



Assessment of the opinions and experiences of anatomy educators regarding the distance anatomy education in medical facilities under the effect of COVID-19 in Turkey

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Abstract

Purpose Aim of this research is to assess the perceptions and views of the anatomy lecturers (educators) of the medical faculties in Turkey on undergraduate distance anatomy education during the COVID-19.

Methods Anatomy educators nationwide were invited to the online questionnaire developed by the authors. Ninety-one anatomy educators participated in the questionnaire. Views of the participants were evaluated by Likert-type questions and open-ended questions. Distance anatomy education experiences of the participants between March and July 2020 were evaluated.

Results Participants found face-to-face education more beneficial than distance education courses conducted with video recordings. They also reported that they agreed synchronous lessons were more beneficial than asynchronous lessons. They agreed that time management was a positive result. However, they were concerned about the adverse effects of the interruption of formal anatomy education regarding quality. The experience of distance anatomy education applied during the COVID-19 pandemic has revealed the demand for distance theoretical anatomy education supported by video recordings and face-to-face practical anatomy education methods (blended) for the post-pandemic period.

Conclusion There is much research focusing on the students regarding the effects of the COVID-19 pandemic on anatomy education. The experiences and the suggestions of the anatomy educators are also important. The findings of the current research have revealed the positive approach to distance theoretical anatomy education and face-to-face practical anatomy education methods (blended) for the post-pandemic period.

Keywords COVID-19 · Distance anatomy education · Distance education · Medical school students · Basic medical sciences · Gross anatomy education · Medical education · Coronavirus · Online anatomy · Remote teaching · Laboratory · Lecture · Anatomy teachers · Anatomy educators

Introduction

The COVID-19 (coronavirus disease, variants of SARS-COV-2) pandemic, which went down in history as a new, interesting, and in many aspects painful experience of our

modern age, as defined by the World Health Organization as a public health emergency on January 30, 2020, and as a "pandemic" on March 11, 2020 [15, 30]. Researchers of the educational sciences took action to understand the impact of the pandemic and produce solutions. When historical experiences are examined for the analysis of the current situation, it is understood that similar situations were experienced in the pandemic known as the Spanish Flu in 1918 [27]. These experiences, such as distance education through correspondence, could be considered difficult for the conditions of that period. The SARS outbreak that emerged in 2003 was another recent pandemic experience for medical education [22]. The consequences of the COVID-19 pandemic in education and medical education are more comprehensive and influential worldwide than previous pandemics [22, 26].

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Owing to the new situations that appeared due to the pandemic, distance education has been started in health disciplines in our country and worldwide. The application and the results of this education style are unclear. The adaptation and integration process of distance education in our country has progressed very quickly. Immediately after the first case in our country emerged on March 11, 2020 [31], the educational activities of all higher education institutions nationwide were suspended. Within three weeks, it was decided to continue these training activities with distance education methods. Medical educators had difficulties due to the high rate and sudden application of distance education methods, and the process has been a new experience for medical/health educators [25]. In fact, due to the impact of modern technology and current needs, research on online/distance education methods had already started before the pandemic [10]. Medical educators with relatively limited distance/online education familiarity had to experience a rapid adaptation process under challenging conditions [25]. Digital platforms started to be used for theoretical anatomy lessons and exams. For practical lessons and exams, institutions took decisions by evaluating many criteria, such as the institution's facilities, the conditions of the student population, technological infrastructures, and the course of the pandemic in terms of public health [3, 29].

Early in the pandemic, the literature on "distance medical education" could have been considered insufficient in the pandemic situations where distance education in medicine was given such a high rate and mandatory coverage. Immediately after the emergence of the COVID-19 pandemic, lecturers' and students' comments, editorials, letters to the editor, and the reactions of different universities to the pandemic began to be published [1, 8, 11, 14, 24].

During the pandemic, obtaining partners' opinions, controlling educational activities, attempting to understand and solve problems, observing institutional or educators' reactions, managing the adaptation process, and improving education alternatives can be counted among the methods that should be tried first [21, 33]. The views of large masses or education stakeholders in different centers, especially anatomy educators, have not yet been comprehensively revealed in the medical education literature. Comprehensive research is needed to examine the perception and experiences of medicine or anatomy educators in distance education in this process. The literature on anatomy education is too limited to solve the problems of anatomy education in this process using past experiences. In this sense, the importance of recording today's problems, solutions, observations, and experiences is evident.

Some of the views of medical/anatomy educators about distance anatomy education during the COVID-19 pandemic period have been reflected in a few letters to the editor and research articles published previously [6, 9, 21, 23, 24, 28,

32]. In these studies, it was observed that questions about some subjects, such as hybrid education, were not asked or that the answers to the open-ended questions were not adequately evaluated analytically, or that the number of participants was relatively limited. Before the pandemic, there were also studies based on student opinions on models such as blended learning in anatomy education that could be an alternative to traditional anatomy education methods [17]. In such studies, the conditions of distance anatomy education had to be examined experimentally or hypothetically. The COVID-19 pandemic has created a realistic environment for the subjects investigated in these studies.

The subject of the current study was the perception and views of anatomy educators in our country at the onset of the COVID-19 pandemic. Additionally, whether the pandemic conditions facilitate the acceptance of models such as the combination of distance and face-to-face education was a secondary question of the research. A comprehensive comparative analysis of distance anatomy education with traditional or face-to-face anatomy education was not within the scope of this study. This questionnaire research aimed to understand the effects of the COVID-19 pandemic on undergraduate anatomy education in medical faculties in our country in terms of distance education experience. Also, it is hoped that these experiences would help develop anatomy education models in the post-pandemic period by compiling opinions, experiences, and suggestions nationwide to examine anatomy education during the pandemic.

Materials and methods

This research was conducted as a questionnaire study on 91 volunteer anatomy educators (lecturers) who responded positively to the digital invitation sent nationwide using the communication platform of the national anatomy association. Ethical approval for this study was obtained from the institutional review board (No: 756/18.06.2020).

Basic features of anatomy education in our country: The integrated (block) model is mainly applied in most medical faculties. Systematic anatomy education is more common than topographic anatomy education. Many medical faculties prefer lecture-based systems, while a few prefer problem-based learning methods. Many of the medical faculties in our country complete anatomy education in the first two years. To the best of our knowledge, before the COVID-19 pandemic, the distance education method was not used in medicine/anatomy education in our country.

Data collection

Participants were informed with a standard text about the purpose of the study, the usage of the findings and data, the

duration of the questionnaire, the target audience, and the volunteering principle of questionnaire participation. The authors prepared the questionnaire's questions, and statements (propositions, Likert items) applied to anatomy educators (Table 1). The data were obtained between August and September 2020, just after the 2019–2020 academic year. An online tool, Google Forms (<https://www.google.com/forms/about/>) was used in data acquisition.

The questionnaire consisted of three parts [Sect. 1 (S1), Sect. 2 (S2), Sect. 3 (S3), Table 1 (“S” is the preferred abbreviation for the “section” of the questionnaire.)]. In the first part, general demographic information of the participants and technical or current conditions related to distance anatomy education were requested by questions (“Q” is the abbreviation for the questions in the sections of the questionnaire.). In the second part, the questions consisted of five-point Likert-type questions that measure the participants' level of agreement in the statements (“St” is the preferred abbreviation for the “statements” of the second section of the questionnaire.) (Assessment options: Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree). Online questionnaire tool was set up to let the participants to respond all questions and statements compulsively in the first two sections. The anatomy educators were asked to express their opinions freely by the open-ended questions in the third part.

Quantitative data analysis

The raw data were transferred from the Google Forms platform to Microsoft Excel (Microsoft Corp., Redmond, WA, USA) and SPSS Statistics Standard Concurrent User V 25 (IBM Corp., Armonk, New York, USA) environments. So, the data were organized and prepared for analysis and visualization. Descriptive statistics (frequencies and percentages) were used to describe the results. The Chi-square analysis method supported by the independently evaluated Monte Carlo simulation was used in assessing the categorical data. The statistical significance level was determined as 0.05. Cronbach's alpha was applied to measure the internal consistency between the items of the second section of the questionnaire.

Qualitative data analysis

In the third section of the questionnaire, the open-ended questions were evaluated by the thematic qualitative content analysis method [4]. Studies using a similar method were reviewed in the literature [9]. In the first step of the qualitative evaluation, the data (responses to the third section) were read several times by the researchers. Subjects of the comments were noted as the premises for the final

themes in the reading step. Comments that mention more than one subject are noted as separate subjects. In the second step, the subjects of the comments evaluated together for similarity and diversity. Accordingly, themes categories for the comments are created. Finally, all comments are re-evaluated to include them in the theme categories. During these steps, comment–subject–theme consistency is evaluated qualitatively by the researchers. Thus, each participant's answers to S3-Q1 and S3-Q2 were included in one of the final themes that emerged by the authors.

Results

Section 1

According to the information from official sources, in Turkey, there are 400 assigned anatomists in the state universities and 111 assigned anatomists in the private universities. [18]. Turkish Society of Anatomy and Clinical Anatomy has 444 members [19]. Electronic invitation is sent via email to 288 members of the community group “Anatomi-TR” [7]. The number of anatomy educators who participated in the questionnaire was 91 nationwide [Female: 47 (51.65%), Male 44 (48.35%)]. The academic titles of the participants are presented in Table 2.

Eighty (87.91%) participants were working at state universities, and 11 (12.09%) participants were working at foundation (private) universities (S1-Q3). Before the COVID-19 pandemic, 14 (15.38%) participants experienced distance (online) education, while 77 (84.62%) participants had no experience (S1-Q4).

The distribution of answers to the question “In which format is the distance (online) education given in your institution during the COVID-19 pandemic? (S1-Q5)” is summarized in Table 3, and the frequency analysis of these answers is summarized in Table 4. The “video recordings (asynchronous)” were the most used (74,73%) format for the online anatomy education.

The distribution of the answers given to the questions “Which digital platforms do you use for distance (online) theoretical anatomy education in your institution during the COVID-19 pandemic? (S1-Q6)” and “Which digital platforms do you use for distance (online) practical anatomy education in your institution during the COVID-19 pandemic? (S1-Q7)” is presented in Table 5. The frequency analysis of these responses is shown in Table 6. “Institutional technological infrastructure (Learning Management System)” was the most used platform for both the theoretical anatomy education (65,93%) and the practical anatomy education (50,55%).

Table 1 The questionnaire form applied to evaluate anatomy educators' opinions on distance anatomy education at the undergraduate degree in the faculty of medicine during the COVID-19 pandemic. (English translation of the questionnaire)

Section-1 (S1) (general information)	<p>Q1. Gender</p> <p>Q2. Academic title (Options: 1. Prof. Dr., 2. Assoc. Prof., 3. Asst. Prof. or Ph.D. or Medical specialist., 4. Research assistant [Graduate students (candidates of MSc / PhD / Medical specialist)])</p> <p>Q3. Which defines the institution that you teach anatomy? (Options: 1. State University / 2. Foundation (Private) University)</p> <p>Q4. Have you had any experience of distance (online) education before the COVID-19 pandemic? (Options: Yes, No)</p> <p>Q5. In which format is the distance (online) education given in your institution during the COVID-19 pandemic? (Options: 1. Live lectures (synchronous), 2. Video recordings (asynchronous), 3. PowerPoint presentations, 4. Text file, 5. Other)</p> <p>Q6. Which digital platforms do you use for distance (online) theoretical anatomy education in your institution during the COVID-19 pandemic? (Options: 1. Institutional technological infrastructure (Learning Management System), 2. Zoom, 3. Microsoft Teams, 4. Skype, 5. Adobe Connect, 6. Other)*</p> <p>Q7. Which digital platforms do you use for distance (online) practical anatomy education in your institution during the COVID-19 pandemic? (Options: 1. Institutional technological infrastructure (LMS), 2. Zoom, 3. Microsoft Teams, 4. Skype, 5. Adobe Connect, 6. Other)*</p>
Section 2 (S2)** (statements)	<p>St1. Conducting theoretical anatomy lessons with video recordings (asynchronous) was more beneficial than face-to-face education</p> <p>St2. Conducting theoretical anatomy lessons with online live lessons (synchronous) was more beneficial than video recordings (asynchronous)</p> <p>St3. Conducting theoretical anatomy lessons with video recordings (asynchronous) has been beneficial for my time management</p> <p>St4. According to my impression, all theoretical anatomy lessons can be conducted with video recordings (asynchronous) during the formal education</p> <p>St5. According to my impression, the number of face-to-face anatomy lessons can be reduced by conducting some of the theoretical lessons via video recordings (asynchronous) in anatomy education</p> <p>St6. According to my impression, the students benefited more from the anatomy resources (two- or three-dimensional) available on the web</p> <p>St7. According to my impression, three-dimensional digital resources can replace the model and cadaver education</p> <p>St8. In the distance education process, the opportunity to interact with undergraduate students decreased</p> <p>St9. According to my impression, students spent more time on anatomy textbooks</p> <p>St10. The fact that practice/laboratory courses were not carried out with theoretical lessons led to disruption in anatomy education</p> <p>St11. It was the right decision to include anatomy practice courses within the scope of distance education</p> <p>St12. It was the right decision to include the theoretical anatomy exam within the scope of the distance education/exam</p> <p>St13. It was the right decision to include the anatomy practice exams within the scope of distance education/exam</p> <p>St14. The quality of anatomy education did not decrease by conducting the theoretical anatomy lessons via distance education</p> <p>St15. The quality of anatomy education did not decrease by conducting the practical anatomy lessons via distance education</p>
Section 3 (S3) (open-ended questions)	<p>Q1. What are your suggestions and observations about deficiencies regarding the distance anatomy education activities in this process?</p> <p>Q2. What are your suggestions for anatomy education methods after the COVID-19 pandemic?</p>

S Section, St Statement, Q Question

*Adobe Connect (Adobe Inc.: 345 Park Avenue, San Jose, California), Microsoft Teams (Microsoft, Inc. Redmond, Washington, USA), PowerPoint (Microsoft Corp., Redmond, Washington, USA), Skype (Microsoft, Inc. Redmond, Washington, USA), Zoom (Zoom Communications, Inc. San Jose, CA, USA),

**Options for all statements: Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree

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Table 2 Distribution of academic titles of the faculty members participating in the questionnaire [*n* (%)]

Academic title	<i>n</i> ₁ (%)	Seniority groups	<i>n</i> ₂ * (%)
Prof. Dr	32 (35.16)	Senior group	37 (40.66)
Assoc. Prof	5 (5.49)		
Asst. Prof	11 (12.09)	Mid-level group	23 (25.27)
Ph.D. or Medical specialist	12 (13.19)		
Research assistant [Graduate students (candidates of MSc / PhD / Medical specialist)]	31 (34.07)	Junior group	31 (34.07)
Total	91 (100%)	Total	91 (100%)

*Distribution of “academic title groups” according to the “seniority groups”

Table 3 The distribution of the answers to the question “In which format is the distance (online) education given in your institution during the COVID-19 pandemic? (S1-Q5)” [*n* (%), S: Section, Q: Question]

Answers	<i>n</i>	% (<i>N</i> =91)
Video recording (asynchronous)	21	23.08
Video recording (asynchronous), Live lesson (synchronous), PowerPoint* presentation file	20	21.98
Live lesson (synchronous)	16	17.58
Video recording (asynchronous), Live lesson (synchronous)	11	12.09
Video recording (asynchronous), PowerPoint* presentation file	9	9.89
Video recording (asynchronous), Live lesson (synchronous), PowerPoint* presentation file, Text file	5	5.49
Live lesson (synchronous), PowerPoint* presentation file	5	5.49
Video recording (asynchronous), PowerPoint* presentation files, Text file	2	2.20
Live lesson (synchronous), Text file	1	1.10
PowerPoint* presentation file	1	1.10
Total	91	100.00

*PowerPoint (Microsoft Corp., Redmond, Washington, USA)

Table 4 The frequency analysis of the answers to the question “In which format is the distance (online) education given in your institution during the COVID-19 pandemic? (S1-Q5)” [*n* (%)] (each participant could give multiple answers for this question) (*N*=91) (S: Section, Q: Question)

Answers	<i>n</i> *	%**
Video recording (asynchronous)	68	74,73
Live lesson (synchronous)	58	63,74
PowerPoint*** presentation file	43	47,25
Text file	7	7,69

**N*=91

**Each participant could give multiple responses to this question

***PowerPoint (Microsoft Corp., Redmond, Washington, USA)

Section 2

According to the findings in this section of the study, anatomy educators considered that face-to-face training was more beneficial than video recordings (asynchronous) (St1, $p=0.001$). They reported that synchronous lessons were more beneficial than asynchronous lessons (St2, $p=0.025$).

Although the positive aspects of distance anatomy education stood out in topics such as time management (St3, $p=0.002$), it was stated that cadaver and laboratory education was disrupted [(St10, $p=0.001$), (St14, $p=0.001$), (St15, $p=0.001$)]. The data of the second part of the questionnaire are summarized in Table 7 and Fig. 1. The internal consistency of the Sect. 2 was estimated by Cronbach's alpha. Cronbach's alpha value of 0.793 for the answers shows a good consistency between responses of the items (Table 7 and Fig. 1).

Section 3

The research team evaluated the open-ended questions in the third part and categorized them under themes qualitatively, and the findings are summarized in Table 8 for S3-Q1 and Table 9 for S3-Q2. It was observed that the answers in this section could also cover the topics that were asked for opinions in the questionnaire or that a participant could express an opinion on more than one theme. The response rate to the open-ended questions asked in the third part was 39.56% (number of respondents: 36) for S3-Q1 and 39.56% (number

Table 5 The distribution of the answers given to the questions “Which digital platforms do you use for distance (online) theoretical anatomy education in your institution during the COVID-19 pan-

demic? (S1-Q6)” and “Which digital platforms do you use for distance (online) practical anatomy education in your institution during the COVID-19 pandemic? (S1-Q7)” [n (%), S: Section, Q: Question]

Answers	S1-Q6		S1-Q7	
	n	% (N=91)	n	% (N=72*)
Institutional technological infrastructure (LMS)	35	38.46	29	31.87
Microsoft teams	10	10.99	10	10.99
Institutional technological infrastructure (LMS), Zoom	9	9.89	9	9.89
Zoom	8	8.79	6	6.59
Adobe Connect,	6	6.59	4	4.40
Institutional technological infrastructure (LMS), Zoom, Microsoft Teams	4	4.40	–	–
Institutional technological infrastructure (LMS), Youtube	4	4.40	1	1.10
Zoom, Microsoft Teams	3	3.30	2	2.20
Institutional technological infrastructure (LMS), Skype, Zoom,	2	2.20	1	1.10
Institutional technological infrastructure (LMS), Adobe Connect	2	2.20	2	2.20
Institutional technological infrastructure (LMS), Microsoft Teams	2	2.20	1	1.10
Institutional technological infrastructure (LMS), Perculus plus beta	2	2.20	2	2.20
KEYPS	2	2.20	2	2.20
Institutional technological infrastructure (LMS), Skype, Zoom, Microsoft Teams	1	1.10	1	1.10
Zoom, Adobe Connect	1	1.10	–	–
Google Classroom and Google Meet	1	1.10	2	2.20
Total	91	100.00	91	100.00

*19 educators answered this question as “no practical lessons were given”

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Table 6 The frequency analysis of the answers to questions “Which digital platforms do you use for distance (online) theoretical anatomy education in your institution during the COVID-19 pandemic? (S1-Q6)” and “Which digital platforms do you use for distance (online) practical anatomy education in your institution during the COVID-19 pandemic? (S1-Q7)” [n (%)] (N=91, S Section, Q Question)

Answers	S1-Q6		S1-Q7	
	n*	%**	n*	%**
Institutional technological infrastructure (LMS)	60	65.93	46	50.55
Zoom	28	30.77	19	20.88
Microsoft teams	20	21.98	14	15.38
Skype	3	3.30	2	2.20
Adobe connect	9	9.89	6	6.59
Other (Perculus plus beta, Youtube, KEYPS, Google Classroom)	9	9.89	7	7.69

*N=91

**Each participant could give multiple answers for this question

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of respondents: 36) for S3-Q2. Among these answers, the total number of comments within the scope of 4 themes for S3-Q1 is 48, and the total number of comments within the scope of 4 themes for S3-Q2 is 37 (Tables 8, 9). Regarding the question “(S3-Q1) What are your observations about

deficiencies or suggestions for distance anatomy education activities in this process?”, highest comment count was about the theme “Inadequacy of 3-dimensional learning” (Table 8). Regarding the question “(S3-Q2) What are your suggestions for anatomy education methods after the COVID-19 pandemic?”, highest comment count was about the theme “Suggestion for using blended model (face-to-face practical and distance theoretical education)” (Table 9).

Discussion

Although modern technology and educational sciences are developing and we have already met the concept of distance education, the share of distance education has not increased much in academic fields that require face-to-face contact [10]. Owing to the inability of keeping face-to-face education, universities sought alternatives. This was one of the critical issues affecting the education process of the COVID-19 pandemic [11]. Educational institutions are trying to overcome this problem using digital education methods. Distance/online education and examinations have become the main problem of health institutions with inadequate technological infrastructure. At the beginning of the COVID-19 pandemic, although there were not enough guides or resources on how academics

Table 7 Distribution of the responses given to the propositions (S2-St15) in the second part (S2) of the questionnaire [n(%)] (N=91) (S Section S_r Statement)

S2-Statements	Strongly disagree (%)	Disagree (%)	Neither agree nor disagree (%)	Agree (%)	Strongly agree (%)	p*
S2-St1	37 (40.66) ^{a,b}	27 (29.67) ^b	13 (14.29) ^{a,b}	12 (13.19) ^{a,c}	2 (2.2) ^c	0.001
S2-St2	12 (13.19) ^a	11 (12.09) ^{a,b}	17 (18.68) ^b	27 (29.67) ^b	24 (26.37) ^b	0.025
S2-St3	10 (10.99) ^a	10 (10.99) ^{a,b}	21 (23.08) ^b	31 (34.07) ^b	19 (20.88) ^b	0.002
S2-St4	39 (42.86) ^a	17 (18.68) ^{a,b}	21 (23.08) ^a	7 (7.69) ^b	7 (7.69) ^b	0.001
S2-St5	27 (29.67) ^{a,b,c,d}	7 (7.69) ^{c,d}	9 (9.89) ^{b,d}	30 (32.97) ^a	18 (19.78) ^{a,b,c,d}	0.001
S2-St6	5 (5.49) ^a	3 (3.3) ^a	18 (19.78) ^b	42 (46.15) ^b	23 (25.27) ^b	0.001
S2-St7	46 (50.55) ^a	24 (26.37) ^a	15 (16.48) ^a	3 (3.3) ^b	3 (3.3) ^b	0.001
S2-St8	2 (2.2) ^a	3 (3.3) ^a	2 (2.2) ^a	23 (25.27) ^b	61 (67.03) ^c	0.001
S2-St9	17 (18.68) ^a	24 (26.37) ^b	23 (25.27) ^b	18 (19.78) ^{a,b}	9 (9.89) ^a	0.097
S2-St10	4 (4.4) ^a	7 (7.69) ^{a,b}	13 (14.29) ^b	22 (24.18) ^b	45 (49.45) ^c	0.001
S2-St11	38 (41.76) ^a	19 (20.88) ^a	15 (16.48) ^{a,b}	10 (10.99) ^b	9 (9.89) ^b	0.001
S2-St12	33 (36.26) ^a	14 (15.38) ^b	14 (15.38) ^b	17 (18.68) ^b	13 (14.29) ^b	0.004
S2-St13	42 (46.15) ^a	19 (20.88) ^a	18 (19.78) ^{a,b}	7 (7.69) ^{b,c}	5 (5.49) ^c	0.001
S2-St14	40 (43.96) ^a	20 (21.98) ^a	12 (13.19) ^{a,b}	15 (16.48) ^{a,b}	4 (4.4) ^b	0.001
S2-St15	66 (72.53) ^a	13 (14.29) ^b	7 (7.69) ^{b,c}	3 (3.3) ^c	2 (2.2) ^c	0.001

S Section, S_r Statement

Each subscript letter denotes a subset of options categories whose column proportions do not differ significantly from each other at the 0.05 level
 *Chi-square analysis method supported by the independently evaluated Monte Carlo simulation was used in evaluating the categorical data (for each question)

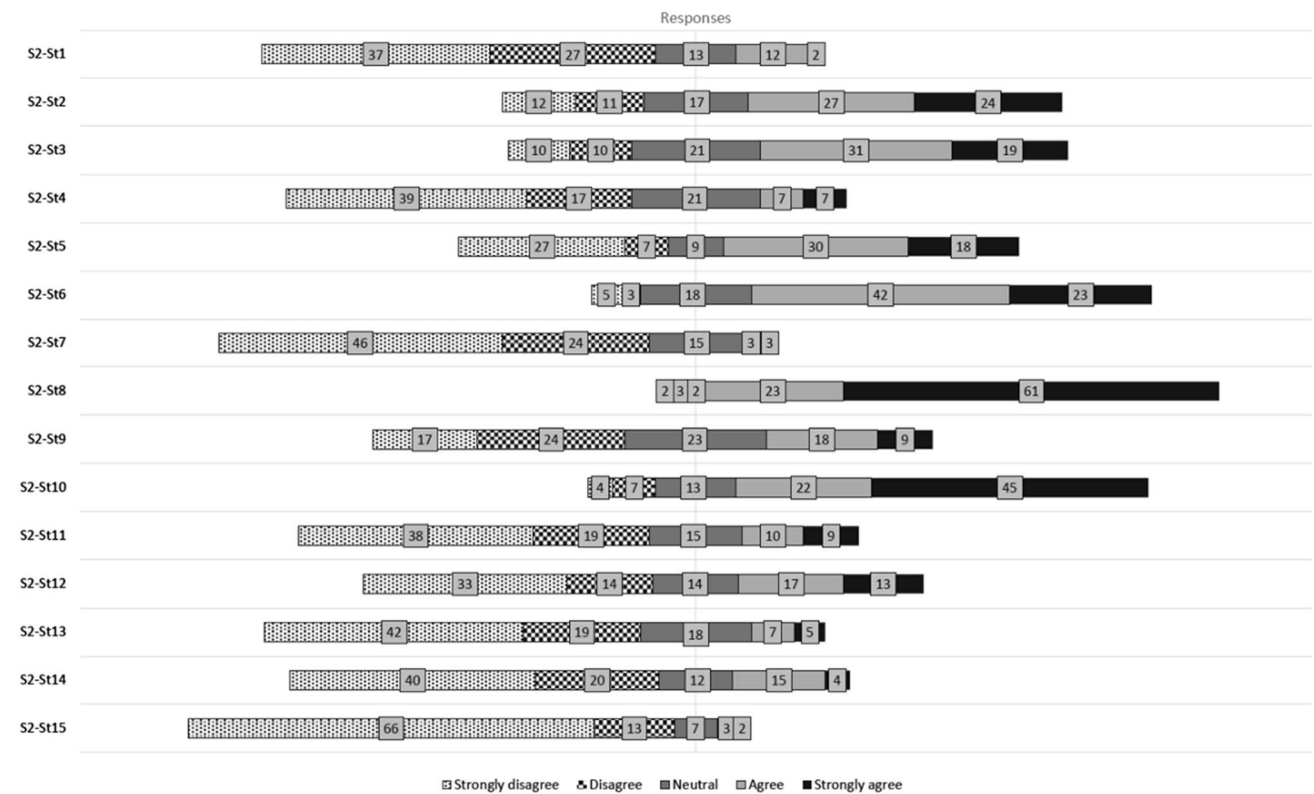


Fig. 1 Distribution of the answers given to the statements (St1-St15) in the second section (S2) of the questionnaire (N:91) (S: Section, St: Statement)

Table 8 Distribution of the responses to the question “(S3-Q1) What are your observations about deficiencies or suggestions for distance anatomy education activities in this process?” asked in the third part of the questionnaire according to the themes (Number of comments) (S Section, Q Question)

Themes	Comment count
Inadequacy of 3-dimensional learning	14
Theoretical lesson problems	10
Exam or assessment problems	10
Communication problems with students	9
Technical digital inadequacies (being unprepared)	5
Total	48

Table 9 Distribution of the responses to the question “(S3-Q2) What are your suggestions for anatomy education methods after the COVID-19 pandemic?” asked in the third part of the questionnaire according to the themes (Number of comments) (S Section, Q Question)

Themes	Comment count
Suggestion for using blended model (face-to-face practical and distance theoretical education)	14
Suggestion for using face-to-face education	8
Suggestion for doing makeup lessons	7
Certification (training the trainer) requirement for online or nontraditional types of training	5
Suggestion for sharing educational resources nationwide	3
Total	37

could provide distance/online health/medical education, institutions had to produce their solutions quickly under challenging conditions. Researchers on anatomy education began sharing their experiences with the scientific world [3, 6, 9, 13, 21, 24, 32].

The COVID-19 pandemic led to alternatives replacing conventional methods very quickly and without clear results [3]. These alternatives were tested worldwide in health education under the unique conditions of educational institutions [5]. Institutions with a prepared digital technological infrastructure, which could analyze current conditions and respond quickly to the needs of students or academic staff, continued to provide education without any significant disruption in theoretical lectures [21, 33].

With the onset of the pandemic in our country, anatomy education was given by distance education methods [2, 20]. Theoretical and practical lessons were given in different methods in anatomy. Theoretical courses, which were already supported by visual materials, could be given remotely with the opportunities provided by digital/internet

technologies. Theoretical anatomy exams could also be conducted with similar methods. More difficulties were experienced in the distance laboratory courses in which three-dimensional perception, dissections in the laboratory, or examination of a dissected cadaver were provided. Practical exams required solving similar problems, same as practical lectures. For practical lessons and exams, the course of the pandemic in terms of public health, the conditions of the institution, or the situation of the students caused different decisions to be taken and different methods to be followed. This process may be an opportunity to discuss bringing a new dimension to anatomy education regarding the applicability of distance education alternatives [13, 20].

It may be insufficient to evaluate the distance education methods only with the academic aspect; it seems necessary to assess them with the social and humanistic aspects. In years time, we will learn about consequences of distance education alternatives, which are placed without the opportunity to analyze the opinions of the partners of the academic education process. It may be necessary to investigate the effect of these education methods on the professional and academic future of students who have received medical/health/anatomy education with distance education methods [12]. Exploring the perceptions and views of students and lecturers by feedback mechanisms may be an early opportunity to evaluate the acute reactions. In this context, with this research, the opinions of anatomy educators are aimed to receive and report.

It was observed that the anatomy educators participating in this study had a balanced distribution in terms of gender [Female: 47 (51.65%), Male 44 (48.35%)]. According to academic titles, the participants were divided into groups [Group 1: associate professor and professor group (senior group), Group 2: specialist/postdoc group (mid-level group), Group 3: research assistant group (junior group)] to reflect seniority or professional experience. It was observed that the groups had a balanced distribution (Table 2, footnote, n2). The low rate of anatomy lecturers in medical faculties of foundation universities (12.09%) was coherent with the low number of medical faculty programs in foundation universities in our country. The high rate (84.62%) of the faculty members who did not have distance education experience before the pandemic shows that the opinions of those who experienced distance education for the first time in this period were taken in this study.

The questions S1-Q6 and S1-Q7 revealed the preferences of the anatomy lecturers about the institutional technological infrastructure. A learning management system is a software or application used by institutions to handle educational activities. These systems are not only produced for commercial purposes but also may be produced by the institutional staff for internal usage. In the answers given, the use of institutional learning management systems at 65.93% in

theoretical courses and 50.55% in practical courses can be interpreted as an acceptable level of technical facilities of institutions for anatomists. However, the observation that more than one method is used at a high rate among anatomy educators suggests that the existing corporate learning management systems may not solely meet the needs (Table 5 and Table 6). With this finding, it would not be an appropriate to interpret the complete usage features or quality of the methods.

According to the responses in the second section, it is understood that the anatomy educators considered face-to-face training (S2-St1) and live (synchronous) theoretical anatomy lessons (S2-St2) more beneficial. The strength of traditional habits may be a factor these outcomes, as well as the experience of using distance education tools and the power to satisfy faculty members. However, the thought that the video recordings of theoretical anatomy lessons were beneficial for time management (S2-St3) was interpreted as a positive opinion in terms of adaptation and integration to distance education. This finding may be a factor that will facilitate the acceptance of the possible role of distance anatomy courses in the post-pandemic period (S2-St4 and S2-St5). Survey participants stated that they observed that the resources in the web environment (two-dimensional or three-dimensional) were used more by students (S2-St6). However, these resources could not replace the education given in the laboratory environment (S2-St7). These evaluations emphasize the importance of classical practical anatomy education in the laboratory. These views seem to be in harmony with the observation of students' low interaction with faculty members (S2-St8). Participants thought that anatomy practice training in distance education due to the conditions imposed by the pandemic disrupted anatomy education (S2-St10 and S2-St11). Participants also thought that including the theoretical and practical exams in the distance education system was not the right decision (S2-St12 and S2-St13). These views of the participants might be affected by the fact that distance exam methods have not been successfully and quickly integrated into the distance anatomy education system. In the anatomy education literature, current publications do not seem to describe the standards of distant anatomy exams comprehensively. When the statistical significance level and the distribution of the answers were examined, it was observed that giving practical courses remotely caused a much higher quality loss than theoretical courses (S2-St14 and S2-St15). For the last two statements, the word "quality" can be described as the "standard of the fulfillment". "Quality" represents the notion of the participants' ideas regarding "how good or how bad it is".

The statistical differences in the answers received in the second part of the questionnaire were investigated according to some demographic/academic characteristics. There were no significant differences between the evaluations of

the questions in the second part according to the characteristics of gender, institution type, and "pre-pandemic distance education experience". However, statistical differences were determined between the "Academic title groups" (Table 2, footnote, n2). According to these findings: (1) The senior group agreed more than other groups to the statement that three-dimensional digital resources could replace models and cadavers (S2-St7, $p=0.040$). (2) The senior group agreed more than other groups to the statement that interaction with medical school students decreased (S2-St8, $p=0.003$). (3) The senior group agreed less than other groups to the statement that students spend more time on anatomy textbooks (S2-St9, $p=0.054$). (4) The senior group agreed less than the other groups to the statement that involving the anatomy laboratory courses within the scope of distance education was the right decision (S2-St11, $p=0.005$). (5) The senior group agreed less than other groups to the statement that involving the anatomy laboratory exams within the scope of distance education was the right decision (S2-St13, $p=0.034$). (6) There was no statistically significant difference between seniority groups (Table 2, footnote, n2) regarding the loss of anatomy education quality due to the inclusion of theoretical anatomy courses within the scope of distance education (S2-St14). However, the senior group agreed more than the other groups that there was a loss in anatomy education quality when practical anatomy courses were included in distance education (S2-St15, $p=0.008$). We thought these significant findings of seniority groups (Table 2, footnote, n2) created in our study might be affected by seniority and experience in the profession. Based on these observations, it can be interpreted that the group with higher seniority and experience is more conservative for classical education, although the first finding emphasized in this paragraph is not contributing to this deduction. The sociodemographic or some other characteristics of the participants, the homogeneity of the distribution, or some factors that were excluded from the scope of the questionnaire may have affected in the emergence of the findings examined here. More accurate comments can be made on these issues with the studies conducted in populations with different characteristics, in which a high number of participants and different factors are also included in the analysis.

We think that the thematic evaluation of open-ended questions in our study is a strong aspect of the study. Receiving the unforeseeable opinions of the participants is an opportunity for open-ended questions. While the analysis of open-ended questions is a methodological challenge, the thematic analysis has some advantages for evaluation [4]. Table 8 and Table 9 show the thematic categorization of the comments of the responses to the questions in part three. Among the themes in these tables, the observation that three-dimensional learning is insufficient and the demand for blended (face-to-face practical and distance theoretical)

education come to the fore. Certification proposal for online or nontraditional education types was evaluated as an essential criterion or competence that should be considered when updating medical health education standards for the post-pandemic period. Sharing educational resources nationwide also draws attention as an essential idea and proposal.

There are some studies in this field in the literature [23, 24]. It is emphasized that a majority of these studies in the literature were student-centered [23, 24]. They discussed the challenges anatomists faced in their role as educators. Our study was motivated by this need as well and was conducted to understand the perceptions and views of anatomists. In a study conducted in China (n:359), 36.2% of lecturers preferred to continue online theoretical anatomy education after the pandemic. In comparison, 24.8% were willing to return to traditional face-to-face classes [6]. Twenty-four anatomists from fifteen universities in the United Kingdom and the Republic of Ireland preferred face-to-face practice (95.8%), preferred the traditional method to the online method (52.6%), considered that students' interaction with each other and their instructors decreased (66.7%) [9]. Anatomy education in classes of anatomists of different professional origins (disciplines) (Total: 356, 293 clinical medicine, 63 nonclinical major) in China was compared [32]. In this study, it was concluded that nonclinical majors were relatively unprepared for online education [32]. However, data regarding the professional origin of the anatomists have not been retrieved in our research. Srinivasan [28] discussed that the insufficient amount of research and findings in the literature about anatomy education using the Zoom platform. Our study may have contributed to making up for this deficiency in some aspects. In a study involving 18 anatomists from 10 institutions in Australia and New Zealand, anatomists' training philosophies and traditional roles were discussed. On the other hand, it has been evaluated that there are some opportunities, such as the placement of distance-synchronized education and new pedagogical understandings in anatomy education [21]. Our findings suggest that participants of the current survey do not seem against online synchronized anatomy education.

In the literature, the findings of publications do not seem consistent [6, 9, 13, 21, 24, 32]. It is understood from these studies that the social or academic acceptance of the COVID-19 pandemic in the field of anatomy education may be divergent. Identifying local problems and their solutions can provide comprehensive solutions by understanding the different dimensions of common problems [6, 9, 13, 21, 24, 32]. Local detection of such problems may also provide short, easy, and more specific solutions.

The dependence of today's educational technologies on digital infrastructure has been proven in the COVID-19 pandemic. The power of the digital education infrastructures of medical faculties ensured that the first responses to the

pandemic were adequate and the transition was smooth. In the upcoming period, medical faculties should review distance education opportunities. It may be possible to get more efficiency from distance education, especially while the Z generation is prone to benefit from current technological opportunities [16].

This study has some limitations. In this study, only the views of anatomy lecturers and their subjective feedback on distance anatomy education during the pandemic period were discussed. The comprehensive positive and negative aspects of distance anatomy education or its place in medical education were not discussed. Our findings were observational and based on the personal declarations of the participants. The factors that may impact the formation of the responses of the questionnaire could not be comprehensively controlled. In the scope of this research, some potential factors on the results are ignored, such as the socio-demographics or technical facilities/features of the institutions of the participants. A research model in which such factors could be included would have provided more comprehensive results. It may be possible for such studies to provide more detailed findings with advanced statistical analyses in which different issues may impact questionnaire responses. This questionnaire was not planned as a scale study. We think this study will form preliminary data for studies that can provide further analysis.

Further research is required in this area. Observations in this field can be increased by researching the themes of the answers given to open-ended questions. It may be necessary to comparatively evaluate the effects of different types of anatomy resources or different types of distance education methods on learning under distance education conditions. It can be researched whether students need a pre-education to take distance (online) courses as in this study.

Conclusion

COVID-19 pandemic revealed that alternatives to conventional methods of anatomy education should be provided. COVID-19 pandemic seems as an opportunity to improve our understanding of anatomy education. The findings of the current research have revealed the positive approach to distance theoretical anatomy education and face-to-face practical anatomy education methods (blended) for the post-pandemic period. For our research population, educational model that is partially integrated distance anatomy education into face-to-face anatomy education seems acceptable. It is understood that distance anatomy education (synchronous or asynchronous courses) may be included more in the curriculum in future.

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