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Online Teaching for Medical Under-Graduates: Faculty's Readiness and Way Forward

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Abstract **Original Research Article**

There exists lack of readiness and challenges for the medical faculty to teach online. During COVID-19 pandemic, the need for constant support and training the faculty at different levels for the online teaching platform has been unanimously felt. Thus, identifying challenges of faculty and their needs is useful to achieve positive learning outcomes of online teaching. A cross-sectional online survey was conducted. The questionnaire was sent via E-mail or What's app to the faculty who were involved in online teaching at our institute as well as other different medical institutions during the COVID-19 pandemic. Majority agreed that they have adequate knowledge and skills regarding online preparation and delivery of the classes. However, over ninety percent also felt the need to have more creative resources for online classes. More than half did not feel confident to handle technical issues. Student engagement factors were the common hurdles in online teaching and majority felt lack of connectedness with the students during online teaching. The need for further training for online teaching platform was uniformly expressed. Online teaching platforms have been considered useful for learning and it was suggested that online teaching should be continued as adjunct to online teaching in medical education post pandemic**.** It can be concluded that the medical faculty needs further training to be competent in their role to ensure the online learning environment. Online teaching methods can be incorporated in the medical curriculum to effectively facilitate learning of the students.

Keywords: Online Teaching, Faculty, Undergraduate medical students, Challenges, Readiness.

INTRODUCTION

The COVID-19 pandemic has affected the education system worldwide, affecting 1.6 billion learners in more than 200 countries (United Nations, 2020) It has forced shut down of all the educational institutions in India also, by mid-March. Ministry of Home Affairs through University Grants Commission and many medical universities instructed all colleges to conduct online classes to maintain the academic calendar. This led to the forced immersion into online teaching as the online mode offered a quick solution to continue teaching in educational institutions. Our institute adopted G Suite for education using Google Classroom coupled with Google Meet for video-conferencing (Singh *et al*., 2020). However, there were several challenges for teachers as well as students due to the sudden shift to online mode. Various factors like need of specific preparation for online teaching, lack of experience and awareness regarding online teaching, poor technical support by many institutes, and lack of interest among faculty as well as students to adopt new mode, etc. influence faculty to teach online. Despite increasing use of technology in various academic activities, faculty experienced difficulties in the

transition to online teaching. The competencies to teach online require faculty to adjust their attitudes towards technology and teaching, simultaneously. Previous studies have suggested that teaching in the online modality is different from traditional teaching in the classroom. The main focus of online teaching faculty remains on virtual management techniques, and the ability to engage students through virtual communication (Ko and Rossen 2017; Wray *et al*., 2008; Easton SS 2003). It has been found that faculty new to online teaching feel a lack of readiness to teach online and needed technical and pedagogical support, and time-management strategies (Downing and Dyment 2013). Also, students are likely to experience more positive learning outcomes when their faculty have positive attitudes towards online course delivery (Volery T 2000). With advances in technology, online learning is likely to become a new normal and its integration with standard classroom teaching in medical education is likely in foreseeable future to enhance the quality of medical education. Therefore, it is essential to understand the viewpoints of various stack holders. So, we planned the present study with primary aim to assess the faculty's readiness and perception of online teaching for the medical under-graduates during COVID-19 pandemic. The secondary aim was to identify the challenges faced by the faculty as well as their needs in order to achieve positive learning outcomes of online teaching.

METHOD

A cross-sectional online survey was conducted. A survey questionnaire was specifically developed by investigators for this study based on the available literature (Guglielmino *et al*., 2003; Mayer RE 2010; Mayer RE 2002; Eslaminejad *et al*., 2010). The survey questionnaire included questions in domains of knowledge, skills, and attitude as these are important determinants of online teaching readiness. Knowledge and skills include resourcefulness and knowledge of pedagogical skills, technical skills and competencies related to online methods of interaction. It also includes delivery of classes using multimedia design principles, previous experience with online teaching, and comfort in managing and utilizing time for preparing the content. Attitude append the overall attitude towards the concept, perceived usefulness, and perceived burdensomeness of online teaching. Apart from the general information the questionnaire comprised of a total of 30 questions. The questionnaire consisted of 21-item, rated on a 5-point Likert scale ("strongly agree", "agree", "neutral", "disagree" and "strongly disagree"). Of these 11 items explored knowledge and skills and 10 items addressed the attitudes towards online teaching platform. Eight items were intended to explore the perception, out of which five were in "Yes/No" format and the rest three had subjective rating on 10-point scale. One last question was open-ended and optional. It intended to obtain any other relevant information or suggestion regarding online teaching. The total time to complete the survey was approximately 15 minutes. Ethical Clearance was taken from the Institutional Ethics Committee vide certificate reference number AIIMS/IEC/2020-21/3090.

The data was collected through a self-administered online survey questionnaire, which was sent via E-mail or WhatsApp to the faculty who were involved in online teaching at our institute as well as other different medical institutions during the COVID-19 pandemic. Participants were provided the information regarding the study and informed consent was taken through digital mode. Those who were not involved in the online mode of undergraduate medical teaching were excluded. The statistical package for social sciences (SPSS version 21, Chicago, US) was used to analyze the data and descriptive analysis was done. Thematic analysis was done for the qualitative data. Comparison of continuous variables was done by independent t-test and categorical variables were done using Chi-square test. A *p*-value of less than 0.05 was deemed to be significant.

RESULTS

Demographic and professional profile

A total of 125 faculty from different teaching medical institutes from India, gave consent and filled the survey questionnaire. Out of these 11 were excluded as they were not involved in undergraduate teaching. Table 1 shows the demographic and professional profile of the participants. The majority of them were between 36-45 years (61.4%) of age and were males (65.8%). Majority (67.6%) had more than 5 years of teaching experience as faculty. Most (55.3%) of them were involved in teaching the clinical subjects.

Table 1: Demographic and professional profile of faculty

Age	**N (%)**
26-35 yrs	33 (28.9)
36-45 yrs	70 (61.4)
>46 yrs	11 (9.7)
Gender	
Male	75 (65.8)
Female	39 (34.2)
Designation	
Professor/Additional Professor.	19 (17.5)
Associate Professor	40 (35.1)
Assistant Professor.	38 (34.2)

Nursing Faculty	17 (14.9)
Teaching experience (years)	
≤ 5	37 (32.4)
6-10	47 (41.2)
≥ 10	30 (26.4)
Specialty	
Clinical	63 (55.3)
Pre/para-clinical	34 (29.8)
Nursing.	17 (14.9)
Format of online class	
Live lectures	106 (93)
Pre-recorded lectures.	8 (7)
Previous experience of conducting online academic activity before COVID-19 pandemic	82 (71.9)
Comfortable to use various method of online teaching (like audio, video animations etc.)	87 (76.3)

Readiness and challenges

Table 2 shows the responses of faculty regarding different domains (Knowledge-K, skills-S and attitude-A) of readiness towards online teaching. The majority agreed that they have adequate knowledge and skills regarding online preparation and delivery of the classes. However, 92.9% of the faculty felt the need to have more creative resources for online classes and around 50% did not feel comfortable to teach practical-clinical skills to the students through online platform. Also, half of them felt higher workload and more time spent while preparing and teaching online. The majority (92.1%) agreed that there was a constant concern related to technical issues while conducting the online classes and around 50% were not confident to handle the technical issues if required. Most of the faculty believed that student engagement factors (like level of interaction, active involvement, motivation, controlling the students, etc.) were the common hurdles in online teaching and majority (95%) felt lack of connectedness with the students during online teaching. Overall, majority of participants (>80%) considered online teaching platforms as a useful and important aspect of learning, although need for further training for teaching in online platform was simultaneously expressed (78%).

Table 2: Responses of faculty regarding different domains (Knowledge-K, skills-S and attitude-A) of readiness towards online teaching during COVID-19 pandemic

Responses	SA	A	N	SD	DA
1. It is manageable for me to break the larger/ continuous lessons into smaller, students paced segments in the online teaching platform. (K/S).	15(13.1)	64(56.2)	25(21.9)	11(9.7)	0(0)
2. There is a need to have more creative resources to be used for the online classes than the traditional classes. (A)	51(44.7)	55(48.2)	7(6.1)	0(0)	1(0.9)
3. It takes longer to prepare for online classes than for face-to-face classes. (K/S).	13(11.4)	33(28.9)	34(29.8)	33(28.9)	1(0.9)
4. I am familiar with the use of communication tools in the online classes (e.g., chat box, threaded discussions, etc.) (K/S)	19(16.7)	70(61.4)	15(13.2)	9(7.9)	1(0.9)
5. I feel competent to eliminate extraneous material, highlight essential material and maintain contiguity in printed words and graphics while delivering the online classes. (K/S)	11(13.2)	68(59.6)	18(15.8)	13(11.4)	0(0)
6. I am able to provide pre-training (orientation/basic understanding regarding the topic to be covered) the key-concepts to the students. (K/S)	16(14.0)	79(69.3)	13(11.4)	6(5.3)	0(0)
7. I feel comfortable in using the verbal mode (spoken words) along with visual-pictorial mode during the online class delivery to the students. (K/S)	32(28.1)	72(63.2)	8(7.0)	2(1.8)	0(0)
8. I am comfortable to present words and pictures simultaneously and present the words in conversational style. (K/S)	23(20.2)	72(63.2)	8(7.0)	12(10.5)	0(0)
9. I feel comfortable to teach the practical-clinical skills to students through online platform. (K/S).	8(7.0)	24(21.1)	29(25.4)	40(35.1)	0(0)
10. There is higher workload/ more time spent when teaching online classes as compared to the traditional one. (A)	10(8.8)	37(32.5)	37(32.5)	28(24.6)	2(1.8)
11. There remains a constant concern related to technical issues while conducting the online classes.	38(33.3)	67(58.8)	7(6.1)	2(1.8)	0(0)
12. I feel confident to handle the technical issues during the online classes, if required. (K/S)	5(4.4)	41(36.0)	31(27.2)	34(29.8)	3(2.6)
13. The support from the institute is adequate to deal with	33(28.9)	53(46.5)	16(14.0)	5(4.4)	7(6.1)

technical problems during online classes. (A)					
14. Online teaching is often frustrating because of technical problems. (A)	5(4.4)	38(33.3)	39(34.2)	31(27.2)	1(0.9)
15. The level of interaction with students in the online course is higher than in a traditional face-to-face class. (A)	2(1.8)	8(7.0)	13(11.4)	55(48.2)	36(31.6)
16. The students are actively involved in the learning during online classes. (A)	0(0)	16(14.0)	27(23.7)	51(44.7)	20(17.5)
17. There are no problems in controlling the students in the online environment. (A)	3(2.6)	27(23.7)	28(24.6)	37(32.5)	19(16.7)
18. It is more difficult to motivate students in online environment than in the traditional setting. (A)	24(21.1)	57(50.0)	20(17.5)	13(11.4)	0(0)
19. Lack of connectedness (face to face) with the students is often felt during online teaching. (A)	52(45.6)	56(49.1)	4(3.5)	0(0)	2(1.8)
20. It is easier to take students' feedback and clear their doubts and queries in the online teaching platform. (K/S)	2(1.8)	35(30.7)	29(25.4)	39(34.2)	9(7.9)
21. Online teaching platform is useful and important aspect of learning. (A)	20(17.5)	71(62.3)	19(16.7)	4(3.5)	0(0)
22. Using any method to evaluate student's understanding (K/S)	Yes 67 (58.8)				
Assignment/ MCQ	35(52.2)				
Discussion/General feedback	9 (13.4)				
Asking questions pre/post teaching	23 (34.4)				
23. Do you feel further need of training for the online teaching? (A)	Yes 89 (78.1)	No 25 (21.9)			

n=114 (SA-Strongly agree, A-Agree, N-Neutral, DA-Disagree, SD-Strongly disagree)

Perception

The mean scores for the perception of faculty towards online teaching during COVID-19 pandemic were reported on 10-point Likert scale. The mean score regarding the comfort and competency in adapting to the sudden shift towards online teaching during COVID-19 phase was 7.20±1.57. Regarding satisfaction with online teaching experience, the mean score was 6.71±1.84. The participants were willing to continue online teaching post-pandemic with a mean score of 6.23±2.54.

Pre/para clinical Vs Clinical

Table 3 shows a comparison of perception between Pre/Para Clinical (PC) vs Clinical (C) specialty subjects towards online teaching. A significant difference was found between the two groups regarding willingness to continue online teaching post-pandemic with clinical specialty group more willing to continue ($p < 0.05$). However, the comfort level of teaching practical-clinical skills (using verbal mode along with visuo-pictorial mode and presenting words and pictures simultaneously) was more in the faculty teaching pre/para clinical subjects than the faculty teaching the clinical subjects ($p < 0.05$).

It was suggested by most participants that online teaching should be continued as mixed method and/or adjunct to online teaching post pandemic. However, lack of connectedness with the students is reported as a major drawback of online teaching.

Table: 3 Comparison of perception and readiness between Pre/Para Clinical (PC) vs Clinical (C) specialty towards online teaching during COVID-19 pandemic

	Specialty n=97	**Mean±SD**	**P value**
How comfortable /competent did you feel in adapting to the sudden shift towards online teaching during COVID-19 phase?	C 63 PC 34	7.14 ± 1.63 6.88 ± 1.62	0.45
How satisfied did you feel with your online teaching experience during COVID-19 phase?	C 63 PC 34	6.75 ± 1.80 6.12 ± 2.01	0.12
How willing are you to continue online teaching post pandemic?	C 63 PC 34	6.54 ± 2.36 5.29 ± 2.82	0.022*

P≤0.05 (significant)

DISCUSSION

The present survey was an attempt to assess the readiness and perception of the faculty involved in online undergraduate teaching in various teaching medical institutes in India during COVID-19 pandemic. Earlier studies have suggested that the readiness to teach online depends on knowledge, attitude, skills and practices of the teaching faculty (Eslaminejad *et al*., 2010; Martin *et al*., 2019). The sudden shift from traditional teaching to the online mode of teaching in the medical institutes provided an opportunity to understand and explore utility of online lectures in medical curriculum and to reshape undergraduate medical education through online platform of learning.

In our study most, participants were comfortable in using various methods of online teaching and had adequate knowledge and skills regarding online preparation and delivery of the classes. In contrast, previous studies found that faculty members new to online mode of teaching did not feel adequately prepared to teach online and felt need of technical and pedagogical support, and time-management strategies (Downing and Dyment 2013; Lichoro DM 2015). This difference may be attributed to the previous experience of the majority of the faculty in conducting online academic activities. Also, the questionnaire used in our study did not include complete information regarding integration of all the multimedia design principles like purposeful design of slide topography, slide decks, etc. from the faculty. In context of medical education, application of multimedia design principles to medical students' lectures have shown to improved attainment of learning objectives both short-term and long-term (Issa *et al*., 2013; Issa *et al*., 2011). The concern related to technical issues while conducting the online classes was uniformly expressed and half of them were not confident to handle the technical issues, if required. In line with findings of the present study, previous literature also suggested that the availability of online help desk services was an essential need of online teaching faculty (Gay GH 2016). Another similar study, also recommended that faculty must be trained with more technological skills and more technology infrastructure is required for online education (Moralista and Oducado 2020). It has been advocated to enhance the competency of teachers using complex Information, Communication and Technology (ICT) tools (Marcial and de la Rama 2015). The competency in computer and technology is vital for online teaching as it is associated with enjoyment, less time-consumption and lesser difficulty level in the web-based courses (Moralista and Oducado 2020). Moreover, faculty's attitude towards online teaching has also been found to be linked with technical knowledge and computer exposure (Du Y 2004).

The student engagement factors (like level of interaction, active involvement, motivation etc.) were believed to be common hurdles in online teaching. Almost all felt lack of connectedness with the students during online teaching. Similarly, another study found that there was lack of scope for meaningful interaction and decreased level of understanding among the students during virtual classes (Moralista and Oducado 2020). The mechanical conduct of classes and limited range of innovative teaching methods in the online platform were the significant challenges faced by teachers (Moralista and Oducado 2020). Though majority of participants used student evaluation, it was observed that around 40 percent of the faculty did not use any method to evaluate student's understanding. This can be attributed to lack of training for online teaching. The inability to utilize the online assessment methods can contribute to lack of active engagement of students in online learning. Due to inability to read the face and mood of the students, it was difficult for teachers to change teaching patterns. Concerns were also expressed regarding the practical and laboratory activities which are essential part of the medical curriculum (Kisanga D 2016). Most of the faculty, especially those teaching clinical subjects, felt the need to have more creative resources to be used for the online classes than the traditional one in the present study. It was also observed that the comfort level of teaching practical-clinical skills (using verbal mode along with visuo-pictorial mode and presenting words and pictures simultaneously) was more among the faculty teaching pre/para clinical subjects than the faculty teaching the clinical subjects. This finding has been supported by Mishra et al. who expressed the demand of simulation techniques for the laboratory practical in higher education (Mishra *et al*., 2020).

Overall, most of the faculty considered online teaching platform as useful and important aspect of learning. They were satisfied with their online teaching experience and were willing to continue online teaching post-pandemic also. Similarly, previous study also found that faculty considered competencies required for online teaching as fundamental part, but at the same time, also conveyed the need to improve their ability with regard to these competencies to perform better at online teaching (Aydin CH 2005). In contrast, another study highlighted that faculty members were ambivalent regarding continuing online education (Moralista and Oducado 2020). Most faculty in present study felt need for further training for the online teaching methods and technical aspects as well.

Previous literature suggests that perception of online teaching ability improves with professional development programs for faculty (Northcote *et al*., 2015). Also, it has been considered important for the faculty to be competent in their role and acquire necessary skills for the online learning methods to positively impact the student outcomes (Frazer *et al*., 2017). Overall, the findings from the present study may be considered by medical institutions in proper planning and effective implementation of online teaching-learning post-pandemic also. This will further help to achieve a more effective incorporation of e-learning.

Way forward

The findings of the index study provide an insight that online lectures can be integrated into different aspects of medical education that can be tailored as per need of students. Online learning platforms currently used by various institutions comprise of online videos, adaptive tutorials, video conferencing, webcasts, and virtual models. The range extends from discussion forums, websites, and online discussion spaces to real-time online chat (McLaughlin and Brame 2020; Sutterlin J 2018; Baig *et al*., 2020). These learning resources can be easily accessed using smartphones. The websites and blogs can help to provide basic information and later, the demonstration of essential skills like

procedural clinical skills can be taught through host videos. Online teaching–learning can be implemented in the medical education via synchronous and asynchronous modes. Synchronous teaching tools like e-lectures, e-labs, e-problem based learning and virtual patients can be used to impart basic subject and clinical competencies to the students while asynchronous teaching through chat rooms and discussion forums can be used to enhance student engagement and interaction (Taha *et al*., 2020). The adoption of flipped classroom model can be considered most beneficial as it allows students to learn from different self-paced tools including online lectures before attending live teaching sessions (Prober and Heath 2012). This model provides more quality time with teachers as well as peers to focus on clinical context, more difficult topics and discussion of applications. Still, adopting the innovative ways to deliver the required and desirable outcomes remains a challenge for the medical educators. The present COVID 10 crisis has given the opportunity to explore the technology based medical education. The blended teaching-learning model may be incorporated in medical education by using the emergent technology (Pei and Wu 2019).

In developing countries with inadequate infrastructure in terms of medical educators, academic resources, etc., online learning can pave a way to strengthen quality of medical education due to its adaptability and flexibility. However, for the effective integration of online teaching-learning model, certain attributes like curriculum goals, students preferences, multi-media design principles of digital learning and good online teaching practices need to be considered (Saiyad *et al*., 2020). Therefore, further research would be helpful to identify the specific design features of online lectures that can best facilitate medical student learning. A more focused research study plan is required to investigate which type of multimedia design principles correlate best with improved learning outcomes. Moreover, the effectiveness of traditional face-to-face teaching, online lectures (didactic) and online modules (interactive), along with the settings in which each modality can be best applied needs to be compared and explored further. Finally, to bridge the gap between effective use and good online practices, it is suggested to enhance the development of different attributes by faculty i.e., faculty development workshops in addition to subject knowledge. These are effective for guiding and enhancing faculty to achieve new roles and competencies for online learning (Dhir *et al*., 2017). Various factors like pedagogical, interface design, evaluation, technological, resource support, management, and institutional, etc. should be considered while developing and conducting faculty development programs (Badrul HK 2020). Thus, it is strongly recommended that stakeholders of the medical education in different medical institutes put their academic experience into practice and give a scholarly vision and forward thinking for the practical solutions for maximum benefit to medical students.

CONCLUSION

There are some limitations in the present study. This was a survey-based, cross-sectional study and hence tracking of changes in the perception of the faculty over time could not be done. The generalizability and representativeness of the finding is affected in view of purposive sampling. Based on our findings, it is opined that online teaching can be blended with face-to-face learning as an adjunct and should be incorporated in the medical curriculum. With a need to adapt to the transition to the online mode of teaching-learning, the faculty needs to be competent in their role to ensure the online learning environment that effectively facilitates learning of the students and achieve positive learning outcomes. Therefore, it is recommended that faculty members must be provided with continued support, development and training in online teaching.

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