

# A Comparative Analysis of Students' Level of Satisfaction Regarding Online versus On-Campus Learning in the Subject of Anatomy

Kiran Kamran, Ruqia Shafi, Hina Kundi, Saima Sohail

## ABSTRACT

**Objective:** To compare the perceptions of students about online versus on-campus teaching in the subject of Anatomy and to analyze the difference in the performance of students in assessments after on-campus and online teaching.

**Methodology:** A cross-sectional survey was carried out with the help of a closed-ended validated questionnaire provided to first and second year MBBS students. The on-campus assessment was taken at end of face to face and online teaching to compare the performance of students after the use of both teaching modalities. Data collected was analyzed by using Statistical Package for the Social Sciences (SPSS) version 26.

**Results:** A total of 208 MBBS students participated in the study. Among these students, 103 were first year MBBS and 105 were second year MBBS students. Sixty nine (67%) first year students were females and 34(33%) first year students were males. Among second year, 71(67%) were females and 34(32%) were male students. Regarding online teaching, 52% students of 1<sup>st</sup> year MBBS were satisfied, 26.4% were dissatisfied, and 21.6% had neutral responses. While 50.3% students of 2<sup>nd</sup> year MBBS were satisfied, 30.1% were dissatisfied, and 19.6% had neutral responses. The pass percentage of first year MBBS class after online teaching was 58% and after on-campus teaching, it was 67%. The pass percentage of second year MBBS after online teaching was 70% and after on-campus teaching, it was 75%.

**Conclusion:** Most of the students were not satisfied with online teaching. The subject of Anatomy is difficult to grasp through online teaching but effective use of videos, digital photographs, and synchronous teaching can facilitate students in achieving the desired concepts.

**Keywords:** *Online learning, On-campus learning, Anatomy.*

## INTRODUCTION

The COVID-19 pandemic has disrupted the education system and forced us to find new ways to address the teaching and learning crisis. A change occurred from conventional teaching and learning to online educational activities to ensure the safety of students, teachers, and related staff. These online activities were required for the sustainability of teaching, and learning processes at different levels of education including medical colleges.<sup>1</sup> In medical education, online learning can be a more effective and easier way, especially in uncertain global situations such as pandemics.<sup>2</sup> The success of online learning depends on many factors including availability and accessibility of appropriate equipment, methods of delivering, the course content, and assessment criteria. Online learning, like other methods of teaching, has benefits as well as shortcomings for both students and teachers.<sup>2</sup>

A face to face teaching set-up provides immediate feedback to faculty members and students about the understanding of the lesson and ways of its delivery. Moreover, questions and comments from fellow

students can assist in learning. Direct observation of the student's response allows the faculty member to immediately adjust the teaching method and its pace. Online education does not provide these same clues and the teacher and students must count on written responses or feedback.<sup>3</sup>

In Pakistan, online learning has never been considered as a part of formal education by a majority of medical institutions until the spread of COVID-19.<sup>4</sup> The administrators and teachers of medical colleges took all necessary measures to conduct effective online learning via lectures and small group discussions like demonstration, practical, and case-based learning. Also, various software for online teaching are being explored by teachers to meet this challenge and to deliver the teaching material.<sup>5</sup> Anatomy is a labor-intensive subject in which students have to memorize anatomical terms and hardcore facts. The concepts are acquired by studying bones, 3-D models, histological slides, and cadaveric specimens during face to face sessions which enhance and facilitate understanding and learning of the subject.<sup>6</sup>

As online teaching methodology is newly adapted, both teachers and students are still in the process of getting accustomed to this system so it is essential to find out students' views regarding this method of teaching and learning in the subject of Anatomy.<sup>7</sup> It will be of interest to analyze whether the students are adjusted to learning Anatomy through online classes or if they want any modifications. Therefore, the purpose of this study was to achieve a comparative analysis of students' perceptions regarding online versus on-campus

*Sharif Medical & Dental College, Sharif Medical City,  
Sharif Medical City Road, Off Raiwind Road, Jati Umra,  
Lahore 54000, Pakistan.*

*Correspondence: Dr. Hina Kundi  
Associate Professor Department of Anatomy  
Fazaia Medical College, Air University, Islamabad  
E-mail: drhinazaid@gmail.com*

*Received: October 7, 2022; Accepted: November 26, 2022*

learning in the subject of Anatomy and to measure the performance of students after the use of both online and on-campus teaching modalities. The study will be helpful in identifying & addressing the weak points so that online teaching can be more effective and meaningful.

### METHODOLOGY

It was a cross-sectional study performed at Fazaia Medical College, Air University, Islamabad from July to November 2021. A total of 208 MBBS students participated in the study. Among these students, 103 were first year MBBS and 105 were second year MBBS students. The identity of students was not revealed. Students who were absent at the time of data collection were excluded from the study. The sampling technique used was probability sampling. All the participants were briefed about the basic concept behind the study before providing the questionnaire. Written informed consent was taken from every participant. The study was approved by the institutional ethical review board. For this study, a self-constructed questionnaire was used having a total of 25 close-ended questions. A pilot study was conducted to validate the questionnaire. Nine questions were concerned with on-campus and 15 were related to online teaching. Percentages and frequencies were calculated for the answers given against each question as per the Likert scale. One & 2 were taken as highly dissatisfied (strongly disagree & disagree), 4 & 5 were taken as satisfied (strongly agree & agree) and 3 was considered as uncertain. Another variable of the study was the assessment of students after online and on-campus teaching to compare the difference in performance among students after using two different teaching modalities.

### STATISTICAL ANALYSIS

Data was analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Frequency & percentage were calculated for categorical data like gender & satisfaction of students. Chi-square was applied to analyze the difference between the performances after online and on-campus teaching. A p-value  $\leq 0.05$  was considered significant.

### RESULTS

Out of 103 first year MBBS students, 69(67%) were females and 34(33%) were males. Among second year, 71(67%) were females and 34(32%) were male students. Regarding on-campus teaching, 82.3% students of 1<sup>st</sup> year MBBS were satisfied, 8.4% were dissatisfied, and 9.3% had a neutral response. Whereas 81.7% students of 2<sup>nd</sup> year MBBS were satisfied, 9.4% were dissatisfied, and 8.9% had a neutral response (Table 1).

Regarding online teaching, 52% students of 1<sup>st</sup> year MBBS were satisfied, 26.4% were dissatisfied, and 21.6% had neutral responses. While 50.3% students of 2<sup>nd</sup> year MBBS were satisfied, 30.1% were dissatisfied, and 19.6% had neutral responses (Table 2).

To assess and compare the performance after on-campus and online teaching in the subject of Anatomy, the results of two end of block examinations were analyzed. The pass percentage of first year MBBS class after online teaching was 58% and after on-campus teaching, it was 67%. The pass percentage of second year MBBS after online teaching was 70% and after on-campus teaching, it was 75% (Table 3).

### DISCUSSION

This study was primarily focused on face to face versus online teaching and learning of students of Fazaia Medical College in the subject of Anatomy. This study showed that 92.2% of 1<sup>st</sup> year and 94.3% of 2<sup>nd</sup> year MBBS students agreed that on-campus face to face teaching is more beneficial, as it is easy for them to understand and retain the bones and models during face to face sessions. Student-teacher interaction was found more effective during on-campus classes as compared to online sessions which is another reason students (89.3% 1<sup>st</sup> year and 85.7% 2<sup>nd</sup> year MBBS students) preferred this system over online learning. Baczek et al. also showed less effective interaction between students and facilitators during e-learning. The attention span and concentration towards lectures are better in on-campus teaching as students find it easier to ask questions there and then clear all the queries and confusions about the topic.<sup>8</sup> Our results are comparable with the research conducted by Barrot et al., in 2021 which raised concerns that lack of face to face study leads to unfavorable effects on students' learning along with communication and socializing skills.<sup>9</sup> One of the reasons for this response could be that there is more distraction while studying online from home along with a lack of knowledge and training in technology. The cause of distraction could also be due to the lack of college academic environment, eye to eye contact with instructors, and effective interaction with peers during online classes.<sup>10,11</sup> Subsequently, 76.7% of 1<sup>st</sup> year and 69.5% of 2<sup>nd</sup> year students felt less motivated in online teaching in the current study. The lack of extra-curricular activities like sports, dramatics, and other cultural events may also be a reason for demotivation and lack of interest.

In our study, it was identified that our students were not satisfied with their computer knowledge and IT skills which is a basic necessity for online learning. Although 61.2% of 1<sup>st</sup> year and 79% of 2<sup>nd</sup> year MBBS students accepted the availability of sufficient equipment and facilities required for e-learning, lack of digital literacy and technical expertise impeded the educational

**Table 1: Level of Satisfaction of First & Second Year MBBS Students Regarding On-Campus Teaching**

Sr. No.	Questions Regarding On-Campus Teaching	Student Response	First Year MBBS n=103	Second Year MBBS n=105
1	Traditional on-campus face to face teaching is more beneficial than online teaching for the subject of Anatomy.	Agree	95(92.2%)	99(94.3%)
		Neutral	5(4.9%)	4(3.8%)
		Disagree	3(2.9%)	2(1.9%)
2	Teaching and demonstration of bones and Anatomy models were difficult to grasp in online sessions compared to face to face sessions.	Agree	100(97.1%)	93(88.6%)
		Neutral	3(2.9%)	8(7.6%)
		Disagree	0(0%)	4(3.8%)
3	On-campus lectures are more interesting and innovative than online lectures for the subject of Anatomy.	Agree	86(83.5%)	94(89.5%)
		Neutral	15(14.6%)	7(6.7%)
		Disagree	2(1.9%)	4(3.8%)
4	On-campus teaching created more effective interaction with teachers compared to online teaching.	Agree	92(89.3%)	90(85.7%)
		Neutral	8(7.8%)	10(9.5%)
		Disagree	3(2.9%)	5(4.8%)
5	The facility to ask questions or clear doubts during on-campus face to face lectures is much more convenient.	Agree	81(78.6%)	86(81.9%)
		Neutral	16(15.6%)	16(15.2%)
		Disagree	6(5.8%)	3(2.9%)
6	Attention span and concentration towards the lecture and teacher are markedly reduced during on-campus classes.	Agree	33(32%)	32(30.5%)
		Neutral	16(15.5%)	17(16.2%)
		Disagree	54(52.5%)	56(53.3%)
7	The study of Anatomy is much more interesting with the models and bones in the hand.	Agree	95(92.2%)	98(93.3%)
		Neutral	6(5.9%)	4(3.8%)
		Disagree	2(1.9%)	3(2.9%)
8	Some very basic terminology and concepts are easy to explain in face to face learning.	Agree	92(89.3%)	91(86.7%)
		Neutral	9(8.8%)	9(8.5%)
		Disagree	2(1.9%)	5(4.8%)
9	This academic year was a hybrid of on-campus and online learning methods. On-campus learning of the subject was easy to grasp and long-lasting.	Agree	89(86.4%)	89(84.8%)
		Neutral	8(7.8%)	9(8.7%)
		Disagree	6(5.8%)	7(6.7%)

capabilities of many students. If we are unable to come up with students' expectations regarding online studies, it will have a negative effect on students' learning.<sup>12</sup> During online learning two modalities were used. Initially, prerecorded Anatomy lectures were shared with students and later on synchronous teaching was also performed. Students showed a positive response towards synchronous teaching as compared to prerecorded sessions since synchronous teaching provides an opportunity to interact with the teacher at the time of learning to clarify and grasp the concepts of Anatomy. In contrast to our findings, a research conducted at Ottawa university showed that though medical students had a slight preference for asynchronous as compared to synchronous Anatomy

learning, they were generally satisfied with both modalities for various Anatomy courses.<sup>13</sup> A research conducted in the year 2021 in the UK found that students preferred a hybrid method of teaching, including live interactive lectures as well as prerecorded sessions, but on-campus lectures were preferred over any teaching modality.<sup>14</sup> In another study, when two forms of instructional strategies (both prerecorded and online sessions) were compared, students not only showed strong agreement for prerecorded lectures for the flexibility and convenience to study from audio/video recordings but they also showed a lack of motivation in learning from video lectures and excessive workload accumulation specially before exams.<sup>15</sup> In a question, regarding the

**Table 2: Level of Satisfaction of First & Second Year MBBS Students Regarding Online Teaching**

Sr. No.	Questions Regarding Online Teaching	Student Response	First Year MBBS n=103	Second Year MBBS n=105
1	Do you have sufficient computer knowledge and IT skills to manage your online learning?	Agree	56(54.4%)	80(76.2%)
		Neutral	32(31.1%)	18(17.1%)
		Disagree	15(14.5%)	7(6.7%)
2	Do you have sufficient equipment and facilities (computer/laptop/internet/software) to participate in online lectures?	Agree	63(61.2%)	83(79%)
		Neutral	29(28.2%)	12(11.5%)
		Disagree	11(10.6%)	10(9.5%)
3	Online lectures are more interesting and innovative than traditional/live classroom lectures for the subject of Anatomy.	Agree	13(12.6%)	12(11.4%)
		Neutral	20(19.4%)	25(23.8%)
		Disagree	70(68%)	68(64.8%)
4	Online teaching created more effective interaction with teachers compared to on-campus face to face teaching.	Agree	14(13.6%)	13(12.4%)
		Neutral	26(25.2%)	18(17.1%)
		Disagree	63(61.2%)	74(70.5%)
5	The facility to ask questions or clear doubts during online lectures is much more convenient.	Agree	23(22.3%)	13(12.4%)
		Neutral	36(35%)	31(29.5%)
		Disagree	44(42.7%)	61(58.1%)
6	Studying through e-learning mode provides flexibility to study at a time convenient to the learner.	Agree	50(48.5%)	44(41.9%)
		Neutral	25(24.3%)	26(24.8%)
		Disagree	28(27.2%)	35(33.3%)
7	Attempting an assessment after online teaching is convenient as compared to an assessment taken after on-campus face to face learning.	Agree	20(19.4%)	20(19%)
		Neutral	22(21.4%)	26(24.8%)
		Disagree	61(59.2%)	59(56.2%)
8	Do you feel the deficiency of online resource material?	Agree	34(33%)	41(39.1%)
		Neutral	38(36.9%)	23(21.9%)
		Disagree	31(30.1%)	41(39%)
9	You missed live models and histology laboratory sessions.	Agree	72(69.9%)	69(65.7%)
		Neutral	13(12.6%)	14(13.3%)
		Disagree	18(17.5%)	22(21%)
10	Learning embryology without models is more difficult.	Agree	89(86.4%)	73(69.5%)
		Neutral	8(7.8%)	17(16.2%)
		Disagree	6(5.8%)	15(14.3%)
11	Live online classes are more beneficial compared to prerecorded lectures.	Agree	50(48.5%)	57(54.3%)
		Neutral	22(21.4%)	12(11.4%)
		Disagree	31(30.1%)	36(34.3%)
12	There is always an element of distraction.	Agree	76(73.8%)	71(67.6%)
		Neutral	22(21.3%)	25(23.8%)
		Disagree	5(4.9%)	9(8.6%)
13	I miss the college environment, companions, cultural and sporting events.	Agree	89(86.4%)	76(72.4%)
		Neutral	9(8.7%)	16(15.2%)
		Disagree	5(4.9%)	13(12.4%)
14	There is a lack of self-motivation.	Agree	79(76.7%)	73(69.5%)
		Neutral	16(15.5%)	21(20%)
		Disagree	8(7.8%)	11(10.5%)
15	I feel uncertain about concepts in the current academic year.	Agree	75(72.8%)	67(63.8%)
		Neutral	16(15.5%)	24(22.9%)
		Disagree	12(11.7%)	14(13.3%)

**Table 3: Performance of First & Second Year MBBS Students in Assessment**

Class	End of Block Examination	Pass	Fail	Total	p-value
First Year MBBS	EOB 1 (After On-Campus Teaching)	70	32	102	0.123
	EOB 2 (After Online Teaching)	60	43	103	
Second Year MBBS	EOB 1 (After On-Campus Teaching)	71	34	105	0.226
	EOB 2 (After Online Teaching)	76	25	103	

availability of study material during e-learning, 36.9% 1<sup>st</sup> year and 21.9% 2<sup>nd</sup> year students gave neutral responses whereas 30.1% 1<sup>st</sup> year and 39% 2<sup>nd</sup> year students didn't perceive any deficiency of resource material. One of the reasons could be that students were provided sufficient study material in the form of pictures/videos of models, cadaveric specimens, and histology slides by uploading the content on their Google classrooms. Besides the availability of sufficient resource material, students preferred the hands-on study of models, bones, cadaveric specimen, and histology slides under microscopes which shows that understanding and retention is better by the use of one's psychomotor skills during learning. Our results are comparable with a research conducted on two groups of students where one group was taught in the dissection hall and the other group was taught by showing Anatomy videos. Students who learnt Anatomy through hands-on practice were more satisfied and also showed higher grades.<sup>16</sup>

Our results showed that 82.3% students of 1<sup>st</sup> year MBBS and 81.7% students of 2<sup>nd</sup> year MBBS were satisfied with on-campus teaching. Whereas, only 52% students of 1<sup>st</sup> year MBBS and 50.3% students of 2<sup>nd</sup> year MBBS were satisfied with online teaching. Similar results were shown in another study conducted by Ahsan et al., which showed that 61.9% students were not satisfied with online teaching.<sup>17</sup> Another study reported that 89.62% of medical students believe that traditional classroom teaching is better than online teaching.<sup>18</sup>

In the current study, assessments were taken after both online and on-campus teaching and both results were compared which showed an insignificant difference between the two teaching modalities. Though results after on-campus teaching were slightly better, but the difference between the two was statistically insignificant which showed that besides apprehensions and perceptions regarding hindrances and difficulties faced during e-learning, it had minimal effect on the results of students showing that synchronous teaching and sufficient resource material in the form of videos provided by the faculty bridged the gaps in online teaching. Another study reported that there is no significant difference in the performance of students after online and on-campus teaching.<sup>19</sup>

### CONCLUSION

Most of the students were not satisfied with online teaching. The subject of Anatomy is difficult to grasp through online teaching but effective use of videos, digital photographs, and synchronous teaching can facilitate students in achieving the desired concepts.

### LIMITATIONS & RECOMMENDATIONS

The study was conducted in one particular college, so

the results cannot be generalized. In this study, only two modules were compared. Comparison among multiple modules could have given more reliable results. For future recommendations, data from multiple colleges conducting online as well as face to face studies in the subject of Anatomy can be taken for comparison. Online teaching sessions should be conducted during on-campus teaching to train faculty and students.

### REFERENCES

1. Saykili A. Distance education: definitions, generations and key concepts and future directions. *Int J Contemp Educ*. 2018; 5(1):2-17. Available from: [https://www.researchgate.net/publication/338825629\\_Distance\\_Education\\_Definitions\\_Generations\\_Key\\_Concepts\\_and\\_Future\\_Directions](https://www.researchgate.net/publication/338825629_Distance_Education_Definitions_Generations_Key_Concepts_and_Future_Directions).
2. Al-Balas M, Al-Balas HI, Jaber HM, Obeidat K, Al-Balas H, Aborajooch EA, et al. Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: current situation, challenges, and perspectives. *BMC Med Educ*. 2020; 20:341. doi:10.1186/s12909-020-02257-4.
3. Mukhtar K, Javed K, Arooj M, Sethi A. Advantages, limitations and recommendations for online learning during COVID-19 pandemic era. *Pak J Med Sci*. 2020; 36(COVID19-S4):S27-31. doi:10.12669/pjms.36.COVID19-S4.2785
4. Mumtaz N, Saqulain G, Mumtaz N. Online academics in Pakistan: COVID-19 and beyond. *Pak J Med Sci*. 2021; 37(1):283-7. doi:10.12669/pjms.37.1.2894.
5. Brassett C, Cosker T, Davies DC, Dockery P, Gillingwater TH, Lee TC, et al. COVID-19 and Anatomy: stimulus and initial response. *J Anat*. 2020; 237(3):393-403. doi:10.1111/joa.13274.
6. Cheng X, Chan LK, Pan SQ, Cai H, Li YQ, Yang X. Gross Anatomy education in China during the COVID-19 pandemic: a national survey. *Anat Sci Educ*. 2021; 14(1):8-18. doi:10.1002/ase.2036.
7. Diaz CM, Linden K, Solyali V. Novel and innovative approaches to teaching human Anatomy classes in an online environment during a pandemic. *Med Sci Educ*. 2021; 31(5):1703-13. doi:10.1007/s40670-021-01363-2.
8. Baczek M, Zaganczyk-Baczek M, Szpringer M, Jaroszynski A, Wozakowska-Kaplon B. Students' perception of online learning during the COVID-19 pandemic: a survey study of Polish medical students. *Medicine (Baltimore)*. 2021; 100(7):e24821. doi:10.1097/MD.00000000000024821.
9. Barrot JS, Llenares II, Del Rosario LS. Students' online learning challenges during the pandemic and how they cope with them: the case of the Philippines. *Educ Inf Technol (Dordr)*. 2021; 26(6):7321-38. doi:10.1007/s10639-021-10589-x.
10. Khalil R, Mansour AE, Fadda WA, Almisnid K, Aldamegh M, Al-Nafeesah A, et al. The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives. *BMC Med Educ*. 2020; 20(1):285. doi:10.1186/s12909-020-02208-z.
11. Warfvinge P, Lofgreen J, Andersson K, Roxa T, Akerman C.

- The rapid transition from campus to online teaching - how are students' perception of learning experiences affected? *European Journal of Engineering Education*. 2021; 47(2):211-29. doi:10.1080/03043797.2021.1942794.
12. Baticulon RE, Sy JJ, Alberto NRI, Baron MBC, Mabulay REC, Rizada LGT, et al. Barriers to online learning in the time of COVID-19: a national survey of medical students in the Philippines. *Med Sci Educ*. 2021; 31(2):615-26. doi:10.1007/s40670-021-01231-z.
  13. Ramnanan C, Di Lorenzo G, Dong S, Pak V, Visva S. Synchronous vs. asynchronous Anatomy content delivery during COVID-19: comparing student perceptions and impact on student performance. *FASEB J*. 2021; 35(Suppl 1):10.1096/fasebj.2021.35.S1.02770. doi:10.1096/fasebj.2021.35.S1.02770.
  14. Harris R, Blundell-Birtill P, Sutherland E, Pownall M. Students' perceptions of online lecture delivery: an empirical mixed-methods investigation. *Psychol Teach Rev*. 2021; 27(1):69-78. Available from: [https://www.researchgate.net/publication/351746723\\_Students'\\_perceptions\\_of\\_online\\_lecture\\_delivery\\_An\\_empirical\\_mixed-methods\\_investigation](https://www.researchgate.net/publication/351746723_Students'_perceptions_of_online_lecture_delivery_An_empirical_mixed-methods_investigation).
  15. Islam M, Kim DA, Kwon M. A comparison of two forms of instruction: prerecorded video lectures vs. live Zoom lectures for education in the business management field. *Sustainability*. 2020; 12(19):8149. doi:10.3390/su12198149.
  16. Harmon DJ, Attardi SM, Barremkala M, Bentley DC, Brown KM, Dennis JF, et al. An analysis of Anatomy education before and during COVID-19: May-August 2020. *Anat Sci Educ*. 2021; 14(2):132-47. doi:10.1002/ase.2051.
  17. Ahsan U, Nasim A, Aslam A, Khan FA, Aslam M, Yusuf L. Student's satisfaction with online teaching during the COVID-19 pandemic. *PJMHS*. 2022; 16(3):255-7. doi:10.53350/pjmhs22163255
  18. Paallavi B, Yuvaraj B, Krishnakant P. Comparison of distance learning with traditional classroom in medical college students in COVID-19 lockdown period in India. *FMEJ*. 2020; 10(4):42-5. Available from: <https://www.sid.ir/paper/416572/en#downloadbottom>.
  19. Paul J, Jefferson F. A comparative analysis of student performance in an online vs. face to face environmental science course from 2009 to 2016. *Front Comput Sci*. 2019; 1:7. doi:10.3389/fcomp.2019.00007.

