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Original Article

Challenges and acceptance of e-teaching among medical professionals during the COVID-19 pandemic

Arvinth Arthanareeswaran[1*], Suganya Ezhilarasan[2]

[1]Department of Pharmacology, Sri Venkateshwaraa Medical College Hospital and Research Centre, Puducherry, India.
[2]Department of Community Medicine, Sri Venkateshwaraa Medical College Hospital and Research Centre, Puducherry, India

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Abstract
Background: Previously resistant to change, medical professionals have now embraced e-teaching as a modern technology and the COVID-19 pandemic has compelled the entire world to accept it as a fundamental tool for education. This study aimed to evaluate the challenges and acceptance of E-teaching by medical professionals during the COVID-19 pandemic.
Methods: An electronic form questionnaire was designed and validated according to the Technology Acceptance Model (TAM) to find out the factors that affect the acceptance and use of E-teaching by medical professionals.
Results: Most of the participants (88%) agreed that the technological skills of giving online courses increase the educational value and experience of teaching medical professionals. The highest barrier to E-teaching was unsteady internet connectivity (56%), inadequate internet data(48%), lack of computers/ laptops (16.5%), and technical problems (73%). The rate of participant agreement on perceived usefulness, perceived ease of use, and acceptance of E-teaching was (83.1%, 81.4%, and 88.6% respectively).
Conclusion: In our current study, most of the participants strongly agreed with the perceived usefulness, perceived ease of use, and acceptance of E-teaching. It is evident that online teaching will persist, and education will increasingly adopt a hybrid model.

Introduction

In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic.[1] The pandemic has affected all global industries, including education.[2] In addition to social distancing, the most effective preventative strategy since the emergence of COVID-19, medical education has been profoundly disturbed as it involves in-person didactic lectures and tutorials, clinical rotation exposure, laboratory experiences, observing and assisting relevant medical and surgical procedures.[3-5] In India, the pandemic of COVID-19 caused many schools and colleges to remain closed temporarily.

Face-to-face education was ended by many medical colleges because of the pandemic. This may result in negative impacts on educational activities, as social distance is crucial at this stage. Educational institutions are now trying to find many alternative ways to manage these problems.[6] This lockdown stimulated the growth of online educational activities so that there would be no interruption to education. The majority of the faculties are involved in providing better online course material by involving students and assessing their performance.[7]

Therefore, this pandemic has made the new technology accepted by many organizations that were previously resistant to follow. However, this was really a tough period for the institutions to deal with the present situation, especially medical education which was found to be more challenging.[8] E-teaching is described as a teaching method using electronic devices ie. computers, laptops, smartphones, etc. with internet availability in synchronous or asynchronous surroundings. E-teaching will be a better platform that makes the process of education more student-centered, creative, and flexible.[9] Online courses are more cost-effective and easily accessible especially when teaching to students of rural background. The United Nations (UN) and the WHO have joined hands as a helpful tool for accomplishing the educational needs of many countries especially developing countries.[10] Many Medical institutions in our country have implemented numerous creative strategies to overcome the crisis, using various software and applications like Google Classroom, Zoom, and Microsoft Teams to take online classes and were widely used by the teaching medical professionals. This was initiated not only to complete the syllabus but also to maintain constant contact with the learners. This online class teaching was started to improve the

***Corresponding author:** Arvinth Arthanareeswaran, Email: arvinth@svmchrc.ac.in

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confidence of the students towards their faculty during the COVID-19 pandemic.

It is expected that with the effective implementation of E-teaching, the role of medical professionals will be transformed from the traditional teacher-centric to student-centric model which exists as the current new curriculum in many teaching medical colleges. Therefore, the aim of this study is to evaluate their experiences and challenges to E-teaching during the COVID-19 pandemic.

This study aimed to evaluate the challenges and acceptance of E-teaching by medical professionals during the COVID-19 pandemic.

Materials and Methods

Study sesign

Cross-sectional study.

Study area

Tertiary Care Teaching Medical College Hospital, Chennai.

Study population

The study included 200 medical professionals from pre-clinical, para-clinical, and clinical departments who are involved in the development and teaching of online courses. Medical professionals who were not involved in online teaching were excluded from the study.

Study procedure

The study protocol was reviewed and approved by the Scientific Research Committee and Institutional Ethics Committee. A questionnaire was designed on Google Forms by the principal investigator. The accuracy of the content and validity of the internal survey items were finalized with multidisciplinary departments from the study investigators. Finally, it was piloted with 10 medical professionals who were not enrolled in the study and a few modifications were made as per their suggestions. After validation, the Google form web link for participating in the study was shared via the mail portal and each department's WhatsApp group by the investigators.

Data analysis

Data were analyzed using the SPSS version 25.0. The normality of data distribution was assessed using the Shapiro-Wilk test. The descriptive analysis was performed to obtain quantitative data by mean and standard deviations. Qualitative data were obtained and analyzed using frequencies and percentages, as applicable. Finally, a multivariate regression analysis was performed to predict the potentially significant determinants of acceptance and use of E-teaching in education. A P value < 0.05 was considered statistically significant.

Results

The study included 200 Teaching medical professionals. Among the study participants, 103(51.5) were Males and 97(48.5) were Females. Most of the teaching staff enrolled are Assistant professors (60.5%) and a majority have not taken online classes before the COVID-19 pandemic (67.0%) (Table 1).

Before evaluating the challenges, insight into the response of the medical professionals towards E-teaching revealed that the online class is more flexible compared to the direct contact class (50.5% strongly agreed and 28.5% agreed). Many faculty members (66.5% strongly agreed and 25.5% agreed) prefer face-to-face contact with students over online interaction. Additionally, 44% agreed that the design of online classes allows faculty to manage their time more effectively. While 44.5% of the faculties were neutral that the theoretical class is easy to take online compared to 93.5% of faculties admitted that the Practical modules are difficult for faculties to conduct in online classes (82.5% strongly agreed and 11% agreed) (Table 2).

A study on the challenges of E-teaching reported by medical professionals revealed that (56%) had issues with unsteady internet connectivity, (48%) encountered inadequate internet data, (33%) lacked computers or laptops and (73%)experienced technical problems (Table 3).

The application of the Technology Acceptance Model (TAM) to medical professionals revealed that 83.1% of the participants perceived the use of E-teaching as highly beneficial. This suggests that the majority of study participants believe E-teaching significantly improves and advances the educational process.

A significant 81.4% of participants strongly agreed that the E-teaching systems implemented were highly easy to use and operate, indicating a high level of perceived ease of use. Furthermore, the acceptance rate of E-teaching

Table 1. Socio-demographic data of the studied group (N = 200)

Variables	No. (%)
Gender	
Male	103 (51.5)
Female	97 (48.5)
Category	
Preclinical departments	28 (14.0)
Preclinical departments	64 (32.0)
Clinical departments	108 (54.0)
Designation	
Tutor/SR	28 (14.0)
Assistant professor	121 (60.5)
Associate professor	22 (11.0)
Professor	29 (14.5)
Have you taken online classes before Covid-19?	
No	134 (67.0)
Yes	66 (33.0)

Table 2. Insights of medical professionals towards E-teaching

Question	Medical professionals (N = 200)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
In the classroom environment, face- to -face contact with students is favored over online teaching.	133 (66.5)	51 (25.5)	9 (4.5)	6 (3)	1 (0.5)
The online class is more flexible than direct contact class.	101 (50.5)	57 (28.5)	32 (16)	8 (4)	2 (1)
The online class design permits faculties to manage time.	75 (37.5)	88 (44)	21 (10.5)	12 (6)	4 (2)
Practical modules are difficult for faculties to conduct in online classes.	165 (82.5)	22 (11)	7 (3.5)	4 (2)	1 (0.5)
Theoretical class is easy to take online.	35 (17.5)	63 (31.5)	89 (44.5)	7 (3.5)	10 (5)
Online classes fascinate students as no prior classroom setup is needed	107 (53.5)	54 (27)	28 (14)	9 (4.5)	2 (1)
Online class reduces interaction with students than face-to-face class.	169 (84.5)	22 (11)	4 (2)	2 (1)	3 (1.5)
It is difficult to conduct exams on an online platform.	87 (43.5)	32 (16)	65 (32.5)	12 (6)	4 (2)
Online class permits content self-learning more than "classic" face-to-face class.	10 (5)	31 (15.5)	149 (74.5)	6 (3)	2 (1)
Online classes lack skill-based training for students.	178 (89)	16 (8)	4 (2)	1 (0.5)	1 (0.5)
Online class requires more obedience from students than regular traditional classes.	151 (75.5)	36 (18)	10 (5)	2 (1)	1 (0.5)

Table 3. Challenges of E-Teaching among medical professionals (N = 200)

Challenges	No. (%)
Unsteady internet connectivity	112 (56.0)
Inadequate internet data	96 (48.0)
Lack of computers/laptops	33 (16.5)
Technical problems	146 (73)
Heavy workload of the online courses	127 (63.5)
Limited technology skills	98 (49)
The level of interaction with students in the online course is lower than in a traditional face-to-face class	176 (88)
Longer time to prepare for an online course	106 (53)
Difficulty in motivating students in the online environment than in the traditional setting	134 (67)
Lack of suitable online environment at home (e.g. presence of children, and other family members)	156 (78)
It is difficult to divide students into subgroups for group task working	168 (84)
It is difficult to receive student feedback in the online course versus in a traditional face-to-face class.	121 (60.5)

Table 4. Technology Acceptance Model (TAM) results of medical professionals to E-teaching (N = 200)

Item	Questions	Percentage of response	Category
Perceived usefulness	Accelerate work Improve performance Increase productivity Effective Simplify work Helpful	83.1%	Strongly Agree
Perceived ease of use	Easy to learn Can be controlled Clear and understandable Flexible Easy to use Easy to be skilled	81.4%	Strongly Agree
Acceptance of E-teaching	I will use E-teaching in the future I will use E-teaching frequently I am satisfied with E-teaching I recommend others to use E-teaching	88.6%	Strongly Agree

was found to be 88.6%, suggesting that, based on user perception, the implemented E-teaching system was highly accepted.

This was achieved because both perceived ease of use and perceived usefulness were assessed as satisfactory by the users (Table 4).

The limitations of our current study are due to time constraints and the consequences of the COVID-19 pandemic. Despite these challenges, a significant number of health professionals could have been included.

Discussion

The abrupt transition from face-to-face learning to online teaching has produced numerous challenges for teachers, as this transition occurred unexpectedly and without prior preparation. E-teaching, a crucial tool in medical education, can offer an effective alternative to the traditional in-person education system. The use of electronic teaching has increased worldwide over the past few decades, and several medical colleges in developing countries have already embraced this trend.[11] However, the challenges of accessing new technologies, dealing with unreliable internet connections, and navigating a weak institutional framework for implementing e-teaching are significant obstacles to its successful establishment.[12,13] E-teaching is one of the best platforms that provides an interactive learning environment online for medical students without getting much affected during the COVID-19 pandemic lockdown. E-teaching poses a significant challenge for medical professionals, as they must adapt to delivering lectures on online platforms.[14] Our study investigated the challenges and obstacles

encountered by medical professionals in accepting e-teaching as a learning method during the COVID-19 pandemic, participants strongly agreed (83.1%) that the technological skills to deliver online classes increase the educational value of experience of teaching medical professionals. Similarly, these findings from our research correlate with the results of research studies conducted by Kleiman[15] and Jamlan.[16]

Most participants in our study agreed (44%) concerning the advantages of time flexibility in teaching on the online platform. Contrary to this, Bhardwaj et al[17] reported that some faculty members believe e-teaching can be time-consuming, lead to difficulties in monitoring students, and reduce interest in traditional face-to-face teaching.

Furthermore, in our study, the majority of participants strongly agreed that online classes accelerate their work and improve their performance. Similarly, Tullis and Benjamin acknowledged the benefits of self-paced online learning.[18]

In our study, a significant 43.5% of participants strongly disagreed with the notion that conducting exams via an online platform is challenging for faculty. This perception among medical professionals could be due to the fact that many online exams are structured around multiple-choice questions. This format allows for automated grading, significantly reducing the time and effort required by faculty members.[19]

Contrary to our findings, Hannafin et al observed that many observational and participatory evaluations of web-based learning posed challenges.[20] Similarly, Oncu and Cakir[21] found that the absence of direct face-to-face interaction and informal assessment made online teaching a challenge for faculty members. The application of the TAM on our study participants revealed that a higher percentage of the respondents agreed with the perceived usefulness of E-teaching and accepted that E-teaching is valuable in improving the learning process. A study by Poon et al revealed that their participants were not fully comfortable with the Online platforms as an alternate tool for teaching.[22] This perception is related to many factors such as technological challenges, difficult interactions and discussions with students, lack of adequate internet connectivity, and personal learning preferences.[23] Contrary to the findings by Chokri,[24] our study depicted that most of the respondents were satisfied and strongly agreed with the use of E-teaching in the future. Medical professionals should respond by recognizing the impact of the COVID-19 pandemic on medical students. This understanding will enable them to adapt to the changes implemented to enhance their learning experience. Consequently, students will be better equipped to manage their time effectively and continue their education.

Academic strategies such as special classes and MCQ tests could potentially lead to improvement. Other strategies like feedback collection on a regular basis can be implemented to engage students. However, these initiatives may require institutional support and interactive learning by the medical students.

Conclusion

Despite the sudden migration of instructional delivery to online platforms by medical colleges and other citadels of E-teaching during this pandemic, the challenges experienced by medical professionals are well explored and transformed into opportunities. In our current study, the majority of the participants strongly agreed with the perceived usefulness, perceived ease of use, and acceptance of E-teaching. It is evident that virtual learning will only be a complimentary method for traditional learning methods and education will become more hybrid.

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Authors' Contribution

Conceptualization: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Data curation: Suganya Ezhilarasan.
Investigation: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Methodology: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Project administration: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Resources: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Software: Arvinth Arthanareeswaran.
Supervision: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Writing–original draft: Arvinth Arthanareeswaran, Suganya Ezhilarasan.
Writing–review & editing: Arvinth Arthanareeswaran, Suganya Ezhilarasan.

Competing Interests

The authors declare no conflict of interests.

Ethical Approval

Consent was obtained from all the participants. The study was approved by the ethics committee of TMCH (No.ECR/634/Inst/TN2014/RR20).

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