

Comparison between online and traditional teaching-learning among non-clinical medical students

Aziz MMA^a, Imtiaz M^b, Rasul CH^c

ABSTRACT

Background: Medical institutes remained on complete shut down during the coronavirus disease of 2019 (COVID-19) pandemic while Information Technology (IT) bridged the teaching learning between the students and teachers. The study objectives were to determine the opportunities and obstacles of teaching learning process and overall effectiveness of online classes over traditional classes.

Methods: A cross-sectional study was conducted from July 2020 to December 2020 between students and teachers of Khulna city Medical College, Khulna, Bangladesh. An online questionnaire was developed using google form containing four sections about different aspects of IT and teaching learning process.

Results: Around 87% (160 vs 48) students and teachers responded to the questionnaire. The most preferred online teaching learning platform for students and teachers was zoom (84.4% vs 83.4%) and the favored devices were smart phone (96.2% vs 87.5%) followed by laptop computer (90.6% vs 83.3%). The majority felt connected to each other (82.5% vs 62.5%) and could work faster and effectively (75% vs 66.7%). Conversely, students (65.6%) felt online learning was more enjoyable than teachers (29.2%), where significant difference was found; ($p = 0.006$). Poor network (98.1% vs 79.1%) and affordability of mobile data (81.2% vs 66.7%) were the two main barriers among them. On-line teaching-learning neither increased student- teacher interaction (51.9% vs 66.7%), nor had better scope of asking question (52.5% vs 70.8%) and there was less scope of explaining details (52.5% vs 66.7%). Oral assessment was the most preferable (89.4% vs 83.3%), but the practical assessment (78.1% vs 83.3%) was the least preferable method for assessing students' knowledge and skill online. Overall effectiveness of online classes over traditional classes was scored around 50% ($\pm 10\%$) by students and teachers (58.1% vs 62.5%).

Conclusion: Despite having barriers like poor network, data affordability and limited computer and net usability, online classes played a pivotal role to continue the academic activities in a medical college during Corona pandemic.

Keywords: Information technology, teaching-learning process, student-teacher interaction.

(*BIRDEM Med J* 2022; 12(1): 45-50)

Author information

- Masood Mohammed Abdul Aziz, Associate Professor, Department of Biochemistry, Khulna City Medical College, Khulna, Bangladesh, Mobile No. 01746657621, E-mail: maziz15@gmail.com
- Masud Imtiaz, Associate Professor, Department of Physiology, Khulna City Medical College, Khulna, Bangladesh
- Choudhury Habibur Rasul, Professor, Department of Pediatrics, Khulna City Medical College, Khulna, Bangladesh.

Address of correspondence: Masood Mohammed Abdul Aziz, Associate Professor, Department of Biochemistry, Khulna City Medical College, 33 KDA Avenue, Khulna, Bangladesh. E-mail: maziz15@gmail.com

Received: July 11, 2021

Revision received: October 27, 2021

Accepted: October 31, 2021

INTRODUCTION

Nowadays, the incorporation of Information Technology (IT) and E-learning have increasingly gained acceptance in medical education. Most medical students own an IT device such as smartphone, laptop, desktop, tablet or iPad and E-book reader etc. These versatile devices can be used to input, store, retrieve, transmit and share teaching and learning materials and other healthcare-related information¹. Medical education has been strikingly impacted by Information technology which is evident in different literature^{2,3}. Currently, undergraduate students prefer both online and face-to-face learning experiences⁴. This is why blended learning methods such as flipped classroom are gaining popularity now

in developed countries. Presently, young generation of our country is very much comfortable in using IT devices for socialization and entertainment, but the use of these tools for the purpose of teaching and learning is relatively new and unexplored concept in our country until now.

World Health Organization declared coronavirus pandemic at the end of January 2020⁵ and the first case was detected on 8th March in our country⁶. As the number of cases were increasing rapidly, the government imposed lockdown throughout the country from 26 March, 2020⁷. All the educational institutes were closed by government declaration since 17 March, 2020 until now (June 2021). It was a massive blow to our medical students who totally depends on hands on training to become a competent physician. As the shutdown continued, educational institutions were desperately looking for a way out to overcome this situation and information technology and E-learning gave us some hope. Although the curriculum was mostly dependent on interactive lectures, small group tutorials and hands on clinical skill development through traditional teaching methods, the pandemic situation compelled the medical colleges of our country to deliver all the teaching through E-learning methods.

On the above background, it is important to know the effectiveness of online classes in medical education. While knowledge and skill are equally important for patient care, understanding the effectiveness of IT in medical education will guide us for its proper use in future. Therefore, the current study was aimed at identifying advantage and disadvantage of IT in medical education. The study objectives were to determine the benefits and barriers of teaching-learning process, assessments procedure and overall effectiveness of online classes over face to face classes.

METHODS

This cross sectional study was conducted at the Khulna City Medical College (KCMC) in the city of Khulna, Bangladesh between July 2020 and December 2020. A questionnaire was developed and was pretested on a small group of students and teachers. Then it was converted to online questionnaire using google form for easy access during lockdown situation. Anonymity was maintained throughout the study. The approval of

the study was taken from Ethical Review Committee of KCMC.

The first section of the questionnaire investigated participant's technological devices ownership and the pros and cons of using them. The second part explored the merits and demerits of teaching-learning process in online classes. The next section was formulated to measure the strength and weakness of the assessment methods in online teaching. Fourth and final part was designed to categorize the overall effectiveness of online teaching also including a section for open comments.

All the students and teachers of this college were our study population. Initially they were informed about purpose of this study and they can respond at their convenience within two weeks' time limits. The participation was entirely voluntary. Verbal consent was taken from each participant before sending questionnaire to them through email. After two weeks a gentle reminder was sent through email to increase the response rate.

All numerical data were imported to Microsoft Excel and analyzed using SPSS, version 20 (IBM corporation, Armonk, NY). The descriptive analysis was used to quantify the responses. t test was done in apparently significant number to explore the statistical significance. p value below 0.05 was considered as significant.

RESULTS

Questionnaires were sent to 240 participants. Initial respondents were 59%. After reminder, the number rose to 87%. Among the respondents; 160 were students and 48 were teachers.

Students favored zoom (84.4%) and Google classroom (73.8%), whereas teachers favored zoom (83.4%) and Messenger (70.8%) as preferred IT application for online classes (Table 1). In addition, students and teachers preferred smart phone (96.2% vs 87.5%) followed by laptop computer (90.6% vs 83.3%) respectively as an appropriate digital tools for online classes.

Most of the students and teachers felt connected to each other (82.5% vs 62.5%), can work faster and effectively (75% vs 66.7%) and felt comfortable in using technologies in learning (74.4% vs 54.2%). In contrast, students (65.6%) felt online learning was more enjoyable than teachers (29.2%) (Figure 1). There was significant difference between students (Mean =2.31, SD=0.76) and teacher's (Mean =2.79, SD=0.93) opinion regarding online classes make learning more enjoyable; (t = 2.786, df = 182, p = 0.006).

Table I Preferences of information technology in online classes.

Ratings	Zoom (%)		Google classroom (%)		Email (%)		Facebook live (%)		Messenger (%)	
	Student	Teacher	Student	Teacher	Student	Teacher	Student	Teacher	Student	Teacher
Very good	32.5	54.2	16.3	16.7	15.0	4.2	17.5	4.2	18.8	29.2
Good	51.9	29.2	57.5	37.5	47.5	16.7	51.9	41.9	45.6	41.7
Poor	10.0	16.7	20.0	33.3	28.7	45.8	25.6	45.8	25.6	16.7
Very poor	5.6		6.3	12.5	8.8	33.3	5.0	8.3	10.0	12.5

Poor network (98.1% vs 79.1%) and affordability of mobile data (81.2% vs 66.7%) were the two main barrier among the students and teachers. Additionally, they acknowledged other barrier of using IT were limited computer skill (63.2% vs 54.1%) and the net use (65.0% vs 54.1%) (Table II).

The majority of students and teachers believed that online teaching-learning do not increase student-teacher interaction (51.9% vs 66.7%), do not have better scope of asking question (52.5% vs 70.8%) and less scope of explaining details (52.5% vs 66.7%). Both groups (56.3% vs 51%) thought that online teaching-

learning covers more content. On the other hand, regarding upgrading student's knowledge and skill via online classes most of the students (62.5% & 61.9%) agreed, but the teachers (54.1% & 62.5%) disagreed upon these statement (Table III). However, the results were statistically non-significant (p value = 0.96 vs 0.087). Most students and teachers (89.4% vs 83.3%) believed that oral assessment was the most preferable, and the written was less preferable but practical assessment (78.1% vs 83.3%) was the least preferable method for assessing students' knowledge and skill online (Table IV).

Table II Barriers of teaching-learning in the web.

Ratings	Poor network (%)		Lack of basic computer skills (%)		Limited skill to use the internet (%)		Difficulty in using apps (%)		Affordability of mobile data (%)	
	Student	Teacher	Student	Teacher	Student	Teacher	Student	Teacher	Student	Teacher
Strongly agree	51.2	70.8	16.9	8.3	5.0	20.8	10.6	12.5	30.0	29.2
Agree	46.9	8.3	46.3	45.8	60.0	33.3	51.2	29.2	51.2	37.5
Disagree	1.3	-	33.8	41.7	31.3	33.3	37.5	54.2	16.3	8.3
Strongly disagree	0.6	20.8	3.1	4.2	3.8	12.5	0.6	4.2	2.5	25.0

Table III Comparison between online and traditional teaching-learning process.

Ratings	Student teacher interaction (%)		More coverage content (%)		Easily understandable (%)		Scope of explaining details		Upgrades student's knowledge (%)		Develop ment of skill (%)		Scope of counseling (%)		Scope of asking question (%)	
	Stu	Tea	Stu	Tea	Stu	Tea	Stu	Tea	Stu	Tea	Stu	Tea	Stu	Tea	Stu	Tea
Strongly agree	5.6	12.5	2.5	21.8	6.3	8.3	4.4	16.7	5.0	12.5	5.0	16.7	5.0	12.5	3.8	16.7
Agree	42.5	20.8	53.8	29.2	44.4	41.7	43.1	16.7	57.5	33.3	56.9	20.8	51.2	29.2	43.8	12.5
Disagree	35.0	45.8	36.3	36.5	45.0	37.5	48.1	41.7	33.1	33.3	29.4	37.5	40.0	37.5	45.0	58.3
Strongly disagree	16.9	20.8	7.5	12.5	4.4	12.5	4.4	25.0	4.4	20.8	8.8	25.0	3.8	20.8	7.5	12.5

Table IV Opinion about assessments in online classes.

Ratings	Oral assessment (%)		Written assessment (%)		Practical assessment (%)	
	Student	Teacher	Student	Teacher	Student	Teacher
Very good	16.3	33.3	14.4	12.5	1.3	12.5
Good	73.1	50.0	42.5	37.5	20.6	4.2
Poor	8.1	12.5	31.3	16.7	48.8	16.7
Very poor	2.5	4.2	11.9	33.3	29.4	66.7

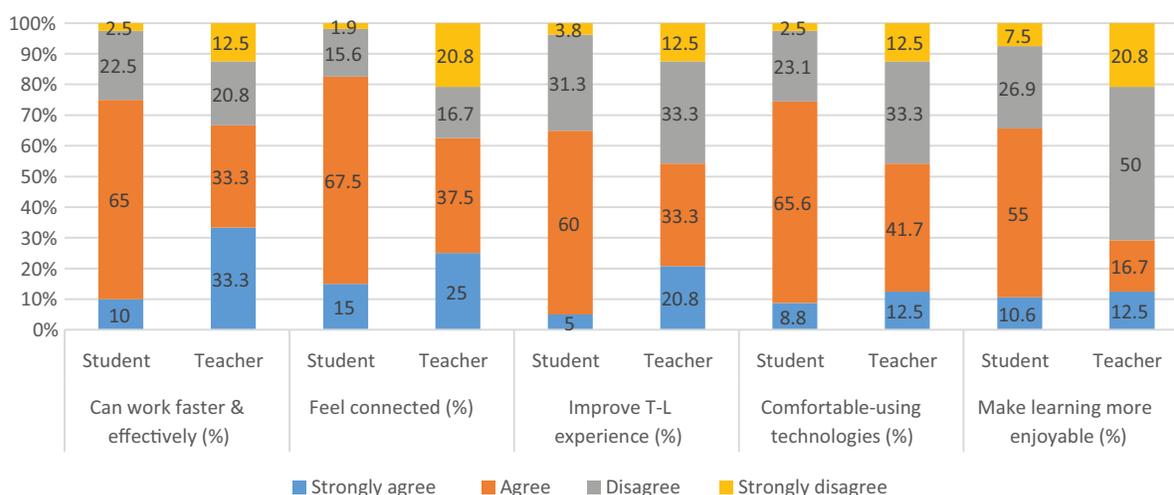


Figure 1 Benefits of IT in medical education.

The preponderance of the students and teachers (58.1% vs 62.5%) scored less than 60 out of 100 (Figure 2). There was no significant difference between students (Mean = 51.37, SD=13.15) and teacher’s (Mean = 54.16, SD = 15.82) opinion about overall effectiveness of online classes over traditional classes ($t = 0.072$; $df = 182$; $p = 0.943$).

In the open comments section, most students and teachers think that it’s a good way to communicate with each other in this pandemic situation (86% vs 72%), so that students can keep in touch with the books and they can get help on studies in this hard time when they have to stay home without any social and physical activities. Moreover, both students and teachers believe that Practical classes are ineffective via online education (78.1% vs 83.3%).

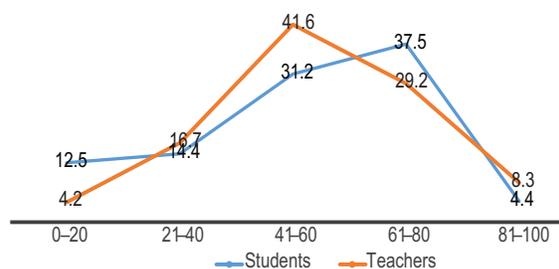


Figure 2 Overall effectiveness of online classes (in percentage)

DISCUSSION

COVID-19 pandemic has driven us to incline completely towards online teaching to continue the medical education process in Bangladesh. The current study explored the strength and weakness of online teaching-learning over traditional classes for undergraduate medical students.

Regarding digital tools for online classes this current study showed most of our students and teachers preferred smartphone (96.2% vs 87.5%) and laptop (90.6% vs 83.3%) as a IT tools and Zoom (84.4% vs 83.4%) as IT media for online classes. Khamis N et al reported that mostly used devices by students were laptops (81.03%), followed by smart phones (77.11%)⁸.

In relation to benefits of IT in medical education the major benefit found in this study was most students and teachers felt connected (82.5% vs 62.5%), comfortable (74.4% vs 54.2%) and could work faster (75% vs 66.7%) using IT through distant learning process. Report from Saudi Medical College highlighted that most of the medical students strongly agreed that IT helps them to work faster (95.5%), felt updated (89.5%), expand knowledge (90.9%), feel connected (61.0%), make learning more creative (85.9%)⁸. Likewise, another study found that e-learning enhances knowledge, skill, and viewpoint at a faster rate than with traditional learning process⁹. These benefits provide scope for incorporating E-learning with traditional teaching to generate a competent life-long learner.

In consideration of barriers of teaching-learning in the web in our study on students and teachers, poor network ((98.1% vs 79.1%)) and affordability of the data (81.2% vs 66.7%) is a prime concern for both the students and teachers to use Information technology. In our country, it is well known that the cost of data is relatively expensive in relation to the socio-economic status of our countrymen. Moreover, the network coverage is poor in the rural areas and Wi-Fi service is not available in most of the remote places. This study revealed that, both students and teachers have limited computer (63.2% vs 54.1%) and the internet using skill (65.0% vs 54.1%). Authors from Europe suggested that to develop students and teacher's IT skills, sufficient and proper use of IT in medical education must be incorporated to provide up-to-date patient care^{10,11}.

While comparing between online and face to face student-teacher interaction our study unfolded that online teaching-learning have less scope of interaction (51.9% vs 66.7%), less scope for asking question (52.5% vs 70.8%) and explained details (52.5% vs 66.7%). In contrast, majority of the participants thought it covers more content (56.3% vs 51%). While considering upgrading knowledge and skill (62.5% & 61.9%) vs

(54.1% & 62.5%) most of the student agreed, but most of the teachers disagreed with the statement. Guri-Rosenblit in his higher education policy suggested that as people need socializing, students prefer face to face classes over online classes even if rich e-learning environment was provided¹². Additionally, the students get easily distracted while attending classes from home by family members and or phone calls, which implies the importance of traditional classes over online classes¹³.

Regarding assessments in online classes in this study, most students and teachers believed that oral assessment (89.4% vs 83.3%) is preferable while assessing students' knowledge. Similarly, oral communication was preferred in psychiatry, when medical students were asked to rate various methods of communication¹⁴. Conversely, most students and teachers here thought that online assessment was the least preferable method for assessing practical skill (78.1% vs 83.3%). However, no similar study was found to compare this data.

Overall effectiveness of online classes compared to face to face teaching-learning in our study revealed that online classes are 40-60% effective compared to traditional classes among students and teachers. In the open comments section, both students and teacher thought that in this pandemic situation, online classes were immensely helpful to carry out their academic pursuit. On the other hand, both students and teachers felt that network problem (98.1% vs 79.2%) and data affordability (81.3% vs 66.7%) were the biggest hurdle and also ineffective practical teaching (78.1% vs 83.3%) were the major setback of online teaching-learning process. Educationist from other parts opined that individual's diversity of learning style could lead to this wide spectrum of opinion.¹⁵

This study is limited by several factors. Firstly, the numbers of teachers were disproportionately small in comparison to students which have affected the significance test. As a new medical college we just have four batches of students, so only preclinical and Para clinical teachers were included in this study. Secondly, we could not compare the results of traditional and online-teaching, so the impression depends on perception only. Lastly, inclusion of one medical college is inadequate for a good inference.

Conclusion

In spite of few barriers like poor network, data affordability and limited computer and net usability, online classes played a crucial role to continue the academic activities in a medical college. Overall effectiveness was 50% ($\pm 10\%$) compared to traditional classes indicating the need for improved teaching methods such as further interaction and more resourceful content.

Recommendations

A large multi institutional study is recommended to design a national guide line to incorporate online teaching-learning in medical curriculum. Meanwhile, the policy makers should take necessary steps to cut down the price of internet for students as well as the internet provider should do everything possible to improve the network.

Authors' contribution: Everyone was actively involved in developing questionnaire, data collection and data analysis. All authors read and approved the final manuscript for submission.

Conflict of interest: Nothing to declare.

Funding: None.

REFERENCES

- Kennedy G, Gray K, Tse J. 'Net generation' medical students: technological experiences of pre-clinical and clinical students. *Med Teach* 2008; 30:10-16.
- Houshyari AB, Bahadorani M, Tootoonchi M, Gardiner J, Pena Z, and Pena R. Medical education and information and communication technology. *J Educ Health Promot* 2012; 1:3.
- Valcke M, De Wever B. Information and communication technologies in higher education: evidence-based practices in medical education. *Med Teach* 2006; 8:40-48.
- Dahlstrom E, Brooks DC, Grajek S, Reeves J. ECAR Study of Students and Information Technology. Research report. Louisville, CO: ECAR. 2015.
- WHO, Rolling updates on coronavirus diseases (COVID-19): 2020, accessed on February 2021, [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen]
- The Business standard, First coronavirus cases detected in Bangladesh; 2020, accessed on February 2021, [https://www.tbsnews.net/bangladesh/health/3-tested-positive-coronavirus-bangladesh-iedcr-53476]
- The Hindu, Bangladesh to extend shutdown till May 30.2020, accessed on February 2021, [https://www.thehindu.com/news/international/bangladesh-to-extend-shutdown-till-may-30/article31579303.ece]
- Khamis N, Aljumaiah R, Alhumaid A, Alraheem H, Alkadi D, Koppel D et al. Undergraduate medical students' perspectives of skills, uses and preferences of information technology in medical education: A cross-sectional study in a Saudi Medical College. *Medical Teacher* 2018; 40: sup1, S68-S76.
- Ruiz JG, Mintzer MJ, Rosanne ML. The impact of e-learning in medical education. *Academic Medicine* 2006; 81, 207-212.
- Srivastava TK, Waghmare LS, Jagzape AT, Rawekar AT, Quazi NZ, and Mishra VP. Role of information communication technology in higher education: learner's perspective in rural medical schools. *J Clin Diagn Res.* 2014; 8: XC01-XC06.
- Bullen M, Morgan T, Belfer K, Qayyum A. The digital learner at BCIT and implications for an e-strategy. Paper presented at the 2008 Research Workshop of the European Distance Education Network (EDEN), Paris, France. October 2008.
- Guri-Rosenblit S. Eight paradoxes in the implementation process of e-learning in higher education. *Higher Education Policy* 2005; 18, 5-29.
- Gerl N. Students' adoption of online video based distance learning. Proceedings of the Chais Conference on Instructional Technologies Research: Learning in the Technological Era, The Open University of Israel, Raanana; 11 February 2011.
- Fitzmaurice B, Armstrong K, Carrol V, Dagger D, and Gill M. Virtual Interviews for Students Interacting Online for Psychiatry (VISION): a novel resource for learning clinical interview skills. *Psychiatric Bulletin* 2007; 31, 218-220.
- Galitz W. *The Essential Guide to User Interface Design*. John Wiley: USA. 2002, 71-75. sease (COVID-19); 2020. [Online]. Accessed: 30 July 2020