



# Medical Students' Perception on Learning Anatomy Online During COVID-19 Pandemic in an Integrated Modular System: Comparison of Online and Face to Face SGDs & Interactive Lectures

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## ABSTRACT

**Introduction:** The COVID-19 pandemic influenced education system worldwide. This change was unusual for both students and anatomists. The present study is conducted to perceive online learning experience of 1<sup>st</sup> & 2<sup>nd</sup> year MBBS students in a modular system comparing online SGD & lectures with face to face.

**Objectives:** To assess how medical students of 1st and 2nd year MBBS perceive the experience of learning Anatomy online in an integrated modular system, their attitude towards online small group discussions (SGD) and online Interactive lectures by comparing with face-to-face learning anatomy.

**Place and duration of study:** The study was conducted in the Department of Anatomy at University College of Medicine, University of Lahore during academic year of 2021 over a period of six months from March 2021.

**Material & Methods:** This descriptive cross-sectional study was conducted by using a Questionnaire validated by five medical educationists. The sampling was done by nonprobability convenience technique. For a confidence level of 97%, sample size was 197. A total of 202 students from 1<sup>st</sup> & 2<sup>nd</sup> year MBBS, were asked to fill in a Questionnaire with Likert scale of 5, anonymously after taking informed consent, regarding online learning Anatomy through Zoom by comparing online SGD and Interactive lectures with face-to-face learning during COVID-19 pandemic. Data was analyzed using SPSS (version 28) software, p value  $\leq 0.05$  was considered significant.

**Results:** A total of 202 responses were received of which 197 responses were complete. Of which 56 were from 1<sup>st</sup> year while 141 were from 2<sup>nd</sup> Year MBBS. Some students did not answer some questions. Percentages were calculated against student responses, for missing data the percentages were calculated from total number of responses to each question answered. p values calculated were not significant but overall students did not prefer online learning over face to face learning.

**Conclusion:** Our present study concludes that learning anatomy online is challenging. Overall students did not value online learning more than face-to-face learning in terms of flexibility, freedom, interaction with teachers, lack of hands-on practice and concepts, although they enjoyed the leisure of self-study with whole study material available to them at any time.

**Key words:** Pandemic, validated, Integrated, Modular, Questionnaire, SGD, Interactive lectures.

## INTRODUCTION

It is significant to never forget the vision and reality of the fact that history repeats itself. The COVID-19 pandemic is an unmatched catastrophe that has influenced universal business including education.<sup>1</sup> The hard going of COVID-19 pandemic constrained by social distancing measures disrupted face-to-face learning, limiting educational institutions to convert their mode of education from face to face to online, instantly around the world. Anatomical education is a cornerstone to the majority of health-related fields which is taught traditionally

through interactive though mostly teacher-centered lectures, human cadaveric dissection, osteology illustration, Bones and soft tissue Radiology, microscopic slides of Histology, specimens, models of Embryology and Gross anatomy teaching.<sup>2,3,4</sup> The Anatomists around the globe opted for distant online learning without delays to foster Anatomical education.<sup>5</sup> This transformation was unusual for both anatomists as well as students. Anatomists around the world showed concerns about teaching anatomy online and students felt they might have missed the core of the subject without having three-dimensional approaches to Anatomy.<sup>6</sup> To continue medical education uninterrupted in Pakistan, online classes

were implemented as advised by medical universities and Higher Education commission of Pakistan. Different institutes used different teaching platforms like and not limited to Zoom, Google Meet, Microsoft teams, Google classroom, etc., to continue medical education online endlessly.

In the course of medical education in Pakistan, many medical institutes are trying to adopt an integrated modular system<sup>7</sup> in contrast to the traditional system which is the compartmentalization of basic and applied medicine<sup>8</sup> and the traditional system prevailing across most of the medical institutes in the homeland. An Integrated modular system indicates synthesis of knowledge from various disciplines to make a whole, which is purposeful.<sup>9,10</sup> Due to this interconnection and correlation, a medical student can interpret the overall patient scenario in a real life situation.<sup>11</sup>

Hence, the present study was conducted to assess how medical students of MBBS 1<sup>st</sup> and 2<sup>nd</sup> year, perceive the experience of learning Anatomy online in an integrated modular system? Furthermore, to explore their attitude towards online small group discussions and online Interactive lectures by comparing with face to face learning Anatomy. The research was aimed to achieve students' responses and feedback to propose improved and more appropriate approaches to direct online teaching policies and methods to help remote Anatomy education.

## MATERIAL AND METHODS

The descriptive cross sectional study was conducted in the department of Anatomy at University College of Medicine, University of Lahore during academic year of 2021 over a period of six months from March 2021. Ethical Committee of the University of Lahore, granted clearance with approval no: ERC/12/20/24, Date: 7/12/20. Population was the participants from the 1<sup>st</sup> year and the 2<sup>nd</sup> year MBBS students (150+150). For confidence level of 97%, sample size calculated was 184, our response rate was 197. Nonprobability convenience sampling technique was used. The online Anatomy SGDs and Lectures were presented live using Zoom software by screen sharing and breakout rooms. All sessions were

monitored and recorded. All study material was shared soon after the classes were over as Power Point slides and recorded sessions on Slate, the official e-learning platform of The University of Lahore; therefore, students had full access to study material any time after the classes for self-study. The lack of anatomical demonstrations was replaced with images, flow sheets, mind maps and diagrams. Along with few anatomical softwares like 3D skull etc., A total of 202 students were asked to fill in a Questionnaire with a Likert scale of 5, anonymously regarding online learning Anatomy during COVID-19 pandemic. Informed consent was witnessed by a second person. Data was collected on campus using the Questionnaire. The validation of the questionnaire was done by five medical educationists. Students' responses were registered in a database using Microsoft Excel.

## Statistical analysis:

Descriptive cross sectional analysis was done using IBM SPSS (version 28) software. The Likert score of 5 was used to compare students' responses. The percentages were calculated and compared for face to face and online learning Anatomy from the student's responses.  $p$  value  $\leq 0.05$  was considered significant.

## RESULTS

A total of 202 responses were received of which 197 responses were complete while the remaining 5 responses were incomplete. Of which 56 were from the first-year while 141 were from the second-year MBBS. From 1<sup>st</sup> year 31 respondents were male while 25 were female. From 2<sup>nd</sup> year 74 respondents were male, while 67 were female. Of 197 responses some students did not answer some of the questions therefore for missing data the percentages for those questions were calculated by counting total number of responses to those question.  $P$  value was calculated by Chi Square, which were not significant (more than 0.05), in terms of percentages obtained from students of 1<sup>st</sup> year and 2<sup>nd</sup> year responses regarding perception on learning anatomy online versus face to face. The percentages for each question answered by students are given in Table-1.

	Item #	Questionnaire Items	Strongly Agree	Partly Agree	Neutral	Partly Disagree	Strongly Disagree
<b>Online Learning Anatomy</b>							
1 <sup>st</sup> year	1	The transition to online learning Anatomy was smooth	8.9%(5)	35.7%(20)	12.5% (7)	19.6% (11)	23.2% (13)
2 <sup>nd</sup> year			12.1%(17)	29.3%(41)	20% (28)	23.6%(33)	15% (21)
Total			11.2%(22)	31.1%(61)	17.9% (35)	22.4% (44)	17.3% (34)
1 <sup>st</sup> year	2	Online learning Anatomy was more flexible than face to face learning in terms of space and time management	10.9%(6)	3.6%(2)	23.6%(13)	23.6% (13)	38.2% (21)
2 <sup>nd</sup> year			12.8%(18)	9.2%(13)	19.1%(27)	33.3% (47)	25.5% (36)
Total			12.2%(24)	7.7%(15)	20.4%(40)	30.6% (60)	29.1% (57)
1 <sup>st</sup> year	3	It is easier to communicate with teacher in online environment	23.2% (13)	14.3%(8)	17.9%(10)	17.9% (10)	26.8% (15)

2 <sup>nd</sup> year			15.6%(22)	15.6%(22)	19.1%(27)	24.8% (35)	24.8% (35)
Total			17.8%(35)	15.2%(30)	18.8%(37)	22.8% (45)	25.4% (50)
1 <sup>st</sup> year	4	It is challenging to learn Anatomy online	53.6%(30)	19.6%(11)	7.1% (4)	7.1% (4)	12.5% (7)
2 <sup>nd</sup> year			45.3%(63)	19.4%(27)	15.1%(21)	12.2% (17)	7.9% (11)
Total			47.7%(93)	19.5%(38)	12.8%(25)	10.8% (21)	9.2% (18)
1 <sup>st</sup> year	5	The online course has helped me to improve my IT skills.	18.5%(10)	25.9%(14)	22.2%(12)	16.7% (9)	16.7% (9)
2 <sup>nd</sup> year			18.6%(26)	30%(42)	29.3%(41)	10.7% (15)	11.4% (16)
Total			18.6%(36)	28.9%(56)	27.3%(53)	12.4% (24)	12.9% (25)
1 <sup>st</sup> year	6	I value the online learning environment more than a face-to-face format	8.9%(5)	8.9%(5)	17.9%(10)	17.9% (10)	46.4% (26)
2 <sup>nd</sup> year			10.1%(14)	10.8%(15)	21.6%(30)	21.6% (30)	36.0% (50)
Total			9.7%(19)	10.3%(20)	20.5%(40)	20.5% (40)	39.0% (76)
1 <sup>st</sup> year	7	Online learning Anatomy helped me in creating better understanding of topic	10.7%(6)	7.1%(4)	19.6%(11)	21.4% (12)	41.1% (23)
2 <sup>nd</sup> year			10.7%(15)	11.4%(16)	20%(28)	27.1% (38)	30.7% (43)
Total			10.7%(21)	10.2%(20)	19.9%(39)	25.5% (50)	33.7% (66)
1 <sup>st</sup> year	8	Online learning Anatomy helped me in being more interactive with my teachers	16.1%(9)	23.2%(13)	12.5%(7)	16.1% (9)	32.1% (18)
2 <sup>nd</sup> year			10.1%(14)	13%(18)	23.9%(33)	23.9% (33)	29.0% (40)
Total			11.9%(23)	16%(31)	20.6%(40)	21.6% (42)	29.9% (58)
1 <sup>st</sup> year	9	Online learning Anatomy makes topic more interesting	8.9%(5)	12.5%(7)	16.1%(9)	17.9% (10)	44.6% (25)
2 <sup>nd</sup> year			12.8%(18)	10.6%(15)	20.6%(29)	24.8% (35)	31.2% (44)
Total			11.7%(23)	11.2%(22)	19.3%(38)	22.8% (45)	35% (69)
1 <sup>st</sup> year	10	Online teaching has changed my attitude toward learning Anatomy	19.6%(11)	23.2%(13)	19.6%(11)	16.1% (9)	21.4% (12)
2 <sup>nd</sup> year			14.9%(21)	19.9%(28)	24.1%(34)	19.9% (28)	21.3% (30)
Total			16.2%(32)	20.8%(41)	22.8%(45)	18.8% (37)	21.3% (42)
1 <sup>st</sup> year	11	The misconception and confusion regarding topic were easy to resolve in online learning Anatomy	11.1%(6)	16.7%(9)	24.1%(13)	22.2% (12)	25.9% (14)
2 <sup>nd</sup> year			10.8%(15)	17.3%(24)	35.3%(49)	19.4% (27)	17.3% (24)
Total			10.9%(21)	17.1%(33)	32.1%(62)	20.2% (39)	19.7% (38)
1 <sup>st</sup> year	12	I would benefit if there were more Online Anatomy courses	14.8%(8)	14.8%(8)	16.7%(9)	18.5% (10)	35.2% (19)
2 <sup>nd</sup> year			11.7%(16)	10.2%(14)	22.6%(31)	24.8% (34)	30.7% (42)
Total			12.6%(24)	11.5%(22)	20.9%(40)	23% (44)	31.9% (61)
1 <sup>st</sup> year	13	I prefer online learning Anatomy than face to face learning	11.1%(6)	7.4%(4)	14.8%(8)	20.4% (11)	46.3% (25)
2 <sup>nd</sup> year			12.9%(18)	7.2%(10)	12.2%(17)	25.2% (35)	42.4% (59)
Total			12.4%(24)	7.3%(14)	13%(25)	23.8% (46)	43.5% (84)
1 <sup>st</sup> year	14	Online teaching Anatomy enables me to attend classes more frequently than face to face mode	27.8%(15)	11.1%(6)	18.5%(10)	9.3% (5)	33.3% (18)
2 <sup>nd</sup> year			27.9%(38)	19.1%(26)	16.2%(22)	16.2% (22)	20.6% (28)
Total			27.9%(53)	16.8%(32)	16.8%(32)	14.2% (27)	24.2% (46)
1 <sup>st</sup> year	15	Online learning Anatomy helps me in utilizing my time more efficiently	22.2%(12)	14.8%(8)	18.5%(10)	13% (7)	31.5% (17)
2 <sup>nd</sup> year			21.9%(30)	17.5%(24)	21.9%(30)	19.7% (27)	19.0% (26)
Total			22%(42)	16.8%(32)	20.9%(40)	17.8% (34)	22.5% (43)
1 <sup>st</sup> year	16	It is easier to revise online shared Anatomy material than taking notes in face-to-face teaching environment	30.2%(16)	22.6%(12)	15.1%(8)	17% (9)	15.1% (8)
2 <sup>nd</sup> year			21%(29)	19.6%(27)	22.5%(31)	15.2% (21)	21.7% (30)
Total			23.6%(45)	20.4%(39)	20.4%(39)	15.7% (30)	19.9% (38)
1 <sup>st</sup> year	17	More teaching software are required in online Anatomy course	44.4%(24)	14.8%(8)	27.8%(15)	7.4% (4)	5.6% (3)
2 <sup>nd</sup> year			34.8%(48)	27.5%(38)	19.6%(27)	7.2% (10)	10.9% (15)
Total			37.5%(72)	24%(46)	21.9%(42)	7.3% (14)	9.4% (18)
<b>Small Group Discussion (SGD)</b>							
1 <sup>st</sup> year	18	I would benefit if there were more online SGDs on Anatomy	27.8%(15)	7.4%(4)	24.1%(13)	9.3% (5)	31.5% (17)
2 <sup>nd</sup> year			14.5%(20)	17.4%(24)	25.4%(35)	15.2% (21)	27.5% (38)
Total			18.2%(35)	14.6%(28)	25%(48)	13.5% (26)	28.6% (55)
1 <sup>st</sup> year	19	I am satisfied with the duration of online Anatomy SGD	25.9%(14)	13%(7)	27.8%(15)	9.3% (5)	24.1% (13)
2 <sup>nd</sup> year			17.3%(24)	23%(32)	25.2%(35)	13.7% (19)	20.9% (29)
Total			19.7%(38)	20.2%(39)	25.9%(50)	12.4% (24)	21.8% (42)
1 <sup>st</sup> year	20	I prefer Learning Anatomy through online SGDs	15.4%(8)	9.6%(5)	21.2%(11)	21.2% (11)	32.7% (17)
2 <sup>nd</sup> year			12.4%(17)	12.4%(17)	19.7%(27)	25.5% (35)	29.9% (41)
Total			13.2%(25)	11.6%(22)	20.1%(38)	24.3% (46)	30.7% (58)
1 <sup>st</sup> year	21	I would benefit more if online SGD were merge with live demonstration of bones, models, prosected models, and specimens.	55.6%(30)	18.5%(10)	13%(7)	3.7% (2)	9.3% (5)
2 <sup>nd</sup> year			36%(50)	22.3%(31)	17.3%(24)	10.8% (15)	13.7% (19)
Total			41.5%(80)	21.2%(41)	16.1%(31)	8.8% (17)	12.4% (24)
<b>Interactive Lecture</b>							
1 <sup>st</sup> year	22	I would benefit if there were more online Interactive lectures on Anatomy	25.9%(14)	20.4%(11)	14.8%(8)	11.1% (6)	27.8% (15)
2 <sup>nd</sup> year			17.3%(24)	16.5%(23)	25.9%(36)	18% (25)	22.3% (31)
Total			19.7%(38)	17.6%(34)	22.8%(44)	16.1% (31)	23.8% (46)
1 <sup>st</sup> year	23	I am satisfied with the duration of online interactive lectures of Anatomy	24.1%(13)	14.8%(8)	22.2%(12)	14.8% (8)	24.1% (13)
2 <sup>nd</sup> year			20.1%(28)	20.9%(29)	30.9%(43)	7.9% (11)	20.1% (28)
Total			21.2%(41)	19.2%(37)	28.5%(55)	9.8% (19)	21.2% (41)
1 <sup>st</sup> year	24	Online Anatomy Interactive lectures offer me less advantage	34% (18)	24.5%(13)	17%(9)	13.2% (7)	11.3% (6)
2 <sup>nd</sup> year			20.3%(28)	21%(29)	27.5%(38)	15.9% (22)	15.2% (21)
Total			24.1%(46)	22%(42)	24.6%(47)	15.2% (29)	14.1% (27)
1 <sup>st</sup> year	25	I prefer Learning Anatomy through Interactive online lectures.	25.9%(14)	9.3%(5)	9.3%(5)	22.2% (12)	33.3% (18)
2 <sup>nd</sup> year			13.7%(19)	11.5%(16)	25.9%(36)	20.9%(29)	28.1% (39)
Total			17.1%(33)	10.9%(21)	21.2%(41)	21.2% (41)	29.5% (57)

Table-1: Questionnaire with students' responses.

## DISCUSSION

Healthcare students are generally not that tech savvy. For healthcare workers to embrace evidence-based practice, it is essential for them to be computer literate. Angelina reported no statistically significant difference in computer literacy based on gender and age.<sup>12</sup> Okanath et al. reported that there were difficulties in the implementation of online classes for higher education students;<sup>13</sup> this assertion does not correspond with the findings reported in our study where the majority of the students reported that their transition to online classes was smooth.

The students found the transition to online learning Anatomy to be smooth (42.3% vs 39.7%), the students (59.7%) did not consider the online learning anatomy to be more flexible than face to face learning in terms of space and time management. Also the students didn't find it easier to communicate with teachers in the online environment as compared to face-to-face classes (48.2%), similarly, (59.5%) students did not value the online learning environment more than the face-to-face environment. Likewise (59.2%) Students did not believe that online learning anatomy helped them to have a better understanding of the topic. (51.5%) of Students did not find it more helpful to interact frequently with their teachers. Therefore (67.3%) of Students did not prefer online learning compared to face to face learning. Overall students preferred face to face learning than online learning Anatomy.

James et al. reported that adult learners prefer flexibility when it comes to learning programs.<sup>14</sup> Online education provided the flexibility that the adult learners crave. Azlan et al. reported that students felt that the e-learning and study from home,<sup>15</sup> online classes provided much flexibility. Our study findings revealed that the students didn't consider our online classes to be flexible; this was possibly because our institution followed the same timetable for the synchronous online classes. Thus, the students did not experience the freedom and flexibility that the asynchronous online sessions afford. Social connection is a basic need of humans.<sup>16</sup> Students in an online class may feel lonely and isolated.<sup>17,18</sup> And this feeling of loneliness and isolation may hinder their learning.<sup>19</sup> One of the most important traits of an effective teacher is the rapport that the teacher builds with his or her students in the class.<sup>20,21</sup> Thus, in an online class where students lack the opportunity to interact with their instructors' face-to-face, students are bound to feel isolated, and this may hinder their learning. Our study findings revealed that students found it difficult to communicate with

their teachers in an online class. Our results are in line with findings reported by Mohammad et al. who wrote that the majority of the students reported that the communication between the instructors and the students has become difficult in online classes.<sup>22</sup> Our study findings also revealed that our students found online anatomy learning to be challenging. This is in stark contrast to the findings reported by Kalpana & Robert in their article where the majority of their respondents reported online anatomy learning to be interesting and enjoyable.<sup>23</sup> COVID-19 pandemic transformed medical education as there is increased individual and collective awareness and acceptance that technology can augment and enhance the delivery of medical education.<sup>24,25</sup> Our students also reported that their IT skills have improved because of online classes. Our study revealed that students don't value the online learning environment more than the face-to-face environment; this finding is supported by the data published by Derar where he reported that students had a negative attitude towards online learning in comparison to face-to-face learning.<sup>26</sup> Jyoti et al. wrote that students reported the understanding of the topic was better in face-to-face classes than in live online classes.<sup>27</sup> Rudi Klein et al. wrote that students reported better understanding of anatomy topics when taught online.<sup>28</sup> Similarly, our respondents didn't believe that they developed better concepts during online classes as compared to face-to-face sessions. Abhinandan & Anupama wrote that students reported receiving adequate support and resources from their teachers.<sup>29</sup> This contrasts with our findings where the students did not believe that online classes didn't help them in being more interactive with their teachers. Trifonet al. reported that students ranked the traditional face-to-face teaching of anatomy as more effective than online methods of teaching<sup>30</sup> which is congruent with our findings. They also reported that online teaching methods have improved the student's participation in anatomy lessons<sup>30</sup> which is not congruent to our findings. Xiaoqian suggested that there is a link between attendance and a student's academic performance.<sup>31</sup> Darici et al. reported higher attendance in online classes as compared to on-site classes.<sup>32</sup> In our study 1<sup>st</sup> year students, who were experiencing the online teaching for the first time, did not believe that the online classes enabled them to attend classes more frequently than they would have been able to in face-to-face sessions while the 2<sup>nd</sup> year students who had prior experience of online classes were more positive in their outlook. 1<sup>st</sup> year students didn't feel that the online learning helped them in utilizing their time effectively, this finding is

supported by the results obtained by Anjali & Agamin their study, where majority of the students found it difficult to manage their time during online sessions.<sup>33</sup> While 2<sup>nd</sup> year students in our study were divided on this issue. Our study revealed that students found it easier to revise a topic that they had learned online, possibly because both the recorded video of the online lecture and the PowerPoint presentation were shared with them once the session was over. Alexandra & Sunhea reported that the majority of their respondents felt that online radiological anatomy helped students in anatomy revision.<sup>34</sup> Our findings revealed that the majority of our respondents reported that more resources are required in online anatomy classes. Fareeha et al. mentioned several challenges that arose during online medical education.<sup>35</sup> Naturally for online sessions students need the Gmail accounts and Zoom software, while these issues don't arise in a face-to-face class. Students generally prefer online lectures over face to face classes.<sup>36,37</sup> In our study only first year students preferred online lectures while the second year students did not.

Ambreen et al. reported that even the teachers expressed their reservations about online teaching as they feared that it might compromise the level of teaching for subjects like anatomy that require hands-on practice with bones and models.<sup>38</sup> While online teaching, lectures and tutorials, in preclinical years can be effective,<sup>39</sup> it cannot replace hands-on experience.<sup>40</sup> The level of collaboration in online sessions cannot match the effectiveness of collaboration in face-to-face sessions.<sup>41</sup> These findings match our results. However online medical education has had some success during COVID-19 induced lock-downs but it is prudent to not get carried away by that success.<sup>40</sup> A hybrid system of both online and face-to-face is more preferable.<sup>40</sup>

## CONCLUSION

Our present study concludes that learning anatomy online is challenging. Overall students did not value online learning more than face-to-face learning in terms of flexibility, freedom, interaction with teachers, hands-on practice and concepts, although they enjoyed the leisure of self-study with whole study material available to them at any time. In future a hybrid system of both face to face and online with more anatomy resources can be helpful.

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