

Barriers of conducting Effective Online Classes in Undergraduate Medical Education during the COVID-19 Pandemic

Rahim, R¹., Alo, D¹., Narunnabi, A. S. M^{2,3}., Parvin, S¹., Sufrin, S¹.

Abstract

Introduction: In March 2020, the Coronavirus disease 2019 (COVID-19) pandemic forced medical colleges in Bangladesh to stop face-to-face learning activities and abruptly shift to an online curriculum. This study aims to identify the barriers to online teaching and learning from the perspective of the students and the teachers at a medical college from a developing country's perspective.

Methodology: This prospective, cross-sectional study was based on an electronic survey that was sent to the medical students and teachers of Mugda Medical College, Dhaka, Bangladesh, between August and December of 2021, to find out the barriers that they were facing in online classes during the COVID-19 pandemic. We used a semi-structured questionnaire with a Likert scale to find out the barriers. Data was obtained regarding perceived barriers to online learning.

Results: Perceived barriers to online learning in the COVID-19 situation as identified by the students were poor internet connection specially in the rural or peri urban areas of Bangladesh (67%), high cost of internet package (65%), ineffectiveness of online class regarding practical classes specially anatomy classes (59%), distractions in the home environment disturbs concentration in class (57%), ineffectiveness of online class in solving problems and absence of feedback (41%). On the other hand, according to the teacher's opinion, the most frequently encountered barrier was conducting practical, laboratory or bedside clinical teaching and learning (85%), followed by difficulty in understanding whether students are engaged in learning or not (65%).

Conclusion: Medical students and teachers confronted several interrelated barriers as they tried to adapt to online teaching and learning. Most frequently encountered were difficulty in adjusting learning styles, having distraction in home environment, and above all, poor internet connection. By implementing student-centered interventions, medical colleges and educators can play a significant role in addressing those challenges and finding possible solutions.

Keywords: Online teaching and learning, Undergraduate medical education, COVID-19, Bangladesh

Introduction

COVID-19, a public health crisis of worldwide

¹Mugda Medical College, Dhaka, Bangladesh

²Department of Anatomy, OSD, Directorate General of Health Services (DGHS), Dhaka-1212, Bangladesh

³Ontario Tech University, Oshawa, ON, Canada

Corresponding author: Dr. Riffat Rahim

Email: riffatrahim@yahoo.com

importance, was announced by the World Health Organization (WHO) in January 2020 as a new Corona virus disease outbreak and was reported as a pandemic in March 2020. Bangladesh reported the first case of COVID-19 on March 8, 2020. The increase in the number of cases by mid-March 2020 forced the government to make schools, colleges, and universities closed as



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social distance is crucial at this stage (WHO 2020). This shutdown stimulated the growth of online educational activities so that there would be no interruption to education. Many faculties have been involved in how best to offer online course material, involve students, and perform evaluations (Mukhtar *et al.*, 2020). This was a difficult time for the educational sectors to deal with the current situation; professional education, particularly medical education, was more challenging (Kaur *et al.*, 2020).

Online e-learning is described as learning experiences using various electronic devices (e.g., personal computer, laptop, smart phone, etc.) with internet availability in synchronous or asynchronous environmental conditions. Online e-learning could be a platform that makes the process of education more student-centered, creative, and flexible (Singh & Thurman, 2019). Online delivery of courses is cost effective and easily accessible especially when delivering curriculum to students in rural and remote areas (Colace, De Santo & Pietrosanto 2006). Online e-learning is seen by the United Nations (UN) and the WHO as a helpful tool for meeting educational needs, especially in developing nations (Kaul *et al.*, 2021).

Different medical colleges in Bangladesh have implemented numerous creative strategies to combat the crisis using various software/apps such as Google classroom, Zoom, and Microsoft teams to take online courses (Nurunnabi *et al.*, 2024). In order to complete the required courses in due time as well as to stay in constant contact with the learners, the virtual classroom (online learning) was initiated; another objective was to uphold the assurance and confidence of the students on their institutions and the faculty during the COVID-19 pandemic (Biswas & Uddin, 2020; Chowdhury *et al.*, 2022; Faruky *et al.*, 2022; Nurunnabi *et al.*, 2024). Before the COVID-19 pandemic, medical colleges in the country never had to implement online learning on this massive scale. This unprecedented situation presented an opportunity to critically examine the state of medical education nationwide, systematically evaluate the effectiveness of online curricula in a

developing country and formulate contingency plans for similar circumstances in the future (Biswas & Uddin, 2020; Chowdhury *et al.*, 2022; Faruky *et al.*, 2022; Nurunnabi *et al.*, 2024). This paper is expected to provide some important baseline data into that direction. We proposed this study to recognize the barriers and assess the challenges faced by both students and teachers in online teaching and learning during the COVID-19 pandemic especially in a low-resource setting. Additionally, it will facilitate to investigate the factors influencing the acceptance of e-learning as a tool for teaching and learning within medical education which could help future endeavors aimed at implementing e-learning not only during the pandemic but also in other non-pandemic emergencies in the country.

Methodology

This prospective, cross-sectional study was done between August and December of 2021 by using an electronic survey. The electronic survey was sent to the medical students and teachers of Mugda Medical College, Dhaka, Bangladesh, to find out the barriers that the students and teachers were facing while conducting online classes for MBBS programme during the COVID-19 pandemic in the country. Two different semi-structured questionnaires were sent to the students and the teachers at our medical college. Before that pretesting of the questionnaire was done on a small number of students and teachers. Ethical clearance was obtained from the Institutional Review Board (IRB) of Mugda Medical College, Dhaka, Bangladesh. In the invitation letter study participants were informed about the aims and procedures of the study, were given the choice whether to participate or not and were ensured of their anonymity. For safeguarding confidentiality and protecting anonymity each of the students and the teachers were given only serial numbers as coded by the computer used in this research. Statements were given to be chosen by both the groups in 5 points Likert scale to find out the barriers. To find out causes of barriers open-ended questions were added in the questionnaire. A total of 380 students and 64 teachers were enrolled in this

study. However, 275 medical students and 64 teachers responded. The statistical analysis was done using the Statistical Package for Social Sciences (SPSS) version 22.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Qualitative variables of this study were expressed as frequency and percentage.

Results

Among the students' statements barriers to online learning, the most frequently encountered were difficulty in adjusting poor internet connection specially in the rural or peri-urban areas (67%) of Bangladesh, high cost of internet package (65%), ineffectiveness of online class regarding practical classes specially Anatomy classes (59%), distractions in the home environment disturbs concentration in class (57%), ineffectiveness of online class in solving doubts and/or receiving personal feedback (41%). The data showed that the availability of fast and reliable internet

connection was a bigger concern than either device ownership or technical aptitude (Table 1). Among the teachers' statements on barriers to online teaching learning, the most frequently encountered were difficulty in conducting practical, laboratory or bedside teaching and learning (85%), then difficulty in understanding whether students are engaged in learning or not (65%), There is occasional disruption of internet connection that distract concentration in the class (55%), online evaluation system is not trustworthy in present situation in Bangladesh (50%), students understanding of the lesson cannot be understood always (49%), drawing/capturing students' attention to the lesson is not always possible (49%), online classes are ineffective in solving doubts and/or receiving personal feedback (39%). About 17% of teachers strongly agreed that they were comfortably using online classes on their subjects respectively and 10% of the teachers believe that education technologies are expensive and very complicated to them (Table 2).

Table 1: Distribution of the students by their statements regarding the barriers of online classes

Statements	Frequency (%)				
	Strongly disagree				Strongly agree
	1	2	3	4	5
There are low internet facilities in rural or peri urban areas of Bangladesh hinder effective teaching and learning	10 (3.6)	6 (2.2)	35 (12.7)	39 (14.2)	185 (67.3)
Online classes have a greater financial constraint as costly internet packages have to be bought	6 (2.2)	10 3.6	28 (10.2)	52 (18.9)	179 (65.1)
Distractions in the home environment disturbs concentration	9 (3.3)	14 (5.1)	31 (11.3)	64 (23.3)	157 (57.1)
Online classes are ineffective in solving doubts and/or receiving personal feedback.	15 (5.5)	29 (10.5)	45 (16.4)	73 (26.5)	113 (41.1)
Since practical classes are not possible, online classes are ineffective especially during anatomy class (e.g., dissection)	5 (1.8)	9 (3.3)	48 (17.5)	49 (17.8)	164 (59.6)

Table 2: Distribution of the teachers by their statements regarding the barriers of online classes

Statements	Frequency (%)				
	Strongly disagree		Strongly agree		
	1	2	3	4	5
Teachers are comfortably using online classes on their subjects respectively	6 (9.8)	8 (13.1)	20 (32.8)	10 (16.4)	17 (27.9)
There is occasional disruption of internet connection that distract concentration in the class	3 (4.9)	3 (4.9)	6 (9.8)	15 (24.6)	34 (55.7)
Students understanding of the lesson cannot be understood always	2 (3.3)	2 (3.3)	9 (14.8)	18 (29.5)	30 (49.2)
Whether students are engaged in learning or not-this is not understood always	–	1 (1.6)	7 (11.5)	13 (21.3)	40 (65.6)
Drawing/ capturing attention to the lesson is not always possible	1 (1.6)	1 (1.6)	6 (9.8)	23 (37.7)	30 (49.2)
Online evaluation system is not trustworthy in present situation	3 (4.9)	5 (8.2)	6 (9.8)	16 (26.2)	31 (50.8)
Difficult to conduct practical, laboratory or bedside teaching and learning	–	2 (3.3)	1 (1.6)	6 (9.8)	52 (85.2)
Online classes are ineffective in solving doubts and/or receiving personal feedback.	3 (4.9)	4 (6.6)	10 (16.4)	20 (32.8)	24 (39.3)
Teachers believe that education technologies are expensive and very complicated to them	10 (16.4)	11 (18.0)	20 (32.8)	10 (16.4)	10 (16.4)

Some opinions regarding the causes of barriers as mentioned by the medical students and the teachers are as follows:

1. *It is the first time in Bangladesh the online trend of education has been introduced at a wide scale especially new in the medical education which is patient oriented and different from general education. So, adapting to an online environment can be a challenge for both facilitators and students.*
2. *Regarding teaching learning along with assessments, this online trend has meanwhile encountered some unavoidable circumstances. As for example, in education assessment, practices are limited in the variety and modes in which they are allocated in an online environment.*
3. *It is the first experience both for students and teachers to get connected with online class, so they are found to be struggling with the proper adaptability with this trend as switching from traditional classroom to computer-based teaching and learning in a virtual classroom makes the learning and teaching experience entirely different for them.*
4. *During the shutdown most of the students are staying home in different areas of the country as still in the rural areas, broadband internet facilities are hardly available; therefore, students use mobile internet which interrupts the online connectivity due to poor internet signal.*

5. *The Internet is very expensive in our country. Hence, it is not easily accessible both for the students and the teachers.*
6. *There are some technical issues like poor literacy on handling computers and smart phones. Moreover, students and teachers must download some apps like Zoom, Google meet, etc.; sometimes it seems challenging due to lack of prior experience.*
7. *Time management has been a crucial thing as for example, Zoom can each time connect people online for 40 minutes (free option), but students take time to respond to the class due to some technical interruptions.*
8. *The technical issues, complexity and sequencing of activities are some of the important obstacles to the incorporation of multimedia application in the teaching and learning in this MBBS Programme.*

Discussion

Only few reports are available on the utilization and capacity of online teaching and learning in medical colleges of Bangladesh (Biswas & Uddin, 2020; Chowdhury *et al.*, 2022; Faruky *et al.*, 2022; Nurunnabi *et al.*, 2024). This paper aims to comprehensively identify and describe the barriers to online learning during the COVID- 19 pandemic from the perspectives of 275 medical students and 64 teachers at a reputed high-ranked government medical college in Bangladesh.

In this study, we showed that the number of medical students with limited access to technological resources was highest (67%). Power interruptions, weak infrastructure, and internet costs restricted the students' access to online content. Among both teachers (55%) and students' (67%) statements on barriers to online learning, the most frequently encountered were difficulty in adjusting poor or inadequate internet connection specially in the rural or peri-urban areas of Bangladesh. Again 65% of students stated the high cost of internet service in our study. Some other similar studies on online learning in developing countries often concentrated on students' limited access to

devices and the internet. Evidence suggests that cited inadequate internet, lack of face-to-face interaction, inadequate technical support staff, financial costs of maintaining the platform (Biswas & Uddin, 2020; Chowdhury *et al.*, 2022; Faruky *et al.*, 2022; Nurunnabi *et al.*, 2024). Research in other developing countries has focused mostly on technological (e.g., cost, access, software design) or contextual challenges (e.g., knowledge management, economy and funding, sociocultural norms), often failing to provide a comprehensive view of whole-system perspective (Frehywot *et al.*, 2013; Gachanja, Mwangi & Gicheru, 2021). The lack of infrastructure, technology, internet access, and poor quality of internet services are examples of barriers that impact both learners and faculty members (Biswas & Uddin, 2020; Frehywot *et al.*, 2013; Lakbala, 2016). Some other studies also that many had internet access problems at home and could not afford internet subscription (Faruky *et al.*, 2022, Gachanja, Mwangi & Gicheru, 2021; Rafi, Varghese & Kuttichira, 2020; Regmi & Jones, 2020). Although some service providers have been proactive in giving 1 GB of free data to students, accessibility issues were still unresolved (Lakbala, 2016). A study done in a resource-poor setting found that 12.2% of students mobilized around 1 to 2km from their house to obtain a stable internet connection. It also reported that lack of internet access and digital tools in villages or rural areas was a barrier to online courses (Rafi, Varghese & Kuttichira, 2020). Internet costs and poor internet connectivity were identified as major barriers to e-learning access among medicine and nursing students at Makerere University in Uganda. Over half of these students cited electricity challenges (56%) and lack of skills required to undertake e-learning (50%) as potential barriers (Olum *et al.*, 2020).

A high percentage of students had experienced barriers relating to ineffectiveness of online class regarding practical and clinical classes, especially Anatomy classes (59%). Among the teachers' statements on barriers to online teaching learning, the most frequently encountered were difficulty in conducting

practical, laboratory or bedside teaching and learning (85%). Several studies found similar results as most students appreciated the increased flexibility of remote learning, but also identified several deficits that still need to be addressed, including digital fatigue, decreased ability to participate, and lack of clinical skills, laboratory, and hands-on learning. Studies also illustrated some of the negative sides, more than half of the respondents thought that online learning was much or somewhat less effective in balancing practical and theoretical experience. Satisfaction tends to decrease with increasing years of study, especially when the practical aspects of teaching are at their peak. This is because at this stage of study, it is important for students to have contact with and inspect actual patients and be able to recognize various symptoms face-to-face. These processes are crucial for students' success to ensure that they will be good doctors in the future. Additionally, slightly less than half of the respondents thought that online learning was less effective in building skills and knowledge (Alsoufi et al., 2020; Al-Balas et al., 2020; Baticulon et al., 2021; Dost et al., 2020; Ekenze, Okafor & Ekenze, 2019; Faruky et al., 2022; Li et al., 2021; Papapanou et al., 2022; Shahrivini et al., 2021).

In our study, many students (57%) stated that distractions in the home environment disturb concentration in class. A similar type of study showed that 22.5% of the students did not have a learning space at home, 21.9% students did not have Wi-Fi access, and 11.2% did not receive mobile broadband coverage at home (Roslan & Halim, 2021). Another study found that about 50% students had limited access to internet, there were technical issues like power cut (76.5%), and poor network of internet (69.1%) also reduced the effectiveness of online education (Faruky et al., 2022). In our study, 41% students agreed that ineffectiveness of online class in solving doubts and/or receiving personal feedback. Similarly, such drawbacks like low quality of teaching and poor interaction with instructors were reported by several studies done across the globe. They pointed out that the weaknesses of online learning are the lack of

interaction between the professor and each student and among students (Alsoufi et al., 2020; Al-Balas et al., 2020; Baticulon et al., 2021; Faruky et al., 2022). Over half of the professors wanted to go back to offline lectures as evident by the reluctance and avoidance of educators to engage in new technologies and applications because of their limited knowledge or lacking proper training in these fields. Some studies have shown that there are numerous barriers to the implementation of e-Learning in medical schools e.g., time constraints, poor technical skills, inadequate infrastructure, absence of institutional strategies and support (Alsoufi et al., 2020; Al-Balas et al., 2020; Baticulon et al., 2021; Dost et al., 2020; Ekenze, Okafor & Ekenze, 2019; Li et al., 2021; Papapanou et al., 2022; Shahrivini et al., 2021).

Several studies demonstrated that teachers experience a variety of problems during the COVID-19 pandemic such as lack of opportunities in online learning applications, network and internet use, teacher's planning, implementation and evaluation and collaboration with parents (Alsoufi et al., 2020; Al-Balas et al., 2020; Baticulon et al., 2021). Similar studies done in our country also concluded that the most difficult situation was the training of instructors on online education process in medical education sector during the COVID-19 pandemic period (Biswas & Uddin, 2020; Chowdhury et al., 2022; Faruky et al., 2022; Nurunnabi et al., 2024). Several studies found that the lack of knowledge, skills and scarcity of devices and internet connection, irrelevance and issues with system access were the problems experienced by teachers and students in the COVID-19 pandemic (Alsoufi et al., 2020; Al-Balas et al., 2020; Baticulon et al., 2021; Dost et al., 2020; Ekenze, Okafor & Ekenze, 2019; Li et al., 2021; Papapanou et al., 2022; Shahrivini et al., 2021).

In the present study, the teachers faced difficulty in understanding whether students are engaged in learning or not (65%), occasional disruption of internet connection that distract concentration in the class (55%), online evaluation system is not trustworthy in present situation in Bangladesh

(50%), understanding of lessons by the student cannot be assessed always (49%), drawing/capturing students' attention to the lesson is not always possible (49%), online classes are ineffective in solving doubts and/or receiving personal feedback (39%). Evidence showed that the difficulties faced by teachers during distance education in the COVID-19 pandemic as technical barriers, student's conditioning, student's participation in education and online education experience (Alsoufi *et al.*, 2020; Al-Balas *et al.*, 2020; Baticulon *et al.*, 2021; Dost *et al.*, 2020; Li *et al.*, 2021; Shahrivini *et al.*, 2021). In developed countries, with good and cheap internet, e-learning has been assimilated as part of a blended education system, with both traditional lectures and e-learning (Dost *et al.*, 2020; Sklar, 2020). However, in developing countries, barriers like inadequate infrastructure and skilled personnel impede the enhancement of e-learning (Frehywot *et al.*, 2016; Nurunnabi *et al.*, 2024).

Studying the barriers of e-learning as reported by our survey revealed that reported insufficient/unstable internet connectivity, inadequate computer labs, lack of computers/ laptops, and technical problems were the highest challenge for adapting to online-learning. In alignment with these findings, recent research demonstrated that the main obstacles to e-learning are based on several stakeholder perspectives of infrastructure, technology, management, support, execution (Frehywot *et al.*, 2016; Kim *et al.*, 2020; Nurunnabi *et al.*, 2024; O'Doherty *et al.*, 2018; Sklar *et al.*, 2020).

Conclusion

This study highlights the barriers (technical and infrastructure resources) influencing the acceptance, and use of online learning as a tool for teaching within medical education. It may represent an optimal solution to maintain learning processes in exceptional and emergency situations such as COVID-19 pandemic. Hence, understanding technological, financial, institutional, teachers and student barriers are essential for the successful implementation of

online teaching and learning in medical education. Thus, it will help to develop a strategic plan for the successful implementation of e-learning and view technology as a positive step towards evolution and change.

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Competing interests: The authors declare no personal or financial conflicts.

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