28
23. Teachers prepare documents and presentations suitable for online education.	3.16	1.17
24. Teachers teach effective lessons in online education.	2.87	1.13
25. Instructors also provide active participation of students in online education.	2.40	1.09
26. Motivation of teachers is sufficient in online education.	2.48	1.12
27. In online education, the lessons are held on time and as long as the duration.	3.03	1.21

Note. M: Mean & SD: Standard deviation

Table 4. Distance education attitudes of medical students by age

Attitudes	Age groups	n	Mean	Standard deviation	F-value	p-value
Applications	18-20	187	3.3864	.87421	38.020	.000
	21-23	604	2.8547	.90001		
	24+	115	2.5109	.98919		
Difficulties	18-20	187	3.0963	.80634	9.245	.000
	21-23	604	2.9007	.80512		
	24+	115	2.6812	.94252		
Gains	18-20	187	2.2008	.90347	4.215	.015
	21-23	604	2.1966	.84115		
	24+	115	2.4530	1.04036		
Mechanism	18-20	187	2.9267	.95618	.313	.732
	21-23	604	2.9156	.83441		
	24+	115	2.9863	.97846		

Table 5. Distance education attitudes of medical students by class

Attitudes	Classes	n	Mean	Standard deviation	F-value	p-value
Applications	2 nd class	252	3.3155	.90107	42.550	.000
	3 rd class	208	3.1947	.89514		
	4 th class	285	2.6123	.82283		
	5 th class	109	2.7179	.77661		
	6 th class	52	2.0288	.98724		
Difficulties	2 nd class	252	3.0644	.80250	7.251	.000
	3 rd class	208	3.0459	.78865		
	4 th class	285	2.7466	.83533		
	5 th class	109	2.7819	.80322		
	6 th class	52	2.8376	.96901		
Gains	2 nd class	252	2.2392	.95940	1.009	.402
	3 rd class	208	2.1656	.86536		
	4 th class	285	2.2842	.80613		
	5 th class	109	2.2652	.97364		
	6 th class	52	2.0717	.79545		
Mechanism	2 nd class	252	2.9348	.92742	4.201	.002
	3 rd class	208	2.8297	.87492		
	4 th class	285	3.0000	.82354		
	5 th class	109	3.0760	.84349		
	6 th class	52	2.5632	.91732		

level, as they do not need to go to school, as the achievements of online education. Laboratory trainings (1.50) and clinical practices (1.36) should not continue after the COVID-19 epidemic; it is stated that the theoretical courses (2.55) can continue at the intermediate level. Medical students stated that they could not adequately manage patient management (2.20) with the knowledge and skills they gained through online education, and that they could not learn the lessons better with online education (2.26). Medical students also said that their families should not continue online education after the COVID-19 epidemic (2.11). Medical students have declared at a high level that there is an opportunity to listen to the recordings afterwards in the operation of online education, which continues under the conditions of the COVID-19 epidemic (3.77). They stated that the instructors use documents suitable for online education (3.16) and that the lessons are held at a moderate level (3.03).

According to independent variables, the differentiation status of medical students' attitudes and views about online education was analyzed with t-test, ANOVA, and Tukey tests. It has been determined that the marital status and the presence of chronic diseases of medical students do not cause a difference in online education. It has been determined that there is a significant difference in the dimensions of practices and achievements of the online education assessment scale

according to the gender of medical students, and there is no significant difference in the dimensions of difficulties and functioning. Female medical students participated more in online education applications than male medical students ($p=0.010$). Male medical students gained more from online education than female medical students ($p=0.038$).

As seen in **Table 4**, it has been determined that there is a significant difference in the dimensions of practices, difficulties and functioning of the online education assessment scale of medical students according to age, but there is no significant difference in the dimension of functioning. As the age of medical students increased, their participation ($p=0.000$) and difficulty ($p=0.000$) in online education applications decreased. Medical students aged 24 and above had more gains from online education than medical students in other age groups ($p=0.015$).

As seen in **Table 5**, it has been found that there is a significant difference in dimensions of applications, difficulties and functioning of online education assessment scale according to the classes of medical students, but there is no significant difference in the dimension of achievements. As the class of medical students increased, their participation in online education applications ($p=0.000$) and their difficulty ($p=0.000$) decreased. 2nd, 4th, and 5th class medical students had

more positive evaluations about functioning of distance education than 6th class medical students ($p=0.002$).

DISCUSSION

As a result of this study; in this survey conducted among medical students in Türkiye, challenges of online education, the gains it provides, how it was implemented during the pandemic period, educators' skills and motivations, in this regard reveals its strengths and weaknesses in medical education.

According to the results of this research, medical students stated that the most and high level theoretical courses, medium level laboratory trainings and clinical applications are carried out online, while intern applications are carried out with low level online education. The most theoretical courses were taught online. This is an expected finding, which may be due to the fact that laboratory and clinical practice courses cannot be given online under current conditions.

In [4], it was found that 80.0% of the students found online education satisfactory and were satisfied, and 55.0% preferred co-education with online and face-to-face education. In [4], which was conducted on the students, 78.0% of the students thought that online lessons were useful, while 72.3% of them were satisfied with traditional lessons before the COVID-19 pandemic. 64.5% stated that they prefer an education that combines online and traditional courses [12]. In this study, 2nd, 4th, and 5th class medical students made more positive evaluations about the functioning of distance education compared to 6th class medical students ($p=0.002$). It is seen that those who are most affected by online education are 6th class students who practice one-on-one with the patient. It can be concluded that online education can be done in theoretical courses in medical education, and online education in clinical practice courses is difficult in today's conditions.

As a result of the study in [13] with 800 medical students in Poland, they found that medical students who moved away from the patient and hospital environments with online education declared that they would not be able to do good patient management in the future due to the lack of clinical practice. It was concluded that 85.0% of students preferred traditional methods for practical lessons and found them more useful [12]. In this study, medical students stated that they could not adequately manage patient management with the knowledge and skills they gained through online education and that they could not learn the lessons better with online education. For this reason, laboratory and clinical practice training should not be continued online or various learning methods should be developed for students who require clinical practice in cases, where online education is mandatory such as a pandemic. There is a need for studies on how to conduct clinical practices with online education and the development of new education methods.

The COVID-19 pandemic has caused serious difficulties in medical education, disrupting medical education in an unprecedented way. Medical students could not come together in classes, could not participate in clinical rotations and practices. The lessons that they need to learn by practicing themselves remained in theory. Among the difficulties

encountered in online education [14], inadequate infrastructure, a lack of face-to-face interaction, insufficient technical support personnel, financial costs of maintaining the platform were found. In [4], it was found that the most important difficulties encountered in online education are problems with internet connection, lack of extracurricular activities, inability to meet friends, interact, concentrate on online sessions, and focus. It was concluded that 64.3% of students could not communicate with the teacher in an online environment [12]. In addition to these, in addition to these, the children of low and middle income families have difficulty in accessing the internet and computers due to financial difficulties, limited space available for education at home, conflicts within the family, etc. It has been found to have difficulties [6].

In the study of Rajab et al., the reported difficulties in online education during the COVID-19 outbreak were face-to-face communication (59.0%), student assessment (57.5%), use of technological tools (56.5%), online education experience (55.0%). Difficulties in online education reported in the medical literature include problems with time management, use of technology tools, assessment of students, lack of communication and face-to-face interaction. In addition, online education may not be fair in terms of access and quality of teaching [15, 16].

Some students do not have laptops or high-speed internet access at home. In addition, older internet users benefit the least from online education due to reasons such as technophobia [17]. Many teachers are themselves technophobic, meaning they are anxious or unsure enough about dealing with computer hardware and software in their field. In this study, medical students stated that they had difficulty in following the lesson, asking questions in the lesson and understanding the lesson at a moderate level in the difficulties of online education. As it is understood here, in online education, cost, technological infrastructure and lack/inadequacy in the use of technology cause serious problems such as student-teacher communication and exam evaluation. When these and similar problems are resolved, online education may become more common over time.

In this study, medical students stated that the benefits of online education are economic and time-saving as they do not need to go to school at a moderate level. Students are requested to continue the theoretical courses partially with online education after COVID-19 due to their time constraints and economic gains. In addition, regarding the functioning of the courses, the possibility of repeating the courses from the recordings and easy access to the course documents make online education attractive to the students.

Limitations

This study is cross-sectional. The study could not be conducted face to face, only online systems were used as a data collection tool, and the number of participants was not large. In addition, the low number of 5th and 6th grade students among the participants does not fully reflect the opinions of students doing applied education.

CONCLUSIONS

Epidemics, war and natural disasters have caused a rapid reinterpretation of general approaches such as medical approach, education and training methods etc. accepted all over the world. Pandemics such as COVID-19 will pave the way for the reshaping of medical education. Medical faculty students state that after the pandemic, laboratory training and clinical practices should not continue online, but theoretical courses can continue online. It can be said that students tend to return to traditional education in terms of laboratory and clinical practices in post-pandemic medical education. However, online education has important gains such as economic gain, time saving, course repetition and facilitating access to lecture notes. As a result, it is recommended to evaluate both trends in terms of medical education and to carry out studies to integrate the opportunities and conveniences of online education into medical education.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

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