Original Article

Access this article online

Quick Response Code:

Website: www.jehp.net

DOI: 10.4103/jehp.jehp_655_21

Perception of e-learning in medical students and faculty during COVID time: A study based on a questionnaire-based survey

Sandip Meghnad Hulke, Santosh L. Wakode, Avinash E. Thakare, Rachna Parashar, Rajay N. Bharshnakar, Ankur Joshi[1], Yuganti P. Vaidya[2]

Abstract:

BACKGROUND: With the emergence of COVID, we are forced to use e-learning in form of arranging online classes for students. Medical educators all over the world are conducting online classes for students. This study aimed to evaluate the perception of online learning among MBBS students and teachers through a questionnaire-based survey.

MATERIALS AND METHODS: A cross-sectional study was done in the AIIMS, Bhopal. The study was based on questionnaire (online Google form) response received from 43 number of faculty and 156 number of students.

STATISTICAL ANALYSIS USED: Chi-square test and unpaired *t*-test were used for statistical analysis using statistical software Systac 13.2.

RESULTS: Handling software, technical issues, and lack of face-to-face interaction were more significant problems in students compared to faculty. The desire for the social site which causes disturbances in learning was a significant problem in the students compared to faculty. Giving and taking assessment problem was reported by 60% and 63.8% of faculty and students, respectively (P = 0.67). Both groups preferred the Google Classroom platform (P = 0.16). Students (65.3%) preferred audiovisual recording, while faculty (72%) preferred PowerPoint with narration. PowerPoint presentation without narration was the least preferred (10.8%). Both groups stressed the importance of training (P = 0.17) and infrastructure development (P = 0.85). Students, as well as faculty, strongly discouraged e-learning for practical/clinical teaching.

CONCLUSIONS: Students, as well as faculty, have mixed reactions toward e-learning. Most importantly affected in the present scenario is practical/clinical teaching and assessment. Every attempt needs to be done to strengthen infrastructure and impart training to students and faculty.

Keywords:

COVID, eLearning, Google Classroom, medical education, perception, teacher–student interaction

Department of Physiology, AIIMS, Bhopal, Madhya Pradesh, India, [1]Department of CFM, AIIMS, Bhopal, Madhya Pradesh, India, [2]Department of Anatomy, Peoples Medical College and RC, Bhopal, Madhya Pradesh, India

Address for correspondence:
Dr. Sandip Meghnad Hulke, Department of Physiology, AIIMS, Bhopal, Madhya Pradesh, India.
E-mail: smh555@rediffmail.com,

Received: 11-05-2021
Accepted: 16-10-2021
Published: 28-04-2022

Introduction

E-learning is also called web-based learning, online learning, distributed learning, computer-assisted instruction, or Internet-based learning. E-learning has been extensively used by postgraduate students and teachers/researchers for journals and books. The development of electronic resources has been key to it. We have been using a traditional system like lectures for taking theory classes for medical students. Development of electronic resources has been very much helpful in traditional teaching. The evolution of multimedia had helped to clear the concept of the students. Teachers frequently use images and videos along with traditional teaching. Even

How to cite this article: Hulke SM, Wakode SL, Thakare AE, Parashar R, Bharshnakar RN, Joshi A, *et al*. Perception of e-learning in medical students and faculty during COVID time: A study based on a questionnaire-based survey. J Edu Health Promot 2022;11:139.

students use online material which is easily available on the website. Almost all universities and colleges are providing Internet which facilitates the e-learning methods.

E-learning pioneer Bernard Luskin explains E as exciting, energetic, enthusiastic, emotional, extended, and educational. There are many benefits of e-learning. It can be used anytime as and when required, thus offering flexibility, it is self-paced and it is media reach hence easy to understand.[1] Most importantly, it is consistent and you can use it for unlimited students.[2] However, it has some disadvantages. Students, if not motivated, may fall behind, social interaction is less, and poor Internet connection may be frustrating. One of the important disadvantages is that it cannot replace hands-on/practical learning which is an important part of the medical curriculum.[3-5]

With the emergence of COVID, we are forced to use e-learning in form of arranging online classes for students. Medical educators all over the world are conducting online classes for students. Many of the educators, as well as students, were not used to this system, but they are trying their best to learn their respective subjects. E-learning has been used in the form of computer-assisted learning and mobile learning where course contents and audio–video tapes were mailed to students.[6,7] Many students have had e-learning useful, while some found that both traditional and e-learning should be blended.[8] The teachers have mixed reactions to e-learning. The less tech-savvy generation of teachers considers e-learning as a burden.[9]

We had come across some studies in the past, many of the studies have been focussed on one particular subject or particular module or one particular topic.[10,11] Dhir *et al*. in their review had recommended testing e-learning in the Indian setting.[2]

There are various studies done in the COVID times; however, all these studies were mainly focused on students.[12-18] These were having contradictory results. There are very few studies where the perception of students and faculty is studied. We also came across a study in the Delhi region whereby the perception of faculty as well as students was assessed.[19] Furthermore, we did not come across any of such studies, especially in AIIMS faculty and students. Students with higher rank in NEET/AIIMS entrance examination generally get admission to the AIIMS institute. In addition, AIIMS faculty are equipped with better facilities compared to other colleges. Hence, assessing their perception would be of paramount importance. This endeavored us to undertake this study. With this study, we have made attempt to evaluate the perception of online learning among MBBS students and teachers through a questionnaire-based survey in AIIMS, Bhopal.

Materials and Methods

Study design and setting

This was the cross-sectional study done in AIIMS, Bhopal.

Study participants and sampling

This study involved about 156 students and 43 faculty from various years who have given their consent to participate in the survey. The sampling method was a universal sampling method where the questionnaire was sent to about 150 faculty from various years and about 400 students (100 first-year MBBS, 100 second-year MBBS, and 200 third-year MBBS).

Data collection tool and technique

Data collection was done through the questionnaire prepared by principal investigators in consultation with coinvestigators. These questionnaires were validated by the faculty of various departments. The sum of item-level content validity index/average of questions for faculty and students was 0.86 and 0.9, respectively. The content validity ratio for questions for faculty ranged from 0.83 to 0.97. For students, it ranged from 0.81 to 0.96. Questions that were included have yes/no type, multiple-choice questions, open-ended questions, and Likert scale questions. The Likert scale used was the 7-point scale (strongly disagree – 1 to strongly agree – 7). During question designing, the main parameters that were kept in mind are problems during implication of the e-learning and effectiveness of e-learning as a tool for learning and assessment [Annexures 1 and 2].

Questionnaire in the form of link (online Google form) was sent to faculties and students via mail. Links for questionnaire for faculty and students were https://forms.gle/eD8wZt9LeNLeRWgF9 and https://forms.gle/D5NbjiAC9z4LCRCc8, respectively. The response was received on the Google sheet which was analyzed.

Ethical consideration

The study was conducted after RRB approval and ethical clearance (IHE-LOP/2020/IM 0270). Participants were asked about consent through the link for the questionnaire and willing participants only responded by sending their response.

Statistical analysis was done using statistical software Systac 13.2, Starcom Information Technolgy Limited, Bangalore, Karnataka, India. The difference between categorical variables was tested by the Chi-square test. Unpaired *t*-test was used to compare mean values of the Likert scale of faculty and students.

Results

The response was received from 43 faculty and 156 students. Year-wise distribution of the students and faculty is shown in Table 1.

Forty-one faculty have tried to take attendance and 68% reported that taking attendance was difficult.

Thirty-five faculty had taken online assessments and 60% found that taking online assessments was a tough task. Similarly, 141 students were assessed out of which 63.8% admitted that giving assessment was a major concern ($P = 0.67$).

Sixty-four percent used the same software as used for teaching for taking the assessment. Sixty-eight percent of the students had been assessed through software different from that used for teaching ($P = 0.04$).

One hundred and twenty-three students (78.8%) reported that marks of e-learning assessment should be used for internal assessment.

Major problems encountered by faculty and students are shown in Table 2. Handling software, technical issues, and lack of face-to-face interaction were major problems for students as well as faculty; however, these problems were much significant in students compared to faculty. Both groups had connectivity problems and security concerns. The desire for the social site which causes disturbances in learning was reported by 41.6% of the students.

The preferred platform was Google Classroom (95%) by faculty. The platform liked most by the student was also Google Classroom (91%) ($P = 0.16$). Comparison of the preferred way of teaching and preferred liked by students is shown in Table 3. A PowerPoint presentation was least liked by students compared to that of faculty. Students also significantly liked audiovisual recording of lecture compared to that of faculty.

A comparison of the other issues by faculty and students is shown below. Yes, responses of the student and faculty are compared in Table 4. The student showed significant involvement in e-learning sessions in past. Furthermore, significant use of ready-made e material for learning was shown by students. The recommendation of the faculty to use e-learning along with traditional teaching was significant. Both groups had ease of solving queries and recommended the need for training.

Likert scale questionnaire response comparison by faculty and students is shown in Table 5. Faculty, as well as students, stressed the importance of training and infrastructure development. Students strongly opposed e-learning in the medical curriculum as it would alter the reading habit. Further, they also opine that respective teachers should guide us regarding ideal e-learning material to be used for clearing concepts. Both groups discouraged e-learning due to fear of mobile/Internet addiction problems. They also deter the use of e-learning for taking the assessment. Both groups encouraged the use of e-learning based on the need of the students. Major faculty agreed that e-learning can be used in the medical curriculum with traditional teaching.

The suggestions given by faculty and students are given in Table 6.

Table 1: Year-wise distribution of faculty and students

Academic year	Faculty (*n*=43), *n* (%)	Students (*n*=156), *n* (%)
I year MBBS	21 (48.8)	55 (35.3)
II year MBBS	9 (20.9)	38 (24.4)
III year MBBS	13 (30.2)	63 (40.4)

Discussion

Education all over India is mainly going in online mode and medical education is no exception to this. With this study, we had attempted to assess the perception of e-learning in faculty as well as students in AIIMS, Bhopal. It was one attempt to study various factors to facilitate e-learning.

In the present study, students strongly favored audiovisual recording of the lecture, followed by PowerPoint presentation with narration. PowerPoint

Table 2: Problems encountered by faculty and students

Problems encountered	Faculty (*n*=43), *n* (%)	Students (*n*=156), *n* (%)	*P*
Handling of sofware	24 (55.8)	120 (88.3)	0.006*
Connectivity problem	29 (67.4)	125 (87.4)	0.078
Nonavailability of software	8 (18.6)	18 (11.5)	0.223
Nonavailability of suitable hardware	5 (11.6)	26 (16.6)	0.42
Technical issue – not used e devices for this purpose before	18 (41.8)	47 (30.12)	0.048*
Lack of face to face interaction discouraged you from making quality material	27 (62.7)	64 (41)	0.011*
Security concern (cybercrime) for use of software	10 (23.2)	52 (33.3)	0.2
My desire for social sites caused a lot of distraction during my learning	5 (11.6)	65 (41.6)	0.001*

*Significant

Table 3: Comparison of the preferred way of teaching and preferred way liked by students

Preferred way of teachning	Faculty (*n*=43), *n* (%)	Students (*n*=156), *n* (%)	*P*
Synchronous	31 (72)	105 (67.3)	0.063
Asynchronous	27 (62)	88 (56.4)	0.45
Written material in form of notes in the word/pdf file	9 (20.9)	38 (24.3)	0.076
PowerPoint presentation	17 (39.5)	17 (10.8)	0.00*
PowerPoint presentation with narration	31 (72)	93 (59.6)	0.135
Audiovisual recording of lecture	14 (32.5)	102 (65.3)	<0.001

*Significant

Table 4: Comparison of various issues by faculty and students

Issues faced	Faculty (*n*=43), *n* (%)	Students (*n*=156), *n* (%)	*P*
Designing/involvement in e-learning session in the past	29 (67.4)	128 (82.1)	0.038*
Use of ready made E-material for teaching/learning	20 (46.5)	145 (92.9)	<0.001
Ease of solving query	34 (79.1)	123 (78.8)	0.97
Use of E-learning be used in medical curriculum with traditional teaching	35 (81.4)	96 (61.5)	0.015*
Need for training required	33 (76.7)	98 (62.8)	0.08
Knowledge of learning management software system	21 (48.8)	78 (50)	0.89

*Significant

Table 5: Likert scale questionnaire response comparison by faculty and students

Questions	Faculty (*n*=43), *n* (%)		Students (*n*=156), *n* (%)		*P*
	Mean±SD	Median	Mean±SD	Median	
E-learning can be used in the medical curriculum with traditional teaching	5.14±1.87	6	4.55±1.95	5	0.078
E-learning should be used as and when required option based on the needs of students	5.88±1.4	6	5.76±1.34	6	0.62
Proper training for students as well as teachers is a must before using E-learning as a part of the medical curriculum	6.16±1.34	7	5.85±1.29	6	0.17
Proper infrastructure must be made available to students as well as teachers to use E-learning	6.3±1.4	7	6.34±1.12	7	0.85
E-learning platform should never be used for taking the assessment in the medical curriculum	4.37±2.08	5	3.89±1.85	4	0.17
The respective teacher should guide us regarding ideal E-learning material to be used for clearing concepts	4.93±1.88	5	6.04±1.27	6	0.001*
E-learning is an effective method for us as it would provide immediate support to us as and when required	5.02±1.58	5	5.33±1.6	6	0.26
E-learning should be only used for clearing concept only if they are not cleared during the classes or from the books	4.25±2.09	4	4.76±1.87	5	0.15
E-learning should be discouraged for the undergraduate curriculum as it would cause Internet/mobile addiction problems	3.6±1.9	4	4.05±1.92	4	0.17
E-learning should be discouraged for the undergraduate curriculum as it would alter reading habits	3.55±1.96	3	4.66±1.87	5	0.001*

*Significant difference. SD=Standard deviation

presentations without narration were least liked by students. Major faculty had used PowerPoint presentation with narration. Online video/live demonstration and option for offline viewing were recommended by the majority of the students in a study by Gupta *et al*.[19] YouTube video tutorials were ranked most effective in a study in the UK.[13] Audiovisual recording was also preferred by some authors.[12,15] An important advantage of e-learning is flexibility; according to us, flexibility is possible if students are provided with audiovisual recording. This may be the reason for the preference of this form by students. However, faculty in medical colleges were overburdened and with the emergence of COVID-19, this burden had increased by many folds. Audiovisual recording takes a lot of memory and also quality devices are needed. Further, this recording takes a good time to upload. That was an important reason that faculty prefers PowerPoint presentations with narration. However, in the future, this form should be recommended and such recording may be kept in the library in form of CDs or a college website. Paid software may also be used.[12,19] This would be very useful for clinical case discussion. Students from different geographical regions may be given access for these materials and thus, they would be benefitted.[20]

The preferred platform in the present study was Google Classroom. Blackboard and Zoom were the most

Table 6: Suggestion given by faculty and students

Suggestion by faculty	Suggestion by students
It will be fine if theory classes are taken on online plate form. Clinical skills should be learned on patient	Preplanned and interactive e-learning should be preferred. Discussion with students should be promoted
Didactic lectures and e-learning, both methods should be used for teaching	Slides presentations should be shared in advance. E-learning should be used for giving factual notes
E-learning of >2 h has caused health problems of gaining weight, irritability, and anger. Although these times require the use of methods and do away with the dogmatic practice, conservative ideas and evolve with times, teachers students should be trained in these new methods	College website should be promoted purely for academic purpose
	Teachers should try to improve their traditional methods
	Give stress on key topics, don't try to cover all topics. Prerecorded videos should be used for tricky topics
Taking practicals is a major issue	
The software should be centralized, with soundproof recording rooms, if this mode of teaching-learning has to go on longer	Limit the screen time of learning
	The mix of offline and online is better, but offline classes should be encouraged. Face-to-face interaction is best
E-learning is just a mode of TL method to be used as an adjunct to various other methods	Online lectures and tutorial materials should be provided
	Videos and animation should be added to PPT, Advance learning applications should be used
	E-learning should be used with the blackboard which should be saved as prerecorded videos

PPT=PowerPoint presentation, TL=teaching learning

preferred platforms.[16] Students in Kerala preferred Impartus followed by YouTube and Google Classroom.[15] Combination of Zoom and Microsoft teams was also preferred.[21] In our study, since the Google Classroom was freely available, user friendly, it was mainly used by faculty. Thus, students have no choice for this platform. Faculty need to explore various options to make learning interactive. IT department of various colleges should work in this direction.

Lack of teacher–student interaction, the importance of visual interface, technical issues, and connectivity problem were also reported in other studies.[12,14,16,19,22] Every attempt must be done to make online classes interactive. Student–teacher interaction may be increased by quizzes, student presentations, and brainstorming sessions.[23] Limited opportunities to ask questions have been reported;[13] hence, sessions should be planned in such a way to have sufficient time for student–teacher interaction. One of the advantages of online learning is that students can anonymously ask and answer questions.[24] Active involvement also helps to clear the concept of the students. Thus, these advantages can be taken by prior planning and at the same time, duration of the class should exceed beyond 45 min.[12] In the present study, the need to limit e-learning time was also expressed by faculty.

The need for technical support and guidance was also stressed.[25] In our study, the need for training is also stressed by faculty as well as students. It would be a good idea to keep such training sessions in the foundation course which is conducted at the start of sessions as a part of the medical curriculum.

The desire for the social site was an important problem for our students. This is due to a lack of social discipline.[22] In addition, security concern was also reported.[14] These issues may be solved by proper education to the students. The role of the teacher is very important here, the teacher can help students to overcome this problem by proper guidance.

In the present study, majority of students have been using e-learning material in the past. In a study by Gupta *et al*., more than 60% of students had recommended that links for additional resources should be provided.[19] In the Likert scale questionnaire assessment, major students gave the response that respective teacher should guide us regarding ideal e-learning material to be used for clearing concepts. According to us, the respective teacher is the best person to provide resources about learning material.

In the present study, e-learning was discouraged due to fear of alteration of reading habits and Internet addiction. Online learning was not only associated with Internet addiction but also with some psychiatric ailments such as anxiety and depression.[26] In some studies, the overall impact of e-learning was less,[13,14] while in some, it was useful.[16,22] Majority of students favored a combination of online classes and traditional teaching once the COVID pandemic is over,[12] this was also agreed by many of the faculty in our study. The need for improvement of digital technology was stressed.[14] Faculty, as well as a student in the present study, recommended training and infrastructure development. Furthermore, e-learning should not be just limited to the delivery of content, stress should be given to feedback and interaction.[22] Students, as well as faculty in our study, recommended the use of an advanced learning platform. Gamification and Twitter-enhanced education was used in some studies.[27]

Taking assessment as well as attendance was difficult in online mode. In some studies, submission of the assignment was used for taking attendance.[12] Examination was canceled in about 40% of students in the UK. Others had

given examinations remotely.[13] Medical training in 2019, as well as 2020, is affected, many examinations were also postponed in India. This is very much demotivating for the students and it affects career progression.[28] In the present study, 78.8% of students reported that marks of e-learning assessment should be used for internal assessment. A major issue during the assessment is honesty during the examination, there is no way to ensure honesty from all students while giving an examination, especially if it carries weightage in internal assessment. Hence, infrastructure development in form of suitable hardware/software is a must for an online theory examination. Learning management software systems may be purchased. Training to students as well as faculty may be given. Medical education department of every college should work in this direction. Option for requesting parents as an invigilator may be seeked to avoid malpractice.[29]

However, practical examinations had to be conducted offline; however, one or two examiners may be online. Simulators may be used instead of subject or patient.[30] This may be done in short group. Another option available is that all medical colleges in India may be connected through a suitable platform. Students may be allotted practical centers near his place. Thus, it would limit unnecessary traveling. This would certainly help students who have been sent back home.

During the COVID pandemic, students were sent back home due to many unavoidable reasons.[31] Our universities need to take the bolder decision. The administrator needs to take full responsibility for students as a parent. Rather than sending them back home, they would have allowed staying back, to have the least effect on practical teaching.

In the present study, faculty, as well as students, are concerned about learning practical and clinical skills. Early clinical exposure is considered to be very useful for students to learn clinical skills[32] and it is very difficult to acquire competencies in online mode. However, these may be enhanced by tools such use of computerized virtual patients,[33] remote standardized patients,[34] and video instruction.[35] In video instruction, the teacher silently performs which is followed by repetition by students. Video consultation was found to be an effective form of consultation, this also may be used to teach practical skills.[36] National Medical Commission of India has an important role to play here. There is a certain minimum standard to establish medical colleges in India. NMC can recommend certain basic infrastructures which would benefit future of e-learning in India.

Limitation and recommendation

Questionnaires were sent to about 150 faculty and 400 students; however, we could get responses only from 43 faculty and 156 students. Thus, responsiveness was very less. We had tried our best to get maximum response. Questionnaires were sent more than three times to faculty as well as students. In addition, we could not get uniform representation from all the years of MBBS. Further, a time during which this questionnaire was sent was COVID time. This could have resulted in bias while filling the questionnaire. Bias could have resulted as questionnaires were sent by the faculty involved in teaching students.

Our recommendations

- Practical/clinical teaching, assessment, and attendance must be avoided in online mode
- Infrastructure development in form of suitable software and hardware, technical support, and training to students as well as faculty should be considered as essential
- Interactive sessions must be preferred. For noninteractive classes, PowerPoint presentations without narration must be discouraged. Audiovisual recording and PowerPoint presentation with narration should be encouraged.

Conclusions

Thus to summarize, with the emergence of COVID, the world has been a force to shift online mode and medical education is no exception to this. Students, as well as faculty, have mixed reactions toward e-learning. Most importantly affected in the present scenario are practical/clinical teaching and assessment. Every attempt needs to be done to strengthen infrastructure which may be in the form of procurement of software/hardware, use of telemedicine facilities for academic purposes. The faculty has to work hard and needs to learn digital technology to have a smooth transition in the phase of the COVID crisis.

Acknowledgment

I would like to thank all faculty and students who had taken time from their busy schedules to fill these questionnaires. I would also like to express my gratitude to the research review board and ethical committee of the institute for their constructive feedback and timely approval (Project code – IM0270).

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kaur N, Dwivedi D, Arora J, Gandhi A. Study of the effectiveness of e-learning to conventional teaching in medical undergraduates amid COVID-19 pandemic. Natl J Physiol

Pharm Pharmacol 2020;10:1-5.
2. Dhir SK, Verma D, Batta M, Mishra D. E-Learning in Medical Education in India. Indian Pediatr 2017;54:871-7.
3. Radović-Marković M. Advantages and disadvantages of e-learning in comparison to traditional forms of learning. Ann Univ Petroşani Econ 2010;10:289-98.
4. Arkorful V, Abaidoo N. The role of e-learning, advantages and disadvantages of its adoption in higher education. Int J Instr Technol Distance Learn 2015;12:29-42.
5. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med 2006;81:207-12.
6. Al-Fahad FN. Students' attitudes and perceptions towards the effectiveness of mobile learning in King Saud University, Saudi Arabia. The Turkish Online journal of Educational technology 2009;8:111-9.
7. Svirko E, Mellanby J. Attitudes to e-learning, learning style and achievement in learning neuroanatomy by medical students. Med Teach 2008;30:e219-27.
8. Kong J, Li X, Wang Y, Sun W, Zhang J. Effect of digital problem-based learning cases on student learning outcomes in ophthalmology courses. Arch Ophthalmol 2009;127:1211-4.
9. Flowers SK, Vanderbush RE, Hastings JK, West D. Web-based multimedia vignettes in advanced community pharmacy practice experiences. Am J Pharm Educ 2010;74:39.
10. Varghese J, Faith M, Jacob M. Impact of e-resources on learning in biochemistry: First-year medical students' perceptions. BMC Med Educ 2012;12:21.
11. Webb AL, Choi S. Interactive radiological anatomy eLearning solution for first year medical students: Development, integration, and impact on learning. Anat Sci Educ 2014;7:350-60.
12. Singh KV, Aqeel KI, Misra SK. A cross-sectional study of perception among medical students on online learning amid COVID-19 pandemic, at Government Medical College, Agra, India. Int J Community Med Public Health. 2020;8:248-52.
13. Dost S, Hossain A, Shehab M, Abdelwahed A, Al-Nusair L. Perceptions of medical students towards online teaching during the COVID-19 pandemic: A national cross-sectional survey of 2721 UK medical students. BMJ Open 2020;10:e042378.
14. Abbasi S, Ayoob T, Malik A, Memon SI. Perceptions of students regarding E-learning during Covid-19 at a private medical college. Pak J Med Sci 2020;36:S57-61.
15. Rafi AM, Varghese PR, Kuttichira P. The pedagogical shift during COVID 19 pandemic: Online medical education, barriers and perceptions in central Kerala. J Med Educ Curric Dev 2020;7:1-4.
16. Ibrahim NK, Al Raddadi R, AlDarmasi M, Al Ghamdi A, Gaddoury M, AlBar HM, *et al*. Medical students' acceptance and perceptions of e-learning during the Covid-19 closure time in King Abdulaziz University, Jeddah. J Infect Public Health 2021;14:17-23.
17. Mortazavi F, Salehabadi R, Sharifzadeh M, Ghardashi F. Students' perspectives on the virtual teaching challenges in the COVID-19 pandemic: A qualitative study. J Educ Health Promot 2021;10:59.
18. Rezaei H, Haghdoost A, Javar HA, Dehnavieh R, Aramesh S, Dehgani N, *et al*. The effect of coronavirus (COVID-19) pandemic on medical sciences education in Iran. J Educ Health Promot 2021;10:136.
19. Gupta S, Dabas A, Swarnim S, Mishra D. Medical education during COVID-19 associated lockdown: Faculty and students' perspective. Med J Armed Forces India 2021;77:S79-84.
20. Kogan M, Klein SE, Hannon CP, Nolte MT. Orthopaedic education during the COVID-19 Pandemic. J Am Acad Orthop Surg 2020;28:e456-64.
21. Almarzooq ZI, Lopes M, Kochar A. Virtual learning during the COVID-19 pandemic: A disruptive technology in graduate medical education. J Am Coll Cardiol 2020;75:2635-8.
22. Bączek M, Zagańczyk-Bączek M, Szpringer M, Jaroszyński A, Wożakowska-Kapłon B. Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students. Medicine (Baltimore) 2021;100:e24821.
23. Atreya A, Acharya J. Distant virtual medical education during COVID-19: Half a loaf of bread. Clin Teach 2020;17:418-9.
24. Ni AY. Comparing the effectiveness of classroom and online learning: Teaching research methods. J Public Aff Educ 2013;19:199-215.
25. Lu DF, Lin ZC, Li YJ. Effects of a web-based course on nursing skills and knowledge learning. J Nurs Educ 2009;48:70-7.
26. Garcia-Priego BA, Triana-Romero A, Pinto-Galvez SM, Duran-Ramos C, Salas-Nolasco O, Reyes MM, *et al*. Anxiety, depression, attitudes, and internet addiction during the initial phase of the 2019 coronavirus disease (COVID-19) epidemic: A cross-sectional study in Mexico. medRxiv 2020 Preprint.
27. Hamari J, Koivisto J, Sarsa H. Does gamification work? A literature review of empirical studies on gamification. In: 2014 47th Hawaii International Conference on System Sciences.Hawaii, USA: Ieee; 2014. p. 3025-34.
28. Sahi PK, Mishra D, Singh T. Medical education amid the COVID-19 pandemic. Indian Pediatr 2020;57:652-7.
29. Arowoshola L. Medical education engagement during the COVID-19 era - A student parents perspective. Med Educ Online 2020;25:1-21788799.
30. Gillett B, Peckler B, Sinert R, Onkst C, Nabors S, Issley S, *et al*. Simulation in a disaster drill: Comparison of high-fidelity simulators versus trained actors. Acad Emerg Med 2008;15:1144-51.
31. Shojaei A, Salari P. COVID-19 and the "Stay at home" recommendation: An ethnographic study. J Educ Health Promot 2021;10:62.
32. Tayade MC, Latti RG. Effectiveness of early clinical exposure in medical education: Settings and scientific theories – Review. J Educ Health Promot 2021;10:117.
33. Cook DA, Erwin PJ, Triola MM. Computerized virtual patients in health professions education: A systematic review and meta-analysis. Acad Med 2010;85:1589-602.
34. Langenau E, Kachur E, Horber D. Web-based objective structured clinical examination with remote standardized patients and Skype: Resident experience. Patient Educ Couns 2014;96:55-62.
35. Buch SV, Treschow FP, Svendsen JB, Worm BS. Video- or text-based e-learning when teaching clinical procedures? A randomized controlled trial. Adv Med Educ Pract 2014;5:257-62.
36. Nilsen S, Baerheim A. Feedback on video recorded consultations in medical teaching: Why students loathe and love it – A focus-group based qualitative study. BMC Med Educ 2005;5:28.

Annexures

Annexure 1 – Part 1

Questionnaire for teachers

Instruction

- For yes/no questions, tick any one.
- For multiple-choice questions, you can select more than one option.

1. Have you designed e-learning session for the students in the past?
   a. Yes
   b. No

2. Have you used ready-made material for e-learning for the students in the past?
   a. Yes
   b. No

3. Whether you were involved in designing e-learning session during Covid times?
   a. Yes
   b. No

4. What was your preferred way for designing the e-learning session?
   a. Written material in form of notes in the word/pdf file
   b. PowerPoint presentation
   c. PowerPoint presentation with narration
   d. Audiovisual recording of a lecture
   e. Any other, Please mention_____

5. Which online platform was used?
   a. Google Classroom
   b. Zoom
   c. Webex
   d. Lab station
   e. Any other, Please mention

6. In initial phases, was handling software a major problem?
   a. Yes
   b. No

7. Was the problem resolved with minimal practice?
   a. Yes
   b. No

8. What methods do you use?
   a. Synchronous i.e., on the spot, face to face (live)
   b. Asynchronous i.e., prerecorded

9. Was solving the query of the student feasible?
   a. Yes
   b. No

10. Was taking attendance a major concern in e-learning? (skip if you have not taken attendance)
    a. Yes
    b. No

11. Was taking assessment a major concern in e-learning? (skip if you have not taken assessment)
    a. Yes
    b. No

12. Was evaluation of assessment a major concern in e-learning? (Skip if you have not taken assessment)
    a. Yes
    b. No

13. Have you used same software for assessment of the students?
    a. Yes
    b. No

14. Should e-learning be used in medical curriculum with traditional teaching?
    a. Yes
    b. No

15. What was the major problem?
    a. Connectivity problem
    b. Nonavailability of software
    c. Nonavailability of suitable hardware
    d. Technical issue – not used e devices for this purpose before
    e. Lack of face to face interaction discouraged you from making quality material
    f. Security concern (cybercrime) for use of software

16. Do you think you must undergo training to learn the technology used for e-learning?
    a. Yes
    b. No

17. Do you have the knowledge of learning management software systems where a teacher can create content and monitor students' progress, a student can assess material and give examination, and parent can assess attendance, performance?
    a. Yes
    b. No

Annexure 1: Part 2 – Likert scale questionnaire for teachers

Questions	Strongly disagree			Neither		Agree strongly	
	1	2	3	4	5	6	7
E-learning should be part of medical curriculum (along with traditional teaching)							
E-learning should be used as and when required option based on the needs of students							
Proper training to students as well as teachers is a must before using E-learning as a part of medical curriculum							
Proper infrastructure must be made available to students as well as teachers so as to use E-learning							
E-learning platform should never be used for taking assessment in medical curriculum							
Designing E-learning session should be made compulsory for all teachers							
E-learning is an effective method for student as it provides immediate support to the students as and when required							
E-learning should be only used for clearing concepts only if they are not cleared during the classes or from the books							
E-learning should be discouraged for undergraduate curriculum as it would cause Internet/mobile addiction problem							
E-learning should be discouraged for undergraduate curriculum as it would alter reading habits							

Any other suggestion-_____

Annexure 2: Part 1 Questionnaire for students

Instruction

- For yes/no question, tick any one.
- For multiple choice questions, you can select more than one option.

1. Have you taken e-learning session in the past?
    a. Yes
    b. No

2. Have you used ready-made material (books, YouTube video, any other audiovisual material) for e-learning in the past?
   a. Yes
   b. No

3. Has any teacher provided you e-learning material designed by himself in the past?
   a. Yes
   b. No

4. Which way you liked most for e-learning session?
   a. Written material in form of notes in the word/pdf file
   b. PowerPoint presentation
   c. PowerPoint presentation with narration
   d. Audiovisual recording of lecture
   e. Any other, Please mention_____

5. Among different online platform used which you liked most?
   a. Google Classroom
   b. Zoom
   c. Webex
   d. Lab station
   e. Any other, Please mention

6. In initial phases, was handling software major problem?
   a. Yes
   b. No

7. Was problem resolved with minimal practice?
   a. Yes
   b. No

8. What methods do you used?
   a. Synchronous, i.e., on the spot, face to face (live)
   b. Asynchronous, i.e., prerecorded

9. Was your query/doubts solved?
   a. Yes
   b. No

10. Was giving assessment a major concern in e-learning session? (skip if you have not taken assessment)
    a. Yes
    b. No

11. Was evaluation of assessment done and feedback given to you? (Skip if you have not taken assessment)
    a. Yes
    b. No

12. Was same software (as used for classes) for assessment used? (Skip if you have not taken assessment)
    a. Yes
    b. No

13. Do you think marks of e-learning assessment should be used for internal assessment?
    a. Yes
    b. No, if no mention reasons

14. Should e-learning be used in medical curriculum with traditional teaching?
    a. Yes
    b. No

15. What was the major problem?
    a. Connectivity problem
    b. Nonavailability of software
    c. Nonavailability of suitable hardware
    d. Technical issue – not used e devices for this purpose before
    e. Lack of interaction discouraged
    f. Lack of interested material
    g. Security concern (cybercrime) for use of software
    h. My desire for social sites caused a lot of distraction during my learning

16. Do you think you must undergo training to learn the technology used for e-learning?
    a. Yes
    b. No

17. Do you have the knowledge of learning management software systems where a teacher can create content and monitor student's progress, a student can assess material and give examination, and parent can assess attendance, performance?
    a. Yes
    b. No

Annexure 2: Part 2 – Likert scale questionnaire for students

Questions	Strongly disagree			Neither		Agree strongly	
	1	2	3	4	5	6	7
E-learning can be used in medical curriculum with traditional teaching							
E-learning should be used as and when required option based on the needs of students							
Proper training to students as well as teachers is must before using e-learning as a part of medical curriculum							
Proper infrastructure must be made available to students as well as teachers so as to use E-learning							
E-learning platform should never be used for taking an assessment in medical curriculum							
Respective teacher should guide us regarding ideal e-learning material to be used for clearing concepts							
E-learning is an effective method for us as it would provide immediate support to us as and when required							
E-learning should be only used for clearing concepts only if they are not cleared during the classes or from the books							
E-learning should be discouraged for undergraduate curriculum as it would cause Internet/mobile addiction problem							
E-learning should be discouraged for undergraduate curriculum as it would alter reading habit							

Any other suggestion-_____