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Original Article

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Online Teaching and its challenges faced by Anatomists in Pakistan: A post-pandemic perspective

Fatima Inam [a], Alvia Batool [b], Muhammad Shahid Akhtar [c], Hafiza Sadia Ahmed [d], Fariha Qureshi [c], Fauzia Qureshi [a]

[a]*Associate Professor, Department of Anatomy, Akhtar Saeed Medical and Dental College, Lahore.*
[b]*Associate Professor, Department of Anatomy, Fatima Memorial Medical and Dental College, Lahore.*
[c]*Associate Professor, Department of Anatomy, King Edward Medical University, Lahore.*
[c]*Assistant professor, Department of Anatomy, University College of Medicine and Dentistry, The University of Lahore, Lahore.*
[d]*Professor, Department of Anatomy, Akhtar Saeed Medical and Dental College, Lahore.*

Correspondence: dr.fatima74@yahoo.com*

ABSTRACT

BACKGROUND & OBJECTIVE: Medical teachers in Pakistan lacked the concept of online teaching and had to adapt with limited resources and experience during the COVID-19 pandemic. They were also lacking the necessary IT skills and computer literacy. This study aims to access the different types of online teaching methods, explore computer literacy, and identify the challenges and opportunities faced by the teachers of anatomy to assess the success of online teaching.

METHODOLOGY: An online survey gathered data from n=80, anatomy teachers on demographic factors, prior online teaching experience, teaching methods, IT skills, and perceptions of online teaching challenges and benefits. Responses were analyzed using frequencies and percentages. The Chi-square and Fisher's exact tests were employed to explore relationships between dependent and independent variables.

RESULTS: The study found that 17.5% of anatomy teachers had prior online teaching experience, with Zoom being the preferred app for 54% of respondents. A mix of synchronous and asynchronous teaching was favored by 48.75%. Most teachers reported IT skills above 70-80%. Teaching gross anatomy was cited as the biggest challenge by 74% of participants. Statistical analysis revealed no significant difference in app preference between junior and senior faculty ($p > 0.05$).

CONCLUSION: Teachers of anatomy in Pakistan faced many difficulties in online teaching during the pandemic which is evident by this study conducted in post-pandemic time but did their best to deliver lectures using the resources available and minimal training.

KEYWORDS: online learning, Anatomy, Teaching.

INTRODUCTION

With the shutdown of the world amid the pandemic, we have suffered a huge blow to our educational systems. Institutions from schools to colleges and universities had closed down [1]. These Institutions had to adopt virtual means of learning to continue the education of their students [2]. In an international survey, conducted in 45 countries medical students reported a significant decline in face-to-face lectures, tutorials, and ward-based teaching sessions. Significant students reported even postponement of exams [3].

Although in the past, some institutions had already been teaching through the virtual world of the internet through a well-established concept which is known as blended learning, [4,5,6] it is an entirely new experience to others, to which they are not used to yet [7]. In terms of medical education, some medical schools around the world have already been teaching partially through the Internet. But the same cannot be said for the medical schools in Pakistan. Although some universities had been offering online courses, the medical colleges and universities in the government and other private sectors had no concept of online learning before 2020. So, when

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all the institutions were forced to shut down during the pandemic, they also had to start teaching online with insufficient online teaching resources and experience [8].

Computer literacy and IT skills are indeed important for teachers in medical colleges, as technology is becoming increasingly integrated into healthcare and medical education. However, it is often the case that these skills are not emphasized or prioritized in medical education programs, and as a result, many medical teachers may not have the necessary level of proficiency in IT [9]. Computer literacy /IT skills are rarely surveyed among the teaching staff in medical colleges. Although little data is available suggests that there is great room for improvement needed in developing the I.T skills of medical teachers [10].

Medical education, particularly in the subject of anatomy, has increasingly incorporated online learning through a variety of sources. These include YOUTUBE channels, Zoom and Socorative.com, Facebook groups, Microsoft Teams, etc. [11,12]. Also in recent times, the availability of cadavers for teaching gross anatomy has reduced worldwide but this has mostly been replaced by models, manikins, and 3D visualization technologies [13] so the impact of the mode of learning and teaching gross anatomy remotely without a physical appreciation of structures is still under investigation [14,15]. Also, there is little data about the tools used and proficiency to teach online anatomy in Pakistan as unseen calamities can occur in the future [16].

This study aims to access the different types of online teaching modes adopted by teachers especially in gross anatomy in times of crisis, to explore the computer literacy of the faculty of the anatomy of various medical colleges in various provinces of Pakistan, and to identify the challenges and opportunities faced by the teachers of anatomy in order to access the success of online teaching in anatomy.

METHODOLOGY

This analytical study utilized a non-probability convenience sampling method. Ethical approval was obtained from the Institutional Review Board (IRB) of Akhtar Saeed Medical and Dental College, Lahore (IRB approval no. M-23/105/-Anatomy). Participation was voluntary, and the study involved professors, associate professors, assistant professors, senior demonstrators, and demonstrators who expressed willingness to participate through a WhatsApp group. Their participation was purely voluntary and was kept anonymous.

The filling of forms was taken as informed consent. Incomplete forms were excluded from the study. Only the filled forms were included in the study. The responses were expressed as frequencies and percentages. The chi-square test and Fisher exact test were used to find out the relationship between dependent factors and independent factors. A p-value of ≤ 0.05 was considered statistically significant. The collected data was entered and analyzed using SPSS 26 software. The study period was from February to June 2023.

Demographic factors like age, gender, qualification and designation, institution whether public or private, province, Area of institution whether rural or urban, years of teaching, prior experience, prior experience of online teaching, and online teaching method were recorded. The domains for checking the I.T skills were: 1) word processing skills; 2) internet /web skills; 3) multimedia skills; 4) email skills; and 5) access to a computer [9].

They were assessed by a self-reported survey. Online software or medium used for teaching was recorded. Challenges faced by teachers in switching to online/distant learning were recorded. Also, the perks or benefits of online/ distant learning were recorded. Also, the participants were asked about the format of the online course and how they overcame the lack of physical exposure to cadavers during the teaching of gross anatomy. Overall, what was their level of satisfaction with the effectiveness of teaching was assessed.

RESULTS

Age and gender :

The age of faculty members ranged from 25-70 years. Out of a total of 80 respondents, the majority of teachers were aged between 36-45 years 35 (43.8%). This was followed by 19 (23.8%) in the 25–35 age bracket. Teacher's number in the 46–55 years age group was 17 (23.1%), and beyond 56 were 9 (11.3 %). Of the total teachers surveyed 80% were female (64/80) and 20% were male (16/80).

Information regarding the qualifications, designations, teaching experiences, and location of the medical college is given in Table 1 with frequencies and percentages.

Prior experience of online teaching:

Of the total participants, 14(17.5%) reported having prior experience of individual online teaching of anatomy. Among the participants, 3 (21%) were demonstrators, 1 (7%) held the position of senior demonstrator, and 1 (7%) was an assistant professor. Additionally, 2 (14%) participants were associate professors of anatomy, and 1 (7%) held the rank of professor. It was observed that younger faculty members were more likely to have prior experience with online teaching. Online teaching by their institute was reported by only 9(11.3%) participants. However, there was no statistically significant difference between the public and private institute in implementing the online teaching prior to Covid 19 period. p value ≥ 0.54. only 3 public and 9 private institutes were teaching online prior to Covid. While 17 public and 51 privates were having no prior experience of online teaching.

Online software used for teaching:

The teachers overwhelmingly preferred Zoom as the most common online software, with 52 participants selecting it (Table 2). The statistical analysis showed no significant difference in preference for the usage of the Zoom app, google classroom, WhatsApp, Doodle, YouTube, Microsoft team with p value 0.736*, 0.467**, 0.703*, 1.000*, 0.190* and 0.879** respectively among junior and senior faculty (Table 2).

Table-I:Background personal characteristics of the anatomy teachers, n=80.

Variables	Characteristics	n(%)
Qualification	MBBS	25(31.25)
	MBBS, MPhil	48(60)
	MBBS, FCPS	1(1.25)
	MBBS, MPhil, PhD	6(7.5)
Designation	Demonstrator	21(26.3)
	Senior Demonstrator	9(11.3)
	Assistant professor	14(17.5)
	Associate professor	17(21.3)
	Professor	19(23.8)
Teaching experience in years	0-5	25(31.3)
	6-10	17(21.3)
	11-15	14(17.5)
	beyond 15 years	24(30.0)
Area of Pakistan	Punjab	67(83.75)
	Sindh	6(7.5)
	KPK	5(6.25)
	Baluchistan	2(2.5)
Location of medical college	Urban	69(86.3)
	Rural	11(13.8)
Sector	Private sector	60(25)
	Public sector	20(75)

Table-II:Multiple software used by the participants n=80.

App used by faculty	Response	Junior faculty Demonstrator and senior demonstrator n(%)	Senior faculty Assistant, associate and professors n(%)	P-valve
Google classroom	No	27(90)	43(86)	0.736*
	Yes	3(10)	7(14)	
Zoom	No	9(30)	19(38)	0.467**
	Yes	21(70)	31(62)	
WhatsApp	No	28(93.3)	44(88)	0.703*
	Yes	2(6.7)	6(12)	
Doodle	No	28(93.3)	47(94)	1.000*
	Yes	2(6.7)	3(6)	
YouTube	No	26(86.7)	48(96)	0.190*
	Yes	4(13.3)	2(4)	
Microsoft team	No	25(83.3)	41(82)	0.879**
	Yes	5(16.7)	9(18)	

***P-value calculated by fisher exact test**
**** P-value calculated by chi square test**

Table-III:Faculty preference for Online method of Teaching.

Method of online teaching	Junior faculty Demonstrator and senior demonstrator n(%)	Senior faculty Assistant, associate and professors n(%)	P-valve
Synchronous	16(45.7)	19(54.3)	0.063**
Asynchronous	4(66.7)	2(33.3)	
Mix method	10(25.6)	29(74.4)	

** P-value calculated by chi-square test

Online teaching method preferred by faculty:
Out of all the respondents, 39 indicated that they utilized a combination of synchronous and asynchronous methods for online teaching. Additionally, 35 respondents reported using only synchronous methods, while only 6 teachers chose to use asynchronous methods. In terms of the participants' designations and their preferences for teaching methods, there was no statistical difference (p-value 0.063) (Table III). Also, no statistical difference between males and females and age of the participants regarding the preference of teaching was observed (p-value 0.421 and 0.688) respectively (Table IV and V)

Table-IV:Gender preference of Online method of Teaching.

Method of online teaching	Male	Female	P-valve
Synchronous	7 (43.8)	28(43.8)	0.421**
Asynchronous	0(0.0)	6(9.3)	
Mix method	9(56.2)	30(46.9)	

** P-value calculated by chi-square test

Table-V:Age preference for online method of teaching.

Method of online teaching	Less than or equal to 45	More than or equal to 46	P- value
Synchronous	23(41.8)	12(48)	0.688**
Asynchronous	5(9.1)	1(4)	
Mix method	27(49.1)	12(48)	

** P-value calculated by chi-square test

Computer literacy among anatomy teachers:
Internet /web skills: There was no statistical difference among the faculty by designation regarding the ability to use the internet or web skills (p-value ≤ 0.886) Among the demonstrators, 85% possessed internet/web browsing skills and were proficient in searching various engines. Additionally, 76% of them were able to download and save files from browsers. Among the senior demonstrators, 77% demonstrated proficiency in performing all three tasks. As for assistant professors, 82% could use a web browser, 78% could utilize search engines, and 100% were capable of downloading and saving files. Among associate professors, 82% had web browsing and search engine skills, while 94% could download and save files. Professors reported that 84% of their population had browsing skills, 73% could effectively use search engines, and 94% were capable of downloading and saving files.

Multimedia skills:
There were no statistical differences among faculty in the usage of PowerPoint presentations and inserting graphics (p-value ≥ .245 and ≥.731 respectively). Only 2 questions were asked about the multimedia skills. The questions were about the use of PowerPoint for presentation and inserting the graphics into PowerPoint files. 78 (98%) answered positively about the usage of the PowerPoint for presentation. While 2 (2%) could not use PowerPoint presentations. Inserting the graphics into the PowerPoint looked harder than using the PowerPoint presentation. Fewer participants found this task comfortable. To be precise, 66 out of 78 individuals (82%) managed to include graphics in the PowerPoint presentation, while 15 out of 78 (18%) were unable to do it.

Email skills:
74(92%) of faculty members knew how to compose email. 6(7%) do not know how to compose email. There is also no statistical difference between the senior and junior Staff (p-value≥0.51) and among various age groups. (p-value≥0.66) Among the 80 faculty members, 76(94%) knew how to reply to an email. 5(6%) do not know how to reply to email. There is no statistical difference among the senior and junior staff and different age groups (p-value≥ 0.43).

Challenges faced by teachers of anatomy during online teaching of anatomy:
The teachers faced various challenges in teaching anatomy. Among them, 74% (n=59) found it difficult to teach gross anatomy online. Additionally, 70.90% (n=56) reported that the lack of face-to-face contact with students posed a challenge. For 63.30% (n=50) of participants, maintaining student interest was sometimes problematic. Teacher access to technology was stated as a challenge by 54.40% (n=43), while 46.80% (n=37) found the involvement of campus administration in online teaching to be challenging. Work-life balance was a challenge for 45.60% (n=36) of teachers. Furthermore, 43% (n=34) mentioned that the effective participation of students in online classes posed a challenge for 30.40% (n=24).

Lastly, 25.30% (n=20) expressed that online teaching was more time-consuming compared to classroom teaching. Bivariate analysis showed no significant association between junior and senior faculty and challenges faced during online teaching.

How you overcome the lack of physical exposure to cadavers:
Most participants n=39 overcame this obstacle by showing videos of cadavers, bones, and models. n=22 used online 3D and 4D models and atlases for explaining gross anatomy. n=16 showed diagrams and pictures to explain the structure. n=8 said there was no alternative.

Perks of online distance learning: Work from home and flexible working hours were the most common advantages the participants reported n=60 and n=50 respectively. n=42 reported less administrative work was a relief for them. The wide range of software available was an advantage mentioned by n=35. n=29 reported that going online provided them with the opportunity to earn more by tutoring. n=15 was of the view that individual interaction with the students was an advantage. Bivariate analysis of designation showed no significant association. (Table-VII)

Table-VI:Analysis of designation with the challenges faced by faculty.

Challenges faced by faculty	Response	Junior faculty	Senior faculty	P-valve
Teacher's access to technology	No	13(43.4)	24(48)	0.685
	Yes	17(56.6)	26(52)	
Time resources needed to prepare the study material	No	14(46.6)	32(64)	0.129
	Yes	16(43.4)	18(36)	
Communicating with the students	No	12(40)	23(46)	0.600
	Yes	18(60)	27(54)	
Student access to participate effectively in online classes	No	18(60)	38(76)	0.131
	Yes	12(40)	12(24)	
Unable to maintain student interest at times	No	9(30)	21(42)	0.283
	Yes	21(70)	29(58)	
Lack of face-to-face contact with students	No	18(26.7)	16(32)	0.614
	Yes	22(73.3)	34(68)	
The campus administration's involvement in online teaching	No	17(56.6)	26(52)	0.685
	Yes	13(43.3)	24(48)	
Online teaching is more time-consuming	No	22(73.3)	38(76)	0.790
	Yes	8(22.7)	12(24)	
Work-life balance	No	17(56.6)	27(54)	0.816
	Yes	13(54.4)	23(46)	
Teaching gross anatomy	No	8(26.7)	13(26)	0.598
	Yes	22(73.3)	27(74)	

Table-VII:Analysis of designation with the perks of online distance learning.

Perks of online distance learning	Response	Junior faculty	Senior faculty	P-valve
Flexible work hours	No	11(36.6)	19(38)	0.905
	Yes	19(64.4)	31(62)	
Work from the comfort of home	No	7(23.3)	13(26)	0.790
	Yes	23(72.7)	37(74)	
Less administrative work	No	18(60)	20(40)	0.083
	Yes	12(40)	30(60)	
Opportunities for teachers to earn more from online tutoring websites	No	18(60)	33(66)	0.589
	Yes	12(40)	17(44)	
Individual interaction with students	No	25(83.3)	40(80)	0.712
	Yes	5(16.7)	10(20)	
Wide range of software	No	16(53.3)	29(58)	0.684
	Yes	14(46.7)	21(42)	

How effective your online teaching was:

When asked about the effectiveness of online teaching, the majority of participants (n=38) expressed a neutral opinion. Twenty-five participants found it moderately effective, while six believed it was the most effective. Eight participants considered it the least effective, and only three out of 80 thought it was ineffective.

DISCUSSION

Before COVID COVID-19 pandemic, most medical institutions in the world, including Pakistan, relied upon classroom setups for teaching anatomy, such as lectures, lab classes, and dissection classes. This pandemic provided medical teachers with a unique chance to opt for teaching their subjects online. As a result of the pandemic, face-to-face classes in anatomy were suspended, and a rapid transition to virtual teaching occurred. As in other countries, the majority of medical teachers in Pakistan were not ready for this unexpected transition to virtual from campus-based teaching, with no prior planning and faculty training, especially in the subject of anatomy where the real feel of the tissue or organ is necessary [17]. Therefore, both the students and faculty faced many challenges while engaging in the online teaching of anatomy [18].

In our study, only 17.5% of the anatomy faculty had prior experience of online teaching. It was noted that the younger age group faculty members had experience with online teaching prior to the pandemic. In a similar study conducted at Sorbonne University in Paris on online medical education, it was found that 19% of its faculty had prior experience with online teaching. Similarly, 14% of anatomy teachers in medical institutions in Turkey were involved in online teaching before the COVID-19 pandemic [2].

Prior to the COVID-19 pandemic, the experience of online teaching of anatomy individually by teachers was reported by 17.5% of total participants (n=14) out of 80 participants. In a study conducted at Al Faisal University Riyadh, Saudi Arabia, 57.9% of the faculty members who participated in the research had any prior experience in online teaching which included both preclinical and clinical classes [19]. In a study involving participants from four universities in the southeastern United States across various disciplines, including nursing (14.1%), business (12.3%), biology (6.4%), and kinesiology (6.4%), it was reported that 36.5% of their faculty members had no previous experience in online teaching [20].

The most popular app used for teaching anatomy in our study was Zoom. Zoom is a convenient video conferencing platform that allows its users to communicate online with audio, video, and chat[21]. It became popular among teachers due to its user-friendly nature and its compatibility across all devices. Moreover, Zoom also provides easy services like recording the online session and also allows users to schedule meetings. It also facilitates team-teaching by allowing more than one host and giving all of the hosts administrative capabilities, such as sharing screens and remote control over shared screens. Screen sharing allows the individual to convey concepts and topics to students using different books, videos, and simulation software, which in some cases, can be a more productive way of teaching as compared to face-to-face teaching, with students grasping the concepts effectively. A study conducted on undergraduate medical students regarding their anatomy learning experience showed that 89% of students gave satisfaction regarding the learning of anatomy except the gross anatomy [22].

Most of the respondents in our study used asynchronous and synchronous methods of online anatomy teaching simultaneously as it allows for flexible access to course materials, personalized learning, increased student engagement, and active participation in the subject matter. Yadav et al in 2021 showed synchronous method of online teaching was preferred by the majority of the MLT students in the subject of medical biostatistics students aided by the significant examination scores [23]. A study conducted on Ottawa University students taking the musculoskeletal and reproductive modules revealed that students preferred the asynchronous method of teaching more further adding that it should be combined with the synchronous method [24].

The most common challenge faced by the teachers in our study was to teach Gross anatomy online. In a subject like Gross anatomy, which typically involves hands-on learning and the use of physical models and specimens, the absence of in-person interaction posed difficulties for both the instructors and the students [25]. Teachers found it challenging to effectively demonstrate anatomical structures and provide real-time guidance without the ability to physically interact with the students. Similarly, students faced obstacles in comprehending three-dimensional spatial relationships and developing their practical skills without the hands-on experience offered by traditional classroom settings [26]. As a result, innovative approaches such as virtual dissection software, interactive anatomy apps, and virtual reality simulations were explored to bridge this gap and enhance the online learning experience for both teachers and students [27].

Our study showed that the work-life balance was a challenge for 45.60% (n=36) of teachers. A study by Onal and Dula found that teachers had trouble keeping their work life separate from their personal life and finding a good balance between the two. They faced challenges like not having enough space to work, having unpredictable hours, feeling like they weren't doing a good job, dealing with problems at school, and having conflicts with their families [28].

25.30% (n=20) expressed in our study that online teaching was more time-consuming compared to classroom teaching. This was also reported by a study done by Gurung S. that out of 430 Respondents, 62.7 % of the respondents agreed that more time is required to prepare their content for online teaching than a regular physical class [29].

Other challenges reported mostly by the participants in our study were lack of face-to-face contact with students and maintaining student interest during online learning. In a study conducted on medical students at an Indian Institute of Medical Sciences about 65% of students reported learning anatomy was difficult without face-to-face interaction. furthermore, most faculty members in most countries before the pandemic neither had any formal training for online education nor were aware of the dynamics of live online interaction with the students. They find it challenging to engage the students [30].

Work from home and flexible working hours were the most common advantage the participants reported in our study. The findings of this study support existing evidence that most lecturers considered time flexibility an advantage of online teaching [31].

Some participants viewed individual interaction with students as an advantage. Even shy students who usually remained silent in class were engaging. A study conducted by the Lecturers noted that many students actively used discussion forums and WhatsApp to participate in discussions, replacing face-to-face learning. Often, students felt less inhibited behind keyboards, leading to more open and free participation in discussions[32].

Regarding the effectiveness of online teaching, our study showed that the majority of participants (n=38) expressed a neutral opinion. n=25 participants found it moderately effective, while n=6 believed it was the most effective. n =8 participants considered it the least effective, and only n=3 out of 80 thought it was ineffective. A study conducted at the

University of Lahore, also endorsed that participants were undecided about the favorability of a shift to online teaching [17].

CONCLUSION

The COVID-19 pandemic necessitated a quick shift from traditional classroom-based anatomy teaching to online platforms in medical institutions, including Pakistan. This was a challenge for faculty and students, as most teachers were unprepared for online teaching, particularly in anatomy which requires hands-on learning. Zoom was the preferred app for online anatomy teaching, offering convenient video conferencing and recording features. Both synchronous and asynchronous teaching methods were used to provide flexibility and engagement. The main challenge reported by teachers was effectively teaching Gross anatomy online without physical interaction. To overcome this, virtual dissection videos, interactive anatomy apps, and online Atlas were used.

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Fatima Inam: Substantial contributions to the conception and design of the work.
Alvia Batool: Acquisition of data for the work.
Muhammad Shahid Akhtar: Drafting the work.
Hafiza Sadia Ahmed: Analysis and interpretation of data for the work
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