Original Article

Strength, Weakness, Opportunity, Threat Analysis of the Adaptations in Anatomy Training During COVID-19 Pandemic: Example of Turkey

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Abstract

Introduction: Educational methods used in Turkey as an immediate response to COVID-19 pandemic definitely bear strengths and weaknesses. In this context, the aim of the present study is to carry out Strength, Weakness, Opportunity, Threat (SWOT) analysis of Turkey's adaptations in the anatomy training. **Material and Methods:** This descriptive study included 12 state universities. A questionnaire was used to collect information regarding the modifications of the anatomy departments. All responses were analyzed by the researchers using a thematic analysis following a 6-step process. For the purpose of SWOT analysis, these themes were assigned to either strengths, weaknesses, opportunities or threats. **Results:** According to the results of the study, increasing skills in utilizing new technologies and resources (83.3%), developing new online resources (83.3%) and alternative examination methods (58.3%) and free access to online resources (16.6%) were the strengths of Anatomy training during the crisis. Exam-related issues (83.3%), being obliged to work from home due to curfews, self-isolation, and social-distancing rules (75.0%), insufficiency in practical courses and cadaver practices (75.0%) and time restrictions (58.3%) were considered as weaknesses. The departments consider the teleworking model (83.3%), preparation for including blended learning in future curricula (83.3%) and academic cooperation (33.3%) as important environmental opportunities. There are issues that anatomy departments consider as important environmental threats. These threats include decrease in student-student (83.3%) and teacher-student interaction (66.6%) and suspension of the donor programs (58.3%). **Discussion and Conclusion:** The COVID-19 pandemic has created several opportunities and challenges. Undoubtedly, Anatomy training will need revisions in the normalization process. Results of SWOT analysis studies are thought to be a guide for the departments during the revision process.

Keywords: *Anatomy education, COVID-19, Strength, Weakness, Opportunity, Threat analysis*

Introduction

Anatomy training is one of the important building blocks of the basic medical sciences. Good anatomy training is required for optimization of both clinical and surgical skills.[1] Teaching human anatomy requires identifying the most appropriate teaching tools and approaches and constantly revising these methods from the students' perspective.[2-4] Cadaver dissection, which has been practiced as gold-standard for many years, has important advantages such as improving active and profound learning, preparing students for clinical practice and applying manual skills and helping them understand the relationship between patient symptoms and pathology.[5] Despite all the benefits, traditional cadaver-based training methods have transformed into integrated/system-based curriculum over time.[6]

In the traditional curriculum of medicine, the preclinical years of education are generally devoted to basic sciences, so students have limited chance for further training in anatomy during clinical years.[6] Due to the lack of anatomical knowledge in intern doctors and newly graduated medical doctors, these traditional methods have often been criticized and a vertically integrated curricula has been proposed.[7,8] In the vertically integrated curricula, clinical sciences are again the center of focus during early years of education. In the following years, however, depending on the branch of the specialization (e.g., surgery, which requires a higher level of anatomical knowledge) a blended anatomy training is placed within the curricula to further expand anatomical knowledge of the interns.[9] In this context, system-based education is emphasized in the literature as an important method that supports integrated education.

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In any anatomical region, there are many structures with various features, functions and relationships, each of which belongs to different systems and are taught in different subject lectures. This makes it difficult for the students to fully understand the function of each anatomical region. In a system-based curriculum, learning is facilitated as it clearly demonstrates that each system is a material that forms the basis for subsequent systems.[10] As students proceed in their education, the relationships, functional significance and clinical correlations of structures belonging to different systems are constantly discussed and reviewed. Therefore, these two methods are considered as locomotives among current anatomy training methods.[11]

Since the outbreak of COVID-19 on December 31, 2019, in Wuhan, Hubei province of China, the number of infected cases has grown exponentially in the country and in the world.[12] The situation is identified by the World Health Organization as a public health emergency of international concern.[12,13] This unprecedented emergency has affected all global industries, including education. With the implementation of policies such as social-distancing and self-isolation, it is not feasible for educators and students to attend lessons or lectures as they did previously. The pandemic has disrupted our educational practices and has urged many institutions to implement alternative educational strategies.[14,15]

Online learning is being used as an alternative method for anatomy training in Turkey as well as in other countries. As mentioned above, different techniques and methods of anatomy training have various advantages and disadvantages and have been revised and reformed over time.[16] Educational methods used in Turkey as an immediate response to COVID-19 pandemic definitely bear strengths and weaknesses. In this context, the aim of the present study is to carry out Strength, Weakness, Opportunity, Threat (SWOT) analysis of Turkey's adaptations in the anatomy training in response to COVID-19 pandemic.

Material and Methods

Study design

This descriptive study included 12 state universities that modified their Anatomy teaching methods to meet self-isolation and social-distancing measures during COVID-19 pandemic.

Participants

Anatomy departments of 12 state universities in Turkey were included in the study. Due to ethical issues, the names of the universities are kept confidential.

Ethics committee

This study was approved by Kırşehir Ahi Evran University Medical Faculty Clinical Research Ethics Committee. Before the study, written and verbal consents were obtained from all Anatomy Departments.

Outcome measures

A questionnaire based on previous procedure was used to collect information regarding the modifications of the anatomy departments as an immediate response to COVID-19 pandemic [Table 1].[16] Two biggest opportunities and challenges that they encountered during the COVID-19 pandemic was asked based on Longhurst *et al*.' study results.[16] All responses were analyzed by the researchers using a thematic analysis following a 6-step process that was published in 2012.[17] For the purpose of SWOT analysis, these themes were assigned to either strengths, weaknesses, opportunities or threats. This analytical approach is commonly used in strategic planning and decision making.[18]

Results

In Turkey, there are a total of 82 anatomy departments; 61 in state universities and 21 in private universities. The sample size of our study accounts for 19.67% of the state universities, and 14.63% of all universities with anatomy departments in Turkey.

Theoretical and practical courses

The most common method of training for the theoretical courses was the asynchronized training with the rate of 50.0%. Synchronized method was used in 25.0% of the departments, and a combination of both methods was used in 25.0% of the departments [Table 2]. Apart from local software, universities also use other software such as "Zoom" (Zoom Voice Communications Inc., San Jose, CA), "Collaborate Ultra" (Blackboard Inc., New York, NY), "Microsoft Teams" (Microsoft Corp., Redmond, WA) and "Big Blue Button" (Big Blue Button Inc. Ottawa, Canada) for their synchronized training. For asynchronous training purposes, the most frequently used methods were uploading course materials to the virtual learning platform (58.3%) and video recording (50.0%). Local distance education software and YouTube videos were commonly used for video recordings [Table 2].

Table 1: Questions that were replied by all contributors

1. Which city is your university located in?
2. What is the number of teaching staff in your anatomy department?
3. What methods do you use in the delivery of theoretical courses?
4. What methods do you use in the delivery of practical courses?
5. What methods do you use in the evaluation of the theoretical courses?
6. What methods do you use in the evaluation of the practical courses?
7. What are the two biggest challenges you encountered during the COVID-19 pandemic?
8. What are the two issues that you see as the biggest opportunities during the COVID-19 pandemic?

YouTube videos (YouTube, San Bruno, CA), Cadaveric images, Acland's Video Atlas of Human Anatomy (Acland, 2013), Bespoke videos (prosected/plastinated specimen) and Visible Human Project (US National Library of Medicine, Bethesda, MD) were the most common methods of digital cadaver in descending order of frequency of use [Table 3]. Visible Body (Argosy Publishing, Inc., Newton, MA) and Anatomy TV (Primal Pictures Ltd., Colchester, UK) were the most frequently used 3D virtual reality methods. Complete Anatomy (3D4Medical/Elsevier, Dublin, Republic of Ireland), Sectra virtual dissection table (Sectra AB, Linköping, Sweden) and Sketchfab 3D models (Sketchfab, New York, NY) had similar frequency of use [Table 3].

Evaluation of the theoretical and practical courses

According to the responses, the COVID-19 pandemic mostly affected the evaluation of practical courses. While 33.3% of the universities had no plans regarding the date and format of the exam, 50.0% either cancelled the practical exam (25.0%) or postponed it (25.0%) [Table 4].

One university (8.3%) the practical exam would be held digitally, and one university (8.3%) would use students' performance assignments as an evaluation method.

In 3 universities, theoretical written exams would be in forms of multiple-choice questions, matching questions, single answer questions and single best answer questions (25.0%). 3 departments (25.0%) planned to postpone the theoretical exam, 2 (8.3%) decided to cancel it, 2 (8.3%) replaced it with performance assignments, and online written and online oral exams would be held in 2 departments [8.3%, Table 4].

Opportunities and challenges

Despite the difficulties the COVID-19 pandemic has created in the education system, there seems to be several opportunities in terms of the investigated parameters. Anatomy departments stated that the remote study model (83.3%), increasing skills in utilizing new technology and resources (83.3%) and developing new online resources (83.3%) were among the most important opportunities. Generating alternative examination methods (58.3%), setting ground for including blended learning in future curricula (33.3%), academic collaboration (33.3%) and free access to online resources (16.6%) were considered as other opportunities [Table 5].

Apart from these opportunities, the departments believed that the pandemic has created serious difficulties and challenges for the education system. The reduction in student interaction (83.3%) and exam-related issues (83.3%) were considered as the most important challenges. Being obliged to work from home due to self-isolation and social-distancing rules (75.0%), insufficiency in practical courses and cadaver practices (75.0%),

Table 2: Theoretical and practical courses

	n (%)
Theoretical courses	
Synchronized method	3 (25.0)
Asynchronized training	6 (50.0)
Uploading course materials to the virtual learning platform	7 (58.3)
Event planning	5 (41.6)
Video recording	6 (50.0)
Tape recording	2 (16.6)
Video recording + tape recording	3 (25.0)
A combination of both methods	3 (25.0)
Practical courses	
Digital cadaver	9 (75.0)
3D virtual reality methods	5 (41.6)
Uploading course materials to the local software	7 (58.3)
Postnormalization feedback applications	3 (25.0)

Table 3: Resources used for the practical courses

Resources	Universities												
	1	2	3	4	5	6	7	8	9	10	11	12	Percentage
Digital cadaver													
Bespoke videos (prosected/plastinated specimen)		✓	✓										16.6
Visible Human Project (U.S. National Library of Medicine, Bethesda, MD)	✓												8.3
YouTube videos (YouTube, San Bruno, CA)	✓	✓		✓	✓	✓	✓	✓	✓				66.6
Cadaveric images	✓		✓	✓					✓				33.3
Acland's Video Atlas of Human Anatomy (Acland, 2013)	✓							✓					16.6
3D virtual reality methods													
Anatomy TV (Primal Pictures Ltd., Colchester, UK)				✓	✓								16.6
Sectra virtual dissection table (Sectra AB, Linköping, Sweden)						✓							8.3
Complete Anatomy (3D4Medical/Elsevier, Dublin, Republic of Ireland)				✓									8.3
Visible Body (Argosy Publishing, Inc., Newton, MA)		✓	✓			✓							25.0
Sketchfab 3D models (Sketchfab, New York, NY)				✓									8.3
Uploading course materials to the local software	✓	✓			✓	✓	✓	✓	✓				58.3
Postnormalization feedback applications										✓	✓	✓	25.0

decrease in teacher-student interaction (66.6%), time constraints (58.3%) and suspension of the donor program (58.3%) were also reported as challenges due to the crisis [Table 5].

Discussion

Our study was designed to make the SWOT analysis of the strategies that have been adopted by anatomy departments in Turkey due to COVID-19 pandemic. The pedagogical perception of opportunities-challenges was mostly similar between departments. A SWOT analysis diagram was created based on the themes extracted from the responses to the questionnaire, and this diagram was used to construct the discussion [Figure 1].

Table 4: Evaluation methods of theoretical and practical courses

	n (%)
Theoretical written exams	
MCQs, EMQs, SAQs, SBA	3 (25.0)
Online written exam	1 (8.3)
Online oral exam	1 (8.3)
Cancelled	2 (16.6)
Students' performance assignments	2 (16.6)
Postponed	3 (25.0)
Practical exams	
No plans regarding the date and format of the exam	4 (33.3)
Exam would be held digitally	1 (8.3)
Cancelled	3 (25.0)
Students' performance assignments	1 (8.3)
Postponed	3 (25.0)

MCQs: Multiple choice question, EMQs: Extending matching questions, SAQs: Single answer questions, SBA: Single best answer

According to the results of the study, increasing skills in utilizing new technologies and resources (83.3%), developing new online resources (83.3%), developing alternative examination methods (58.3%) and free access to online resources (16.6%) were the strengths of Anatomy training during the COVID-19 crisis. Exam-related issues (83.3%), being obliged to work from home due to curfews, self-isolation and social-distancing rules (75.0%), insufficiency in practical courses and cadaver practices (75.0%) and time restrictions (58.3%) were considered as weaknesses. The departments consider the teleworking model (83.3%), preparation for including blended learning in future curricula (83.3%) and academic cooperation (33.3%) as important environmental opportunities. There are issues that anatomy departments consider as important environmental threats and that should be addressed during the normalization process after the crisis. These threats include decrease in student-student interaction (83.3%), decrease in teacher-student interaction (66.6%) and suspension of the donor programs (58.3%).

Anatomy departments in Turkey have demonstrated a significant effort to avoid any interruption in the process of education during COVID-19 pandemic. Their adaptation response in relation to the global changes in learning methods seem to provide an effective and safe learning environment and help to overcome difficulties with minimal damage. Adaptation to online teaching and learning is not an easy task for academics and students.[19] Although there are many online anatomy software programs available to students, these programs were generally cost-bearing before the COVID-19 crisis.[20] According to our SWOT analysis, the development of new online resources, the increase of

Table 5: Opportunities and challenges of teaching methods developed as an immediate response to COVID-19 pandemic

	Universities												
	1	2	3	4	5	6	7	8	9	10	11	12	Percentage
Opportunities													
Remote study model	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			83.3
Setting ground for including blended learning in future curricula	✓			✓				✓		✓		✓	33.3
Generating alternative examination methods	✓				✓	✓	✓	✓		✓	✓		58.3
Academic collaboration			✓	✓				✓		✓			33.3
Increasing skills in utilizing new technology and resources	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	83.3
Developing new online resources	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		83.3
Free access to online resources	✓			✓									16.6
Challenges													
Decrease in teacher-student interaction	✓	✓	✓	✓		✓	✓		✓		✓		66.6
Being obliged to work from home due to self-isolation and social-distancing rules	✓		✓	✓	✓	✓	✓	✓	✓	✓			75.0
Time constraints	✓			✓		✓		✓	✓	✓		✓	58.3
Reduction in student interaction	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		83.3
Exam-related issues	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	83.3
Insufficiency in practical courses and cadaver practices	✓	✓		✓	✓	✓	✓	✓	✓	✓			75.0
Suspension of the donor program	✓			✓	✓			✓	✓	✓		✓	58.3

Figure 1: A Strength, Weakness, Opportunity, Threat analysis diagram

new technologies and resources and free access to these online resources are important strengths of the pandemic. Theoret and Ming studied the effects of COVID-19 on education in medical schools and reported that the availability of a wide variety of free online resources at our fingertips is reassuring and should be used frequently to promote communication and learning.[21] There were several other pandemics before the COVID-19. Green and Whitburn reported that academics should consider the online resource development and free access to these resources by completing their feasibility studies in the prepandemic period in order to be able to handle the undesirable impacts in the most efficient way.[22] Since self-isolation and social-distancing measures preclude the traditional exam formats, the aforementioned strengths paved the way for the development of alternative examination methods for the assessment of Anatomy courses. According to our results, the introduction of alternative examination methods was another strength; however, these methods are considered less effective than face-to-face examinations. Franchi stated that the impact of the pandemic on assessment methods is a concern for students. Written spotter examination and oral viva are amongst the several modalities that can be used to assess anatomy. However, none of these methods can obviously be used in the current situation.[20] Franchi's study results support the strengths of our SWOT analysis and in this context, it is clearly necessary to develop online objective alternative examination methods.[20]

The weaknesses of the current situation are just as many and as important. Exam-related issues, insufficient practical courses and cadaveric practices, teleworking, and time constraints were the weaknesses of this pandemic according to the departments. Ali *et al*., stated that many higher education institutions were using cadaver dissection-prosection as a traditional method of practical training.[23] They concluded that online assessment methods were not effective in evaluating the trainings in cadaveric and other practical courses.[23] According to Meyer *et al*., one important way to increase the effectiveness of these methods is that the images used in online evaluations should be identical with the ones that were used during teaching the courses. In this context, assessment images need to be carefully and precisely selected.[24]

According to Gewin, developing an efficient response to the COVID-19 pandemic requires at least three times more workload compared to the traditional format.[25] Considering the psychological pressure of the current situations, trying to produce high quality resources while working from home may negatively affect academicians.[25] Therefore, it is necessary to make cost-benefit analysis of the time required to create new resources. This is supported with the results of the study by Mandernach, in which the author concluded that video training does not lead to a measurable improvement in student achievement and is not an efficient method according to cost-benefit analysis.[26]

The COVID-19 pandemic propounded important environmental opportunities according to the Anatomy departments. Remote working model, providing a preparation to include blended learning in future curricula and facilitating academic collaboration were reported to be by far the most important environmental opportunities. Academics are increasing their cooperation across Turkey through various social media platforms.[27] The facilities of the anatomy departments are not the same in every university.

Maican *et al*., stated that developing academic cooperation with universities, especially with those who have small number of academic staff in the anatomy department, is an important opportunity for these universities to increase their competence during the current situation.[28] Undoubtedly, with the widespread use of the distance working model, the development of online communication methods has enabled universities to collaboratively learn many techniques and methods as a result of academic cooperation. These techniques and methods will contribute to increase the efficiency of blended learning in the normalization process and will help update education curriculum.

According to the departments, the reduction in student-student and teacher-student interaction, and the suspension of the donor programs are among the environmental threats. An effective learning process necessitates student-student and teacher-student interaction, support, and social participation. Academicians who are trying to adapt to the new learning methods should consider these needs.[29] Technical issues such as poor internet connections or lack of suitable electronic devices negatively affect student participation. Wimpenny and Savin-Baden emphasized that if the aforementioned needs could not be met, problems such as decreased academic progress and student satisfaction would be inevitable.[29] One of the issues that threatens student satisfaction and should be emphasized during the normalization process is the suspension of the donor programs due to the COVID-19 pandemic. Pather *et al*., stated that the possibility of the donor body being a carrier of COVID-19 virus could be the reason of the suspension.[4] Together with the increased risk of disease exposure, delay in the donor programs will pose a risk for cadaver-based training and blended training models during the normalization process. In this context, donor programs may need to be revised during the normalization process.

This study has some limitations that need to be addressed. First, this study investigates anatomy departments in Turkey. Hence, our results cannot be generalized for all countries. The second limitation is the small sample size which accounts for 19.67% of state universities and 14.63% of all universities in Turkey. It may be useful to compare our results with studies with larger sample sizes.

Conclusion

The COVID-19 pandemic has created several opportunities and challenges. Undoubtedly, Anatomy training will need revisions in the normalization process. Results of SWOT analysis are thought to be a guide for the departments during the revision process. According to the results of the present study, developing skills in utilizing new technologies and resources, developing new online resources, developing alternative examination methods and free access to online resources are the strengths. These strengths will enrich the teaching techniques and curricula of Anatomy departments in the post-COVID-19 period. Exam-related concerns, having to work from home due to curfew, self-isolation and social-distancing measures, insufficiency in practical courses and cadaver practices, and time restrictions are the weaknesses. Anatomy departments can develop various action plans, taking into account these weaknesses. The COVID-19 process also offers important environmental opportunities such as teleworking model, the preparation and opportunity for including blended learning in future curriculum programs, and academic collaboration. All these opportunities have paved the way for universities to learn many techniques and work together. It is a guiding period especially for departments with small number of academic staff. Environmental threats of the pandemic are reduction in student-student and teacher-student interaction and suspension of the donor programs. The latter is considered an important risk factor for practical courses. The negative effects of these environmental threats need to be analyzed separately from the teacher and student perspective. In this context, various post-normalization feedback applications may be useful to minimize negative effects.

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Conflicts of interest

There are no conflicts of interest.

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