

Perception of dental students towards the online method of dental education during the COVID-19 pandemic

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ABSTRACT

Background: The COVID-19 pandemic has changed the education system drastically. The shift from traditional learning to online mode during the quarantine period affected dental education substantially. The present study aimed to determine the impact of online learning on dental education and the potential challenges being faced by the dental students.

Methods: An online survey-based questionnaire was distributed to 103 BDS students and feedback was recorded.

Results: The study yielded a response rate of 57% comprising of female(56%)and male(44%) respondents. The participants were categorized into two groups with age brackets of 22 years& above. Majority of the female students (86.2%) were more inclined towards offline learning than male students (57.8%) ($p = 0.001$). More predilection for offline mode was observed in 83% of the students (>22 years of age) than 66.1%students (<22 years) ($p = 0.05$).BDS 1st (59.6%),2nd (74.1%) 3rd (93.8%)& 4th year (100%) students preferred offline mode for exams ($p = 0.005$). Most of the students (77.7%) including male (86.7%) and female (70.6%) ($p = 0.05$) strongly disagreed to continue E-learning in future. The students (<22 years) (98.2%) were more accessible to the internet than students (>22 years) (93.2%) ($p = 0.02$). The students (>22 years) found more difficulty in using different online platforms (87.2%) than students (<22 years) i.e., 69.6% ($p = 0.03$).BDS 3rd and 4th year (100%) appeared for the exams in greater numbers than BDS 1st year (76.6%) and 2nd year (92.6%) ($p = 0.02$).

Conclusion: Online learning had a detrimental impact on dental education. The students agreed that online mode cannot substitute conventional face-to-face learning.

1. Introduction

The emergence of the COVID 19 pandemic presented with prompt consternation at the global platform. The severity of the COVID 19 outbreak led most of the countries to impose a lockdown. As a consequence, draconian measures were enforced such as restrictions to public transportation, stay home recommendation and restrained social gathering however, essential services and the health care sector remained functional. The ongoing education system was also severely disrupted and led to a temporary closure of most of the universities and educational institutes worldwide, dental education was no exception to this.

Amongst all the health care workers, dental surgeons are at the highest risk of acquiring SARS COV-2 infection which causes COVID 19

as dental health care practitioners are exposed to various fluids like saliva, blood, nasopharyngeal secretions, and other body fluids.^{1,2}

Hence it is a big challenge for the dental institutes to control the spread of coronavirus disease amongst students, patients, and teaching faculty while ensuring continuity of academic courses. Profound efforts were made to continue the academic curriculum through the incorporation of technology-aided electronic (E-learning) platforms.

One of the biggest challenges associated with E-learning from undergraduates' perspective is continuous adaptations to the newer evolving technologies and implications of the same in dental education and practice.³ Acquisition of newer technologies and learning through simulation and virtual reality in dental education are trending nowadays however, the direct face-to-face learning experience cannot be

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substituted.⁴

Very few studies have been conducted in India to assess the impact of the COVID 19 pandemic on dental education and the challenges related to it. Hence the present study was performed to explore the impact of online learning from a student's perspective. The main purpose of the study is to evaluate the impact of the COVID 19 pandemic on dental education and the potential challenges being faced by dental students.

2. Material and methods

A cross-sectional online survey was conducted on all the undergraduate dental students (n = 180) studying at the Faculty of Dentistry, Jamia Millia Islamia. The survey link was distributed electronically among the students.

2.1. Eligibility criteria

All the undergraduate dental students who were willing to participate and have attended online lectures were included in the study. Students who were unwilling and pursuing internship were excluded from the study.

2.2. Study proforma and data collection

The data was collected using an online proforma comprising 18 questions. Question 1 & 2 consisted of demographic details, the remaining were closed-ended questions. The questionnaire comprised of questions designed to assess the following –

1. Educational challenges and impact of online education on dental students
2. The educational experiences affected by online learning

2.3. Statistical analysis

Statistical Package for Social Sciences (SPSS for Windows, version 21) was utilized for data analysis. The summary of the statistics for each survey question was recorded and scores generated were reported as counts (percentages) and mean were calculated for the variables. The statistically significant difference between the groups was evaluated using the Chi-square test. Value of $p < 0.05$ was considered statistically significant and a value of $p < 0.01$ was considered a highly significant difference between the two groups.

3. Results

A total of 180 students were invited to participate in the study, of which 103 participants responded to the online questionnaire, yielding a response rate of 57%. Of the 103 respondents 58 (56%) were females and 45 (44%) were males. The study participants were categorized into two groups with an age range of 22 years and above. The study sample was composed of 47 (46%) the first-year, 27 (26%) second-year, 16 (15%) third-year and 13 (13%) fourth-year dental students (Table 1).

The majority (73.8%) of the students accepted that offline mode is a better mode of learning than E-learning. However, female students (86.2%) were found to be more inclined towards offline learning in comparison to male students (57.8%) and the results were found to be statistically highly significant ($p = 0.001$). Similarly, more predilection for offline mode was observed in 83% of the students (>22 years of age) than online as compared to the younger age group (66.1%) yielding statistically significant results ($p = 0.05$). In addition, all the students of BDS 1st (59.6%), 2nd (74.1%), 3rd (93.8%), and 4th year (100%) gave preference to offline mode for examination and evaluation ($p = 0.005$) yielding statistically highly significant results (Table 3).

More than half (77.7%) of the students including both male (86.7%) and female students (70.6%) ($p = 0.05$) strongly disagreed to continue

Table 1

Demographic characteristics of participating dental students.

STUDY PARTICIPANTS	TOTAL	
	N	%
TOTAL	103	100
Gender		
Male	45	43.7
Female	58	56.3
Age		
<22 years	56	54.3
22 years and above	47	45.6
STUDENT YEAR		
BDS 1 ST Year	47	45.6
BDS 2nd Year	27	26.2
BDS 3rd Year	16	15.5
BDS 4th Year	13	12.6

E-learning as a part of the teaching curriculum in the future.

In addition, the internet connectivity for the online classes was accessible to 93.2% of the students, however, the younger age group (<22 years of age) (98.2%) were found to have more access to the internet as compared to the older one (>22 years of age) (93.2%) ($p = 0.02$).

A significant percentage of students (>22 years of age) presented with more difficulty in using different online platforms (87.2%) as compared to younger students (<22 years) i.e., 69.6% ($p = 0.03$).

All the students appeared for the examination for the academic evaluation during the pandemic period, however, senior dental students appear in greater numbers i.e. BDS 3rd year (100%) and 4th year (100%) whilst less number was observed in BDS 1st year (76.6%) and 2nd year (92.6%) ($p = 0.02$).

Smartphones (81%) was amongst the most common device used by dental students while 19% were using a laptop to attend online lectures. The Majority (94%) of the students regardless of gender or year of study, agreed that they missed offline educational experiences as a result of the lockdown during the COVID-19 period. Although at present, the digital platform remains the only means of learning yet 77% of the students found that the online learning did not provide enough educational content, however, 25% of the students were fully contented with the information provided. 80% of the students were found not friendly with the technology-aided education rest 23% managed to cope up with the same. Moreover, 86% of students felt a lack of confidence in their skills learned through this technology-based education nevertheless 17% were completely assured about their informative skills. 98% of the students felt a lack of interaction with their fellow batchmates (Table 2 and Table 3).

The results of the present study showed that the Laboratory Practical procedures were among the most severely affected experience followed by Clinical training. About 100% BDS 3rd year students followed by 2nd year (96.29%), 1st year (87.23%) and 4th-year students (84.61%) missed their practical procedures on the virtual learning platform. Clinical training was the most adversely affected experience-reported amongst BDS 3rd and 4th-year students (100%). Comprehensive clinical Case presentations were missed by a higher percentage of BDS 3rd (87.5%) and 4th (69.2%) year students, as compared to BDS 2nd (59.2%) and BDS 1st year (57.44%) students.

Regular offline lectures were missed in significantly higher percentages by BDS 3rd (68.75) and BDS 1st year (55.31%) in contrast to BDS 4th year (46.1%) and BDS 2nd year students (48.1%).

Most of the BDS 1st year students found it difficult to understand theoretical subjects such as Anatomy (82.97%), Dental Anatomy, and Dental Histology (38.29%). Similarly, it was troublesome for the BDS 2nd year to comprehend subjects requiring laboratory procedures like Preclinical Conservative dentistry 17(62.96%) and Preclinical prosthodontics 16(59.25%). Also, BDS 3rd year students were completely dissatisfied with their knowledge and skills acquired in subject's

Table 2
Educational challenges and impact of online education on dental students.

S NO.	QUESTIONS	RESPONSE	N (%)
1.	Do you feel that you missed educational experience as a result of the lockdown?	YES NO	97 (94%)
2.	Which device do you prefer to do an online class?	SMARTPHONE LAPTOP	6(6%) 83
3.	Have you encountered any difficulty in using different online platforms?	YES NO	(81%) 20
4.	Do you feel that there was enough content during online presentation?	YES NO	(19%) 80
5.	Do you feel comfortable with all this technology - based education?	YES NO	(78%) 23
6.	Did this quarantine increase your interaction with your colleagues?	YES NO	(22%) 26
7.	Do you have confidence in the skills acquired during this technology- based Education?	YES NO	(25%) 77
8.	Do you want E learning to further be a part of your teaching in future?	YES NO	(75%) 23(%) 80 (78%) 5(5%) 98 (95%) 17 (18%) 86 (82%) 23 (22%) 80 (78%)

particularly General medicine (56.25%) and General surgery 7 (43.75%). (Fig. 1).

A significant percentage of students (68.9%) accepted that the live online lectures had highly deteriorated their clinical or practical knowledge whilst 29.1% students felt it to be less deteriorated and only 1% of the students agreed that it remained the same and relatively got improved further. (Fig. 2).

4. Discussion

Results of the present study showed that 77.7% of the study participants had a negative perception of E-learning. This could be because of lack of in-person interaction, difficulty in maintaining communication either with instructors/mentors or with fellow batchmates, poor or interrupted internet connectivity leading to higher chances of distraction, inability to remain focused for a longer duration. This is in contrast to the previous studies where students had accepted the digital platform and were satisfied with E-learning methods.^{5,6}

Our study showed that the majority of the students (73.8%) preferred attending offline teaching over E-learning which is very similar to findings of the previous studies.⁷ A probable reason could be that Dental education cannot be wholly carried out on the virtual platform as it requires adequate physical settings such as preclinical laboratories and dental clinics. It is difficult for the students to implement the practical aspects of the learned conceptual facts and correlate the same without demonstration or simulation on live study models. In addition, students lacked paramount learning experiences and motor skills, especially the clinical sessions which could be detrimental as dentistry require an adequate amount of clinical practice and patient exposure which was deficient on the online platform of learning.⁸ Another aspect of this finding could be an inability of teachers in a dental college to provide comprehensive training of dentistry through online mode to their students.

The present study also showed that 87.2% of the dental students who were of age 22years and above were reporting more difficulty in online teaching and experienced less satisfaction in using different online

platforms as compared to the younger age group, the probable reason could be due to technology anxiety and lack of experience to handle complicated technology-based online educational platforms in this age group. Since the younger student's generation (<22 years of age) is more tech-savvy and was more accessible to the internet, they encountered less difficulty in handling different online platforms (69.6%) to have more access to the internet. The findings are in agreement with the studies conducted by Sritongthaworn et al. (2006) and Teo et al. (2011) stating that younger students tend to adapt easily to e-learning.^{9,10}

The present survey also found female students (86.2%) as compared to male students (57.8%) were more inclined towards attending face-to-face learning as compared to E-learning. It is difficult to explain this tendency, however, considering, gender psychology, it has been reported that females tend to possess technology anxiety.¹¹ Previous studies also reported that females tend to have more apprehension and negative approach towards technology (internet, computers) as compared to males.¹² Therefore, females are ambiguous about the extensive use of newer technologies and tend to follow a conventional approach towards learning.

In addition, most of the dental students who were above 22 years of age (83%) belonging to BDS 3rd and 4th-year batches preferred offline learning as compared to online classes, this could be attributed to the fact that they need to acquire clinical skills in dental practice-based training on their theoretical and procedural knowledge. Hence to develop such skills, they require both clinical exposures as well as laboratory sessions to enhance the understanding of the clinical subjects but the execution of the same was hindered due to the COVID pandemic, resulting in an inability to develop motor skills. Also, students got less chance to discuss case-based clinical studies with the instructors which would have been possible under normal circumstances. Our results showed that students lacked the confidence in performing clinical procedures independently. The results are consistent with studies documented by Hattar et al.¹³

Smartphone has turned out to be one of the most popular devices among students for E-learning platform as compared to laptops and tablets.¹⁴ Our study showed that 81% of students preferred smartphones as their main device which is consistent with the results of the previous studies.¹⁵ The possible reason for this could be the easy handling of the smartphone and their E-learning can take place anytime and anywhere.

Despite the odds, students managed to adapt to online learning, yet the majority of the students agreed that the overall teaching experience and learning experience are inferior to offline mode. The students believed that they were not able to acquire the appropriate motor skills because of COVID lockdown. Missed clinical learning experience, lack of clinical exposure, and patient management were among the major concerns of the students from a future perspective.

One of the limitations of the study is that it is a cross-sectional survey hence lacking the ability to assess change in perception towards online teaching among dental students over a period of time. The sample population has been drawn from a single dental college which is limited to a specific geographic region. Therefore, the results of the study cannot be generalized, however, this study provides baseline data for future surveys on a larger sample covering different regions of India.

5. Conclusions

The major transformation during the COVID pandemic was the shift of the entire education system from traditional to virtual mode. Although in this era of tech-savvy generation, information and communication technology in students' daily lives has not always resulted in enriched learning. Our findings indicate that majority of the students preferred face-to-face learning. Most of the students find it difficult to cope up with technology-aided learning and encounter glitches with the internet connectivity while using various online platforms. A significant proportion of students felt a lack of communication among their colleagues. Thus, this study provides evidence that the

Table 3
Educational challenges and impact of online education on dental students.

QUESTION	OVERALL (%)	GENDER		AGE		STUDENT YEAR			
	N = 103 (100%)	MALE N = 45	FEMALE N = 58	<22YEARS N = 56	>22 YEARS N = 47	1 ST Year N = 47	2 ND Year N = 27	3 RD Year 16	4 TH Year N = 13
Which mode do you prefer for your exam?	76(73.8%)*	26	50(86.2%)*	37(66.1%)	39	28	20	15	13
Offline	27(26.2%)	(57.8%)*	8(13.8%)	*	(83.0%)*	(59.6%)*	(74.1%)*	(93.8%)*	(100%)*
Online		19 (42.2%)		19(33.9%)	8(17.0%)	19 (40.4%)	7(25.9%)	1(6.3%)	0(0%)
Do you want E learning to further be a part of your teaching in future?	23(22.3%)*	6(13.3%)	17(29.3%)*	12(21.4%)	11	8(17%)	8(29.6%)	2(12.5%)	5(38.5%)
Yes	80(77.7%)	*	41(70.6%)	44(78.6%)	36	39(83%)	19 (70.4%)	14 (87.5%)	8(61.5%)
No		39 (86.7%)			36 (76.6%)				
Do you have an access to the internet for online classes?	96(93.2%)*	41	55(94.8%)	55(98.2%)	41	42	27(100%)	14	13
Yes	7(6.8%)	(91.1%)	3(5.1%)	*	(93.2%)*	(89.4%)	0(0%)	(87.5%)	(100%)
No		4(8.8%)		1(1.8%)	6(6.8%)	5(10.6%)		2(12.5%)	0(0%)
Have you encountered any difficulty in using different online platforms?	80(77.6%)	38	42(72.4%)	39(69.6%)	41	35	18	16(100%)	11
Yes	23(22.3%)	(84.4%)	16(27.5%)	*	(87.2%)*	(74.5%)	(66.7%)	0(0%)	(84.6%)
No		7(15.5%)		17(30.4%)	6(12.8%)	12 (25.5%)	9(33.3%)		2(15.4%)
Have you appeared for the examination during this pandemic?	90(87.3%)	39	51(87.9%)	48(85.7%)	42	36	25	16	13
Yes	13(12.6%)	(86.6%)	7(12.06%)	8(14.3%)	(89.4%)	(76.6%)*	(92.6%)*	(100%)*	(100%)*
No		6(13.3%)			5(10.6%)	11 (23.4%)	2(7.4%)	0(0%)	0(0%)
Do you feel that you missed educational experience as a result of lockdown?	97(94.1%)	41	56(96.5%)	53(94.6%)	44	43	26	16(100%)	12
Yes	6(5.8%)	(91.1%)	2(3.4%)	3(5.4%)	(93.6%)	(91.4%)	(96.3%)	0(0%)	(92.3%)
No		4(8.8%)			3(6.4%)	4(8.5%)	1(3.7%)		1(7.7%)
Do you feel that there was enough content during online presentation?	25(24.2%)	10	15(25.8%)	10(17.9%)	15	12	5(18.5%)	2(12.5%)	6(46.2%)
Yes	78(75.7%)	(22.2%)	43(74.1%)	46(82.1%)	(31.9%)	(25.5%)	22 (81.5%)	14 (87.5%)	7(53.8%)
No		35 (77.7%)			32 (68.1%)	35 (74.5%)			
Do you feel comfortable with all this technology-based education?	23(22.3%)	7(15.5%)	16(27.5%)	14(25%)	9(19.1%)	11	7(25.9%)	1(6.3%)	4(30.8%)
Yes	80(77.6%)	38	42(72.4%)	42(75%)	38	(23.4%)	20 (74.1%)	15 (93.8%)	9(69.2%)
No		(84.4%)			(80.9%)	36 (76.6%)			
Did this quarantine increase your interaction with your colleagues?	5(4.8%)	0(0%)	5(8.6%)	4(7.1%)	1(2.1%)	3(6.4%)	1(3.7%)	0(0%)	1(7.7%)
Yes	98(95.1%)	45(100%)	53(91.3%)	52(92.9%)	46	44	26	16(100%)	12
No					(97.9%)	(93.6%)	(96.3%)		(92.3%)
Do you have confidence in the skills acquired during this technology-based education?	17(16.5%)	5(11.1%)	12(20.6%)	9(16.1%)	8(17.0%)	8(17%)	4(14.8%)	1(6.3%)	4(30.8%)
Yes	86(83.4%)	40	46(79.3%)	47(84.0%)	39	39(83%)	23 (85.2%)	15 (98.3%)	9(69.2%)
No		(88.8%)			(83.0%)				
Which device do you prefer to do an online class?	83(80.5%)	37	46(79.3%)	43(76.8%)	40	36	23	15	9(69.2%)
Smart phone laptop	20(19.4%)	(82.2%)	12(20.7%)	13(23.2%)	(85.1%)	(76.6%)	(85.2%)	(93.8%)	4(30.8%)
		8(17.8%)			7(14.9%)	11 (23.4%)	4(14.8%)	1(6.3%)	

*statistically significant difference p < 0.005, highly significant p < 0.001, chi square test.

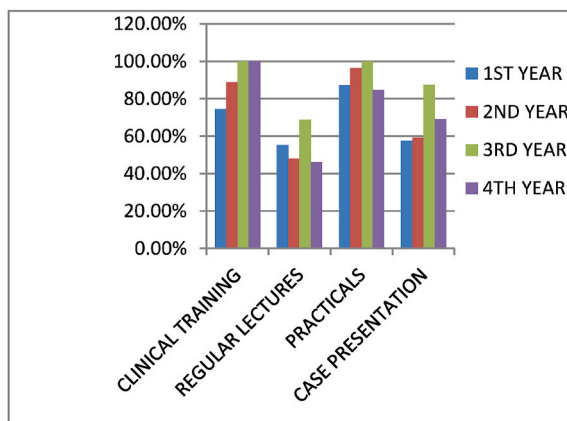


Figure 1. The educational experiences affected by online learning on BDS 1st, 2nd, 3rd and 4th year students.

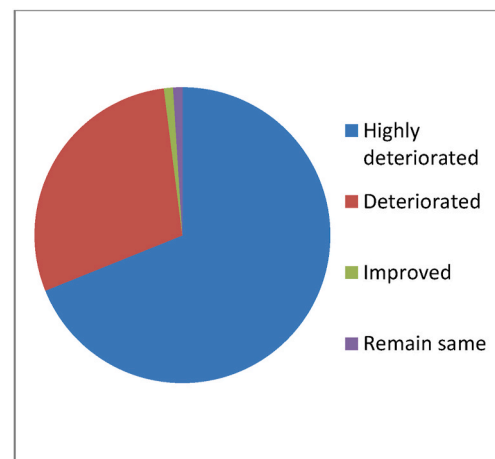


Fig. 2. Impact of online education.

students have a negative attitude towards E-learning and have accepted it only partially.

Declaration of competing interest

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jobcr.2022.02.002>.

References

- 1 CDC. *Considerations for Institutes of Higher Education*. CDC; 2020. May 31, 2020 https://www.cdc.gov/coronavirus/2019-ncov/community/colleges_universities/considerations.html.
- 2 Sabino-Silva R, Jardim ACG, Siqueira WL. Coronavirus COVID19 impacts to dentistry and potential salivary diagnosis. *Clin Oral Invest*. 2020;24(4):1619–1621. PMID: 32078048.
- 3 Zitzmann NU, Matthisson L, Ohla H, Joda T. Digital undergraduate education in dentistry: a systematic review. *Int J Environ Res Publ Health*. 2020;17(9):3269.
- 4 Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on Education and mental health of students and academic staff. *Cureus*. 2020;12(4), e7541.
- 5 Mamattah RS. *Students' Perceptions of E-Learning*; 2016. Available online: <https://www.diva-portal.org/smash/get/diva2:925978/FULLTEXT01.pdf>.
- 6 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. <https://doi.org/10.12669/pjms.36.COVID19-S4.2766> (COVID19-S4): COVID19-S57-S61.
- 7 Quinn B, Field J, Gorter R, et al. COVID-19: the immediate response of European academic dental institutions and future implications for dental education. *Eur J Dent Educ*. 2020;1–4. <https://doi.org/10.1111/eje.12542>, 00.
- 8 Siritongthaworn S, Krairit D, Dimmitt NJ, et al. The study of e-learning technology implementation: a preliminary investigation of universities in Thailand. *Educ Inf Technol*. 2006;11:137–160. <https://doi.org/10.1007/s11134-006-7363-8>.
- 9 Teo T, Luan WS, Thammetar T, Chattiwat W. Assessing e-learning acceptance by university students in Thailand. *Australas J Educ Technol*. 2011;27(8). <https://doi.org/10.14742/ajet.898>.
- 10 Ndubisi ON. Gender differences in entrepreneurial traits, perceptions, and usage of information and communication technologies. *Acad Entrepreneursh J*. 2008;14(2): 107e12.
- 11 Broos A. Gender and information and communication technologies (ICT) anxiety: male self-assurance and female hesitation. *Cyberpsychol Behav*. 2005;8(1):21e3.
- 12 Hattar S, AlHadidiA, Sawair FA, Alraheem IA, El-Ma'aita A, Wahab FK. Impact of COVID-19 pandemic on dental education: online experience and practice expectations among dental students at the University of Jordan. *BMC Med Educ*;21: 151.
- 13 E-Learning Yilmaz O. Students input for using mobile devices in science instructional settings. *Edu Learn*. 2016;5:182. doi: 10.5539/jel.v5n3p182.
- 14 Roberts N, Rees M. Student use of mobile devices in university lectures. *Australas J Educ Technol*. 2014;30:4. <https://doi.org/10.14742/ajet.589>.
- 15 Murphy A, Farley H, Lane M, Hafeez-Baig A, Carter B. Mobile learning anytime, anywhere: what are our students doing? *Australas J Inf Syst*. 2014;18(3). <https://doi.org/10.3127/ajis.v18i3.1098>.